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Systematics of the *keyserlingii* group of *Diplocentrus* Peters, 1861 (Scorpiones: Diplocentridae), with descriptions of three new species from Oaxaca, Mexico

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AND LORENZO PRENDINI³

ABSTRACT

The scorpion genus *Diplocentrus* Peters, 1861, comprising more than 50 species, most of which are endemic to Mexico, is the most diverse in the family Diplocentridae Karsch, 1880 (Santibáñez-López et al., 2011). Hoffmann (1931) divided the Mexican species into two groups, the *whitei* group and the *keyserlingi* group, based largely on differences in size and coloration. Francke (1977) redefined these groups. The *whitei* group, renamed the *mexicanus* group because it included the type species of the genus, comprised species with short cheliceral fingers and the pedipalp femur wider than high. The *keyserlingii* group comprised species with long cheliceral fingers and the pedipalp femur higher than wide. Several new species of *Diplocentrus* were since described, but no attempt was made to synthesize the taxonomy of the species assigned to either group or further clarify the validity of the groups. In the present contribution, the species of *Diplocentrus* with the pedipalp femur higher than wide are reviewed. An operational diagnosis is provided for the *keyserlingii* group. *Diplocentrus formosus* Armas and Martín-Frías, 2003, previously synonymized with *Diplocentrus tehuano* Francke, 1977, is reinstated. Revised, updated diagnoses are provided for all previously described species and three new species, *Diplocentrus*

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kraepelini, n. sp., *Diplocentrus sagittipalpus*, n. sp., and *Diplocentrus sissomi*, n. sp., are described. The female of *Diplocentrus mitlae* Francke, 1977, is described for the first time. A dichotomous key is provided for identification of the 10 species in the *keyserlingii* group.

KEY WORDS: Scorpiones, Diplocentridae, *Diplocentrus*, systematics, Nearctic, Mexico.

INTRODUCTION

The scorpion genus *Diplocentrus* Peters, 1861, comprising more than 50 species, most of which are endemic to Mexico, is the most diverse in the family Diplocentridae Karsch, 1880 (Santibáñez-López et al., 2011). Hoffmann (1931) divided the Mexican species into two groups, the *whitei* group and the *keyserlingii* group, based largely on differences in size and coloration. Francke (1977) redefined these groups in a key to identification of the *Diplocentrus* species occurring in the Mexican state of Oaxaca. The *whitei* group, renamed the *mexicanus* group because it included the type species of the genus, *Diplocentrus mexicanus* Peters, 1861, comprised species with short cheliceral fingers and the pedipalp femur wider than high. The *keyserlingii* group comprised species with long cheliceral fingers and the pedipalp femur higher than wide. Francke (1978) realized that this distinction was problematic, however, because the diagnostic characters of the pedipalp femur were also used to separate other genera in subfamily Diplocentrinae Karsch, 1880. Several new species of *Diplocentrus* were since described (e.g., Stockwell, 1988; Sissom, 1994; Armas and Martín-Frías, 2000; Santibáñez-López et al., 2011), but no attempt was made to synthesize the taxonomy of the species assigned to either group or to further clarify the validity of the groups.

In the present contribution, the species of the *keyserlingii* group of *Diplocentrus* are reviewed (fig. 1). An operational diagnosis is provided for the group, but its monophyly is not assumed, pending further investigation of phylogenetic relationships within the genus. *Diplocentrus formosus* Armas and Martín-Frías, 2003, previously synonymized with *Diplocentrus tehuano* Francke, 1977, is reinstated. Revised, updated diagnoses are provided for all previously described species and three new species, *Diplocentrus kraepelini*, n. sp., *Diplocentrus sagittipalpus*, n. sp., and *Diplocentrus sissomi*, n. sp., are described. The female of *Diplocentrus mitlae* Francke, 1977, is described for the first time. A dichotomous key is provided for identification of the 10 species in the *keyserlingii* group.

METHODS

New material reported in the present contribution was collected during the course of several field expeditions in Mexico, mostly in the state of Oaxaca, between 2004 and 2009. Most of the vegetation types and altitudinal ranges occurring in the state were surveyed, and the type localities of all previously described species of *Diplocentrus* were visited.

Scorpions were collected mostly at night with ultraviolet (UV) light detection (Sissom et al., 1990). Fossorial species of *Diplocentrus* were captured doorkeeping at their burrow entrances, by snatching them with forceps. When attempts to snatch individuals retreating into their burrows were unsuccessful, burrow locations were marked and the burrows excavated the following day. Lithophilous species of *Diplocentrus*, inhabiting rock crevices, were collected in a similar manner.



FIGURE 1. *Diplocentrus keyserlingii* group, microhabitat and representative species. A. *Diplocentrus hoffmanni* Francke, 1977, burrow entrance. B. *Diplocentrus sissomi*, n. sp., female with brood in burrow under stone. C. *D. hoffmanni*, ♂. D. *Diplocentrus mitlae* Francke, 1977, ♂. E. *Diplocentrus rectimanus* Pocock, 1898, ♂. F. *D. sissomi*, n. sp., ♀.

Scorpions were also collected during the daytime, by turning rocks and excavating burrows, which are easily identified from those of other fossorial arthropods by their oval entrances (Lamoral, 1979; Polis, 1990; Prendini et al., 2003; Quijano-Ravell et al., 2012; fig. 1A).

Material is deposited in the following collections: American Museum of Natural History, New York (AMNH), with tissue samples stored in the Ambrose Monell Cryocollection (AMCC); Natural History Museum, London, UK (BMNH); Colección “Luis F. de Armas,” Instituto Tecnológico del Valle de Oaxaca, Mexico (CALA); Colección Nacional de Arácnidos,

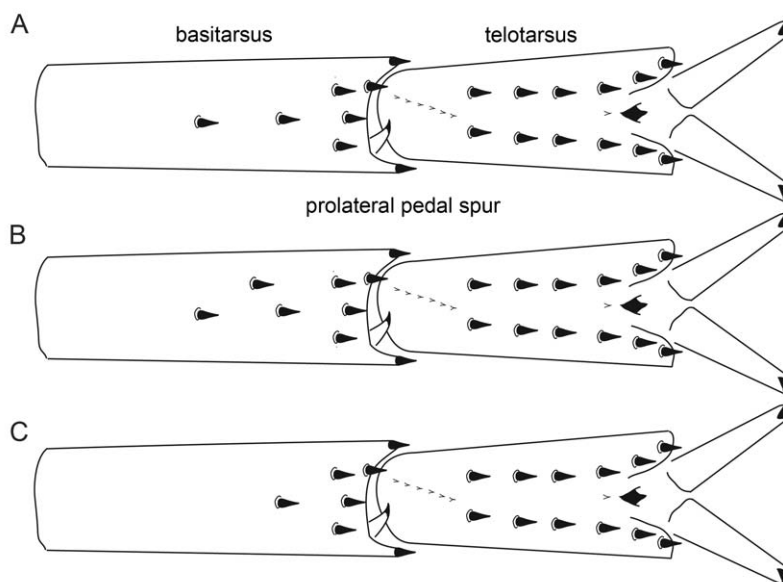


FIGURE 2. Number and distribution of spiniform macrosetae on ventral surface of basitarsi of third and fourth legs in *Diplocentrus mexicanus* group (A, B) and *Diplocentrus keyserlingii* group (C). A. Three terminal, one subterminal and one medial spiniform macrosetae. B. Three terminal, two subterminal and one medial spiniform macrosetae. C. Three terminal and one subterminal spiniform macrosetae.

Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City (CNAN); Eliezer Martín-Frías Private Collection, Mexico City (EMF); Instituto de Ecología y Sistemática, Academia de Ciencias de Cuba, Havana (IES); Museum of Comparative Zoology, Harvard University, Cambridge, MA, (MCZ); Museum für Naturkunde, Berlin, Germany (ZMB).

Geographical coordinates of collection localities were recorded in the field with a GARMIN eTREX H GPS device. Localities without geographical coordinates were retroactively georeferenced using the INEGI (2011) Archivo Histórico de Localidades dataset. Distribution maps were generated in ArcView Ver. 3.2 (ESRI) using the locality coordinates, a base map from the CONABIO (2011) digital database, and a digital elevation model from the CGIAR Consortium for Spatial Information (Jarvis et al., 2008).

Observations were made using Nikon SMZ-800 and SMZ-1500 stereomicroscopes. Measurements, given in millimeters, were obtained with an ocular micrometer calibrated at 10X. Hemispermatothores were dissected following Vachon (1952), and cleared with pancreatin. Digital images were taken under visible and UV light with a Microptics ML-1000 digital imaging system, equipped with a Nikon DS80 camera, or a Nikon SMZ-800 with Nikon Coolpix S10 VR camera attachment. The focal planes of image stacks were fused with CombineZM (Hadley, 2008) and composite images edited with Adobe Photoshop.

Scorpion higher classification follows Prendini and Wheeler (2005). Nomenclature and mensuration follows Stahnke (1970b), except for hemispermatothore (San Martín, 1963), trichobothria (Vachon, 1974), carination of the metasoma (Francke, 1977) and pedipalps (Prendini, 2000), and carapace surfaces (Prendini et al., 2003). The ventrosubmedian spiniform macrosetae on the

leg telotarsi (tarsomeres), counts of which have long been used as species-level diagnostic characters in Diplocentridae, were incorrectly referred to as “spines” by some authors (e.g., Francke, 1977; Armas and Martín-Frías, 2003; Francke and Ponce Saavedra, 2005) prior to Francke and Quijano-Ravell (2009). Lamoral (1979) first pointed out that these articulated structures are setae, rather than spines or spinules (fixed cuticular projections), an observation that was later corroborated (e.g., Williams and Savary, 1991; Prendini, 2000; McWest, 2009). Spiniform macrosetae on the leg basitarsi, informative in the systematics of Scorpionidae Latreille, 1802 (Prendini et al., 2003), were not previously studied in Diplocentridae. The configuration of spiniform macrosetae on the basitarsi of the third and fourth legs is informative at the generic level in Diplocentridae and within the *Diplocentrus*, providing a diagnostic character for the *keyserlingii* group (fig. 2).

SYSTEMATICS

Family Diplocentridae Karsch, 1880

Genus *Diplocentrus* Peters, 1861

Diplocentrus Peters, 1861: 512, type species by subsequent designation (Stahnke, 1976; Francke, 1977):
Diplocentrus mexicanus Peters, 1861.

Diplocentrus Peters, 1861: 512; Thorell, 1876: 12; Pocock, 1893: 393; Kraepelin, 1894: 12, 13 (part); Laurie, 1896a: 193; 1896b: 128; Kraepelin, 1899: 99, 100 (part); Pocock, 1902: 2, 3; Birula, 1917a: 162, 190; 1917b: 58, 108; Mello Campos, 1924: 290 (part); Ewing, 1928: 4; Hoffmann, 1931: 303–305; Kästner, 1941: 234; Bücherl, 1971: 323 (part); Vachon, 1974: 914, 916; Francke, 1977: 145, 146; 1978: 3–5, 23, 32, 33, 55; 1985: 7, 17, 20; Stockwell, 1988: 154, 155; Sissom, 1990: 120, 121 (part); Nenilin and Fet, 1992: 9 (part); Stockwell, 1992: 441, 412, 420, fig. 2, 9, 18, 20; Kovařík, 1998: 130; Sissom and Fet, 2000: 336–344; Beutelspacher, 2000: 25–36; Francke, 2007: 72; Santibáñez-López et al., 2011: 4.

Didymocentrus: Caporiacco, 1938: 252.

Diplocentrus keyserlingii group

Figures 1–19

Diplocentrus keyserlingi group: Hoffmann, 1931: 303, 318.

Diplocentrus keyserlingii group: Francke, 1977: 147, 148; 1978: 5, 23, 32, 33, 55; Sissom, 1994: 257–266.

DIAGNOSIS: Species of the *keyserlingii* group may be distinguished from other species of *Diplocentrus* by the following characters (fig. 1C–F). The length of the cheliceral movable finger is greater than the length of the manus and the length of the fixed finger is greater than the width of the manus in the *keyserlingii* group, whereas the length of the movable finger is less than the length of the manus and the length of the fixed finger is less than the width of the manus in other species of *Diplocentrus*. The height of the pedipalp femur is greater than its width and the dorsal surface of the femur is slightly to markedly convex in the *keyserlingii* group, whereas the height of the femur is less than its width and the dorsal surface of the femur is flat or shallowly convex in other species of *Diplocentrus*. The pedipalp chela ventrointernal carina is weakly to moderately developed, and not infuscated in the *keyserlingii* group, but moderately to strongly developed and

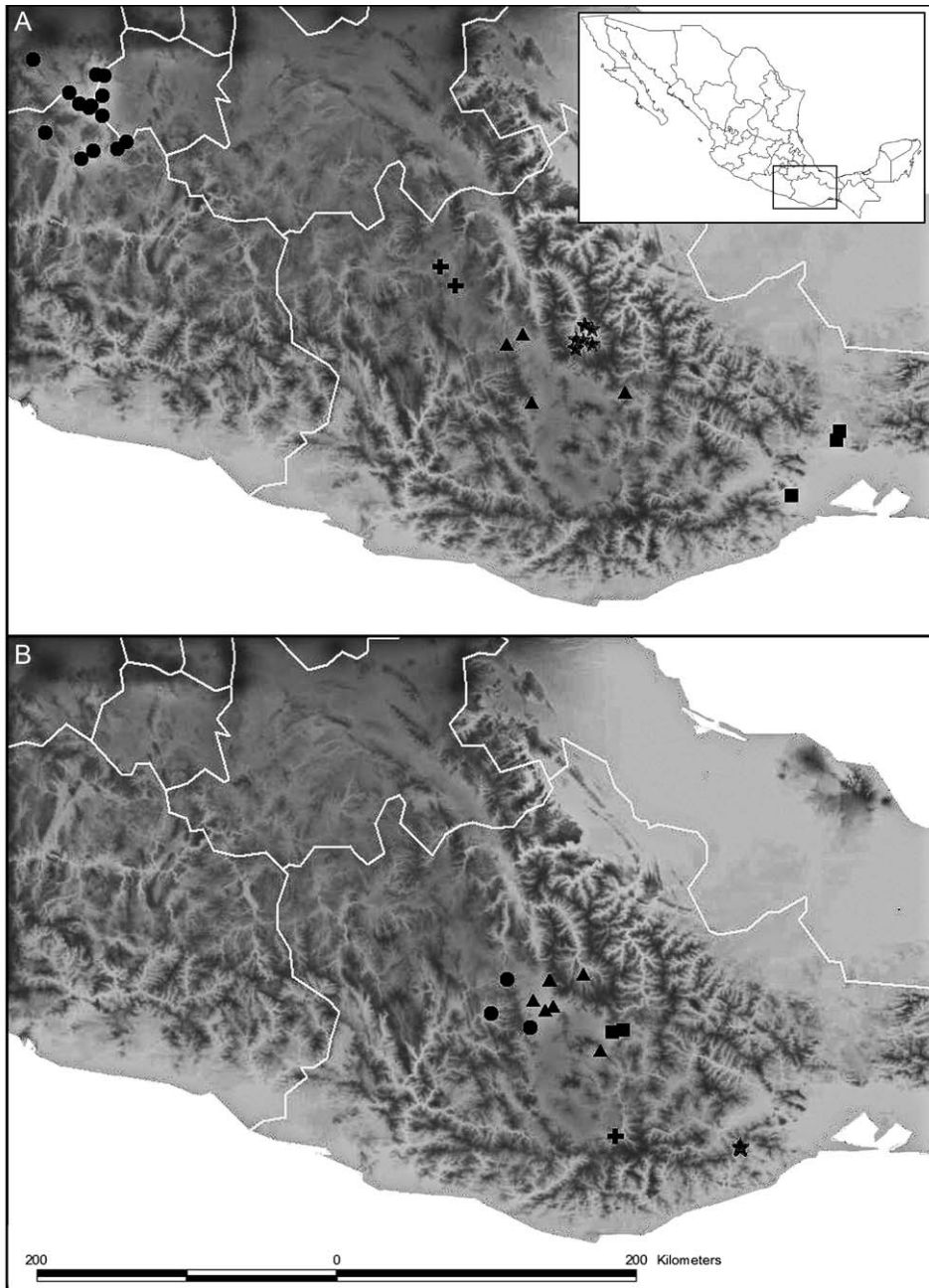


FIGURE 3. *Diplocentrus keyserlingii* group, known records in central Mexico. **A.** *Diplocentrus coylei* Fritts and Sissom, 1996 (circles); *Diplocentrus formosus* Armas and Martín-Frías, 2003 (squares); *Diplocentrus hoffmanni* Francke, 1977 (triangles); *Diplocentrus kraepelini*, n. sp. (crosses); *Diplocentrus sagittipalpus*, n. sp. (stars). **B.** *Diplocentrus keyserlingii* Karsch, 1880 (circles); *Diplocentrus mitlae* Francke, 1977 (squares); *Diplocentrus rec-timanus* Pocock, 1898 (cross); *Diplocentrus sissomi*, n. sp. (triangles); *Diplocentrus tenango* Santibáñez-López and Francke, 2008 (star).

densely infuscated in other species of *Diplocentrus*. The ventral surfaces of the basitarsi of legs III and IV each possess three terminal and one subterminal spiniform macrosetae in the *keyserlingii* group (fig. 2C), but three terminal, one or two subterminal, and one medial spiniform macrosetae in other species of *Diplocentrus* (fig. 2A, B).

INCLUDED SPECIES: Ten species are included in the *keyserlingii* group as defined above: *Diplocentrus coylei* Fritts and Sissom, 1996; *Diplocentrus formosus* Armas and Martín-Frías, 2003; *Diplocentrus hoffmanni* Francke, 1977; *Diplocentrus keyserlingii* Karsch, 1880; *Diplocentrus kraepelini*, n. sp.; *Diplocentrus mitlae* Francke, 1977; *Diplocentrus rectimanus* Pocock, 1898; *Diplocentrus sagittipalpus*, n. sp.; *Diplocentrus sissomi*, n. sp.; *Diplocentrus tenango* Santibáñez-López and Francke, 2008.

DISTRIBUTION: Species of the *keyserlingii* group are recorded from four states of central Mexico: Estado de México, Guerrero, Morelos, and Oaxaca (fig. 3).

KEY TO THE SPECIES IN THE *KEYSERLINGII* GROUP OF GENUS *DIPLOCENTRUS*

- 1 Cheliceral movable finger length less than or equal to manus length, fixed finger length less than or equal to manus width; pedipalp femur width greater than height, dorsal surface flat to shallowly convex; pedipalp chela ventrointernal carina strongly developed, infuscated; legs III and IV, basitarsi each with three terminal, one or two subterminal, and one medial spiniform setae on ventral surface (fig. 2A, B)..... *mexicanus* group
- Cheliceral movable finger length greater than manus length, fixed finger length greater than manus width; pedipalp femur height greater than width, dorsal surface slightly to markedly convex; pedipalp chela ventrointernal carina weakly to moderately developed, not infuscated; legs III and IV, basitarsi each with three terminal and one subterminal spiniform macrosetae on ventral surface (fig. 2C) 2 (*keyserlingii* group)
- 2 Legs III and IV, telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 5/5:5/5–6 3
- Legs III and IV, telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 6–7/6–7:6–7/6–74
- 3 Pedipalp chela manus rounded, dorsal surface strongly reticulate; fingers similar length to manus (fig. 5A)*D. keyserlingii*
- Pedipalp chela manus slender, dorsal surface smooth; fingers longer than manus (fig. 5B)*D. mitlae*
- 4 Pedipalp patella, dorsomedian carina granular (♂); pedipalp chela manus, dorsal surface granular (♂, ♀), digital carina granular, weakly developed, dorsal secondary, digital and external secondary carinae similarly developed (fig. 12) *D. formosus*
- Pedipalp patella, dorsomedian carina smooth (♂); pedipalp chela manus, dorsal surface smooth to reticulate (♂), digital carina smooth to slightly granular, strongly developed, dorsal secondary and external secondary carinae less developed than digital carina (fig. 6).....5

- 5 Pedipalp chela, fixed finger straight or shallowly curved (δ); manus, dorsal surface granular (φ), digital carina moderately developed, granular, dorsal secondary and external secondary carinae weakly developed, granular (φ)6
 – Pedipalp chela, fixed finger gently curved (δ); manus, dorsal surface smooth or faintly reticulate (φ), dorsal secondary, digital and external secondary carinae weakly developed to obsolete, smooth (φ) 7
- 6 Carapace coloration (adult), brown to pale brown; pedipalp coloration paler than, and contrasting with carapace coloration; pedipalp patella, dorsoexternal carina weakly developed to obsolete, smooth (δ); pedipalp chela, fixed and movable fingers shallowly curved (δ ; fig. 6A) *D. rectimanus*
 – Carapace coloration (adult), reddish to ferruginous; pedipalp coloration similar to, and not contrasting with carapace coloration; pedipalp patella, dorsoexternal carina moderately developed, weakly granular to crenulate (δ); pedipalp chela, fixed and movable fingers straight (δ ; fig. 16A)*D. sagittipalpus*, n. sp.
- 7 Legs III and IV, telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 7/7:7/7*D. tenango*
 – Legs III and IV, telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 6/6:6/6–7 8
- 8 Pectinal tooth counts, 14–16 (δ), 11–13 (φ) *D. coylei*
 – Pectinal tooth counts, 8–12 (δ), 6–10 (φ) 9
- 9 Pedipalp chela manus, dorsal surface weakly reticulate (φ), digital carina smooth (φ) to granular (δ), manus rounded (δ ; fig. 4B) *D. hoffmanni*
 – Pedipalp chela manus, dorsal surface smooth (φ), digital carina smooth to crenulate, manus slender (δ)10
10. Base coloration (adult), brown to orange-brown; carapace anteromedian notch U-shaped (fig. 7B); pedipalp patella, dorsoexternal carina weakly developed to obsolete, smooth to slightly crenulate (δ); pedipalp chela manus slender, dorsal surface strongly reticulate (δ), dorsal secondary and external secondary carinae weakly developed, smooth (δ), fingers curved *D. kraepelini*, n. sp.
 – Base coloration (adult), reddish orange; carapace anteromedian notch V-shaped (fig. 7D); pedipalp patella, dorsoexternal carina weakly to moderately developed, crenulate (δ); pedipalp chela manus rounded, dorsal surface granular-reticulate (δ), dorsal secondary and external secondary carinae weakly to moderately developed, crenulate (δ), fingers shallowly curved *D. sissomi*, n. sp.

Diplocentrus coylei Fritts and Sissom, 1996

Figure 4A; tables 1, 2

Diplocentrus coylei Fritts and Sissom, 1996: 43–47, figs. 8–14; Kovařík, 1998: 130; Beutelspacher, 2000: 27; Sissom and Fet, 2000: 337; Teruel, 2003: 54 (part); Francke and Ponce-Saavedra, 2005: 52 (part); Armas, 2006: 11 (part); Santibáñez-López et al., 2011: 4–5.

Diplocentrus malinalco Armas and Martín-Frías, 2000: 75, 76 (synonymized by Armas, 2006: 11).

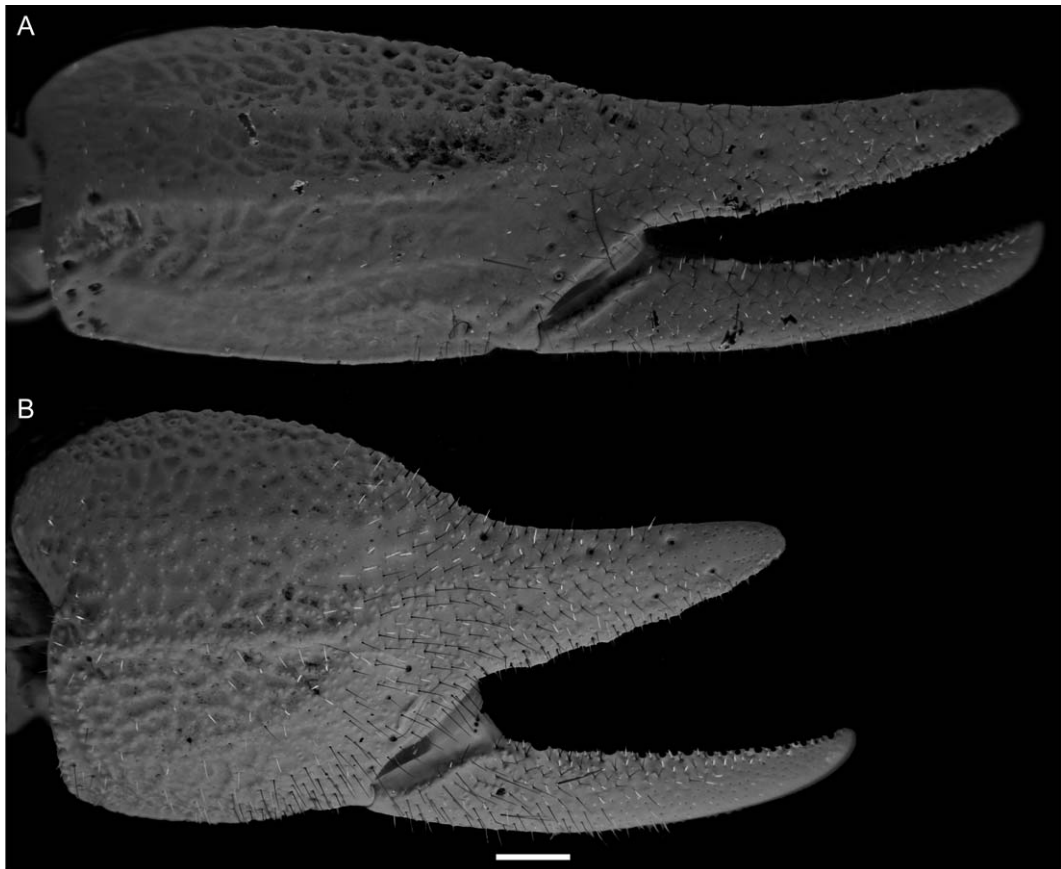


FIGURE 4. *Diplocentrus keyserlingii* group, dextral pedipalp chela, dorsoexternal aspect. **A.** *Diplocentrus coylei* Fritts and Sissom, 1996, ♂ (AMNH). **B.** *Diplocentrus hoffmanni* Francke, 1977, ♂ (CNAN). Scale bar = 1 mm.

TYPE MATERIAL: MEXICO: ESTADO DE MÉXICO: Municipio de Malinalco: Holotype ♂ [*Diplocentrus malinalco*] (IES), De la Vega [18°56.9'N 99°29.68'W], xi.1959 [not examined]. **GUERRERO: Municipio de Pilcaya:** Holotype ♂ (MCZ), 1 juv. paratype (AMNH), Grutas de Cacahuamilpa [18°40'N 99°30'W], outside the caves, 8.vi.1982, F. Coyle [not examined]; 1 ♂, 1 ♀, 1 juv. paratypes (AMNH), Cacahuamilpa, 4 mi. W [18°41'N 99°34'W], summit, 3.ix.1966, J. and W. Ivie. **Municipio de Taxco de Alarcón:** 1 ♂, 1 ♀ paratypes (AMNH), Las Granadas [18°57'N 99°51'W], 12.vii.1980, E. Martin and R. Garcia.

ADDITIONAL MATERIAL: MEXICO: ESTADO DE MÉXICO: Municipio de Malinalco: Chichicasco, 18°51.369'N 99°28.123'W, 1374 m, 25.vii.2002, E. González, 1 ♂, 2 subad. ♂ (AMCC [LP 2236]). **Municipio de Tonatico:** Tonatico, outside Estrella cave, near viewpoint, 18°44.740'N 99°37.821'W, 1594 m, 15.ix.2011, J. Mendoza, R. Monjaraz, D. Barrales and F. Torres, 2 ♀ (CNAN), 1 ♀ [leg] (AMCC [LP 11474]). **GUERRERO: Municipio de Buenavista de Cuellar:** Casino de la Unión, 2 km S, 18°35.53'N 99°28.91'W, 1178 m, 28.viii.2009, O. Francke, T. López, C. Santibáñez and A. Valdez, 2 ♀, 6 juv. (CNAN), 1 juv. [leg] (AMCC [LP 11051]), 1 juv. [leg] (AMCC [LP 11053]). **Municipio de Iguala de la Independencia:** Iguala de la Independencia [18°21'N 99°33.6'W],



FIGURE 5. *Diplocentrus keyserlingii* group, dextral pedipalp chela, dorsoexternal aspect. **A.** *Diplocentrus keyserlingii* Karsch, 1880, holotype ♂ (AMNH) of *Diplocentrus reticulatus* Francke, 1977. **B.** *Diplocentrus mitlæ* Francke, 1977, holotype ♂ (AMNH). Scale bar = 1 mm.

vi.1961, 1 ♀ (CNAN); La Cumbre, 18°24.0306'N 99°29.1198'W, 1212 m, 28.viii.2009, O. Francke, C. Santibáñez and E. Miranda, thorn forest, on ground, UV light, 1 juv. (CNAN), 1 juv. [leg] (AMCC [LP 11033]), 1 juv. [leg] (AMCC [LP 11050]). *Municipio de Ixcateopán de Cuauhtémoc*: Ixcateopán, 2 km S, 18°30.2304'N 99°46.656'W, 1930 m, 21.iv.2012, J. Mendoza, R. Monjaraz, D. Ortiz and G. Contreras, 1 ♀ (CNAN), 1 ♀ [leg] (AMCC [LP 11480]). *Municipio de Picaya*: Caca-huamilpa [18°24.6'N 99°20.4'W], 1520 m, 11.viii.1984, R. Rios, 1 ♂, 1 ♀, 2 juv. (CNAN), 15.vii.2001, M. Córdova and A. Burgos, 1 ♀ (CNAN). *Municipio de Tetipac*: Dos Bocas [18°39.6'N 99°30.6'W], vi.1946, 1 ♂, 1 ♀ (CNAN); Iguala 18°21'N 99°33.6'W, vi.1961, 1 ♀ (CNAN). MORELOS: *Municipio de Amacuzac*: Huajintlán, 18°36.6'N 99°25.8'W, 1510 m, 4.ix.2004, M. Córdova and A. Gotilla, 1 ♀ (CNAN). *Municipio de Coatlán del Río*: El Oyanco, 18°43.8'N 99°25.8'W, 1022 m, 6.viii.2004, M. Córdova and O. Sotelo, 1 ♀ (CNAN-S03005). *Municipio de Miacatlán*: Palpan, 18°51'N 99°25.2'W, 1587 m, 7.viii.2004, M. Córdova and O. Vázquez, 1 ♂, 4 ♀, 10 juv. (CNAN). *Municipio de Tlaquiltenango*: El Comal, border between Morelos and Guerrero, 18°27.086'N 99°17.139'W, 1749 m, 13.vi.2007, O. Francke, J. Ponce, M. Córdova, H. Montaña, L. Beltrán and A.

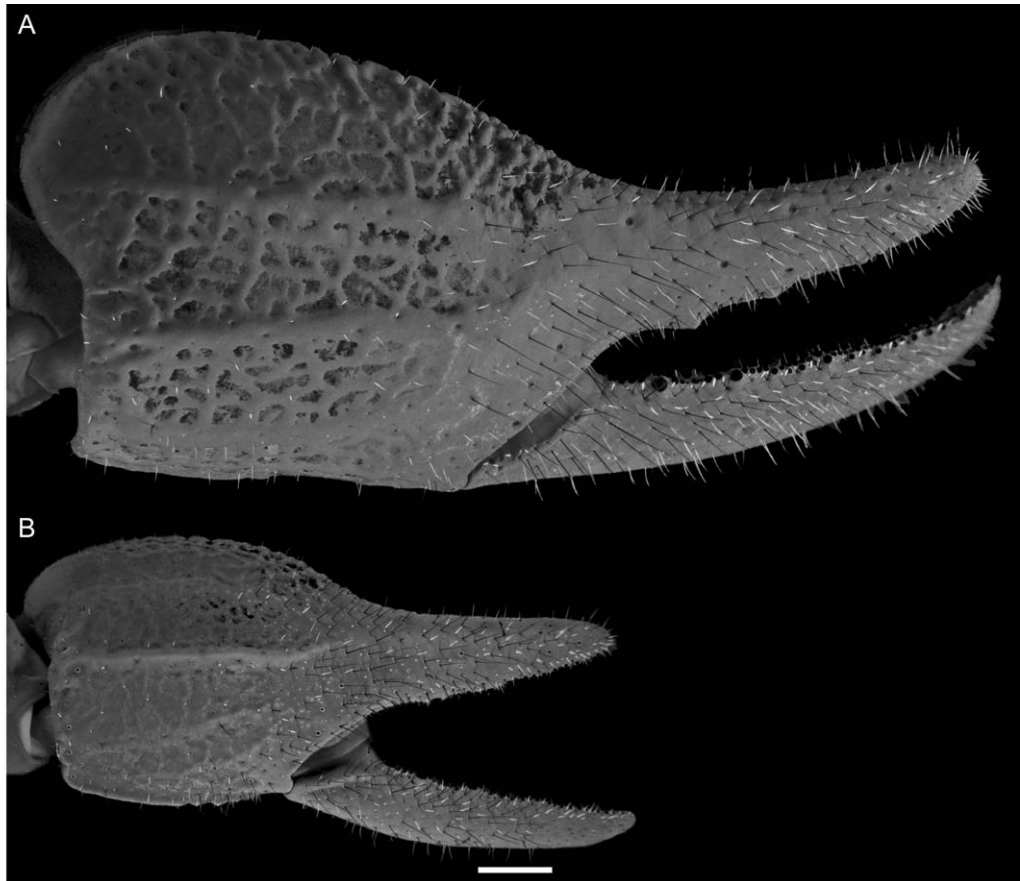


FIGURE 6. *Diplocentrus keyserlingii* group, dextral pedipalp chela, dorsoexternal aspect. A. *Diplocentrus recitimanus* Pocock, 1898, ♂ (AMNH). B. *Diplocentrus tenango* Santibáñez-López and Francke, 2008, holotype ♂ (CNAN-T0273). Scale bar = 1 mm.

Ballesteros, 6 ♂, 4 ♀, 1 subad. ♂, 2 subad. ♀, 3 juv. (AMNH), 6 ♂, 4 ♀, 1 subad. ♂, 3 subad. ♀, 3 juv. (CNAN), 1 ♂, 2 ♀, 2 juv. (CAS), 1 subad. ♂ (AMCC [LP 7031]).

DIAGNOSIS: The following character combination, updated from Santibáñez-López et al. (2011), is diagnostic for *D. coylei*. Total length (adult), 48–60 mm. Base coloration (adult) brownish orange to pale brown. Carapace anteromedian notch V-shaped. Pedipalp femur, dorsal surface sparsely granular. Pedipalp patella, dorsomedian carina moderately developed, smooth to crenulate (♂); dorsoexternal carina obsolete, smooth (♂); externomedian carina weakly developed to obsolete, smooth (♂); ventromedian carina obsolete (♂, ♀). Pedipalp chela manus, dorsal surface smooth to reticulate (♂, ♀); dorsal secondary carina weakly developed, smooth (♂); digital carina strongly developed, smooth to weakly granular (♂) or obsolete, smooth (♀); external surfaces reticulate (♂) or smooth to weakly reticulate (♀); fingers gently curved (fig. 4A). Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 4/5:5/5:6/6:6/6 (variation in table 2). Pectinal tooth count, 14–16, mode = 14 (♂) or 11–13, mode = 12 (♀) (variation in table 1).

Table 1. Pectinal tooth count (number of teeth per pecten) in species of the *Diplocentrus keyserlingii* group, given as number of male and female pectines observed with corresponding tooth count, including data from the original descriptions of *Diplocentrus formosus* Armas and Martín-Frías, 2003, *Diplocentrus hoffmanni* Francke, 1977, and *Diplocentrus tenango* Santibáñez-López and Francke, 2008.

Tooth Count	<i>D. coylei</i>		<i>D. formosus</i>		<i>D. hoffmanni</i>		<i>D. keyserlingii</i>		<i>D. kraepelini</i>		<i>D. mitlae</i>		<i>D. rectimanus</i>		<i>D. sagittipalpus</i>		<i>D. sissonii</i>		<i>D. tenango</i>	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
6								1										1		
7					8		1	3	2		4							5		
8					7		3	2	10		6		6		1		1	15		
9					2	3	6		3	6	2		3		4	1	4	12		
10		1		1					5		2		16		21		7	3		4
11		7		4	6				2				6		6					8
12	1	8		21											1					1
13	1			11																3
14	16		3	3																
15	2		6																	
16			1																	

Diplocentrus coylei resembles *D. mitlae* and *D. rectimanus* in size and coloration but can be distinguished as follows. The counts of spiniform macrosetae on the telotarsi of legs III and IV are higher in *D. coylei* (6/6:6/6) than in *D. mitlae* (5/5:5/5). The pectinal tooth count is higher in *D. coylei* (♂: 14–16; ♀: 11–13) than in *D. mitlae* (♂: 7–10; ♀: 7–8) and *D. rectimanus* (♂: 9–12; ♀: 8–9). The dorsal surface of the pedipalp chela manus (♀) is smooth in *D. coylei* and granular in *D. rectimanus*. The dorsal surface of the pedipalp chela manus (♂) is reticulate in *D. coylei* and smooth in *D. mitlae*.

DISTRIBUTION: *Diplocentrus coylei* is recorded from the following states and municipalities of central Mexico: Estado de México (Malinalco, Tonicaco), Guerrero (Buenavista de Cuellar, Iguala de la Independencia, Ixcateopán de Cuauhtémoc, Picaya, Tetipac), and Morelos (Amacuzac, Coatlán del Rio, Huajintlán, Miacatlán, Tlaquiltenango) (fig. 3A).

ECOLOGY: This species was collected under logs and stones during daytime in a deciduous oak forest, and outside a cave. *Centruroides limpidus* (Karsch, 1879) was collected in sympatry. The habitat and habitus of *D. coylei* are consistent with the pelophilous ecomorphotype (Prendini, 2001).

Diplocentrus formosus Armas and Martín-Frías, 2003

Figures 7A, 8A, 9A, 10A, 11A, 12, 13; tables 1, 2

Diplocentrus formosus Armas and Martín-Frías, 2003: 72–75, figs. 1–7, tables I, II.

Diplocentrus tehuanco: Armas, 2006: 10 (in part, incorrect synonymy).

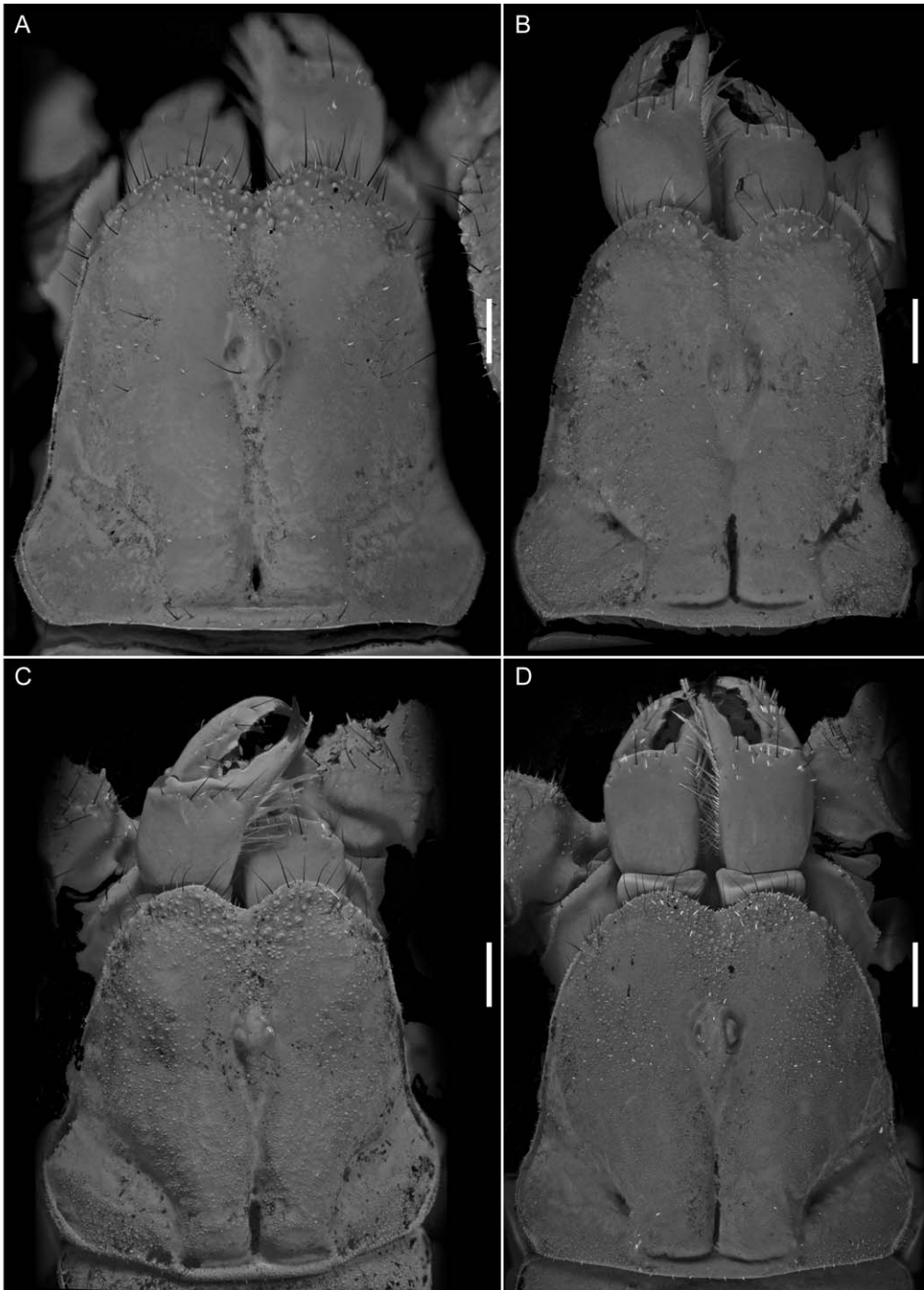


FIGURE 7. *Diplocentrus keyserlingii* group, carapace, dorsal aspect. A. *Diplocentrus formosus* Armas and Martín-Frias, 2003, ♂ (CNAN). B. *Diplocentrus kraepelini*, n. sp., paratype ♂ (AMNH). C. *Diplocentrus sagittipalpus*, n. sp., paratype ♂ (AMNH). D. *Diplocentrus sissomi*, n. sp., paratype ♂ (AMNH). Scale bars = 1 mm.

Table 2. Telotarsal spiniform macrosetal count (number of macrosetae in pro- and retroventral rows of telotarsi on legs I–IV) in species of the *Diplocentrus keyserlingii* group, given as number of legs observed with corresponding proventral (p) and retroventral (r) setal count, including data from the original descriptions of *Diplocentrus formosus* Armas and Martín-Frías, 2003, *Diplocentrus hoffmanni* Francke, 1977, and *Diplocentrus tenango* Santibáñez-López and Francke, 2008.

Leg	Setal Count	<i>D. coyleri</i>		<i>D. formosus</i>		<i>D. hoffmanni</i>		<i>D. keyserlingii</i>		<i>D. kraepelini</i>		<i>D. mitlae</i>		<i>D. rectimanus</i>		<i>D. sagittipalpus</i>		<i>D. sissoni</i>		<i>D. tenango</i>	
		p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r
I	3					1															
	4	24		4		21	2	10	2	18		13	10	19	2	4		4	1		
	5	11	36	45	4	4	24		8	3	20	1	4	12	29	29	32	28	26	8	2
	6			1	46					1							1		5	7	12
	7																				1
II	4	3	1					2	2	3		12	1	2	1	2	1	1			
	5	29	28	26	2	24	24	8	8	18	19	1	12	28	22	31	22	28	6		
	6		3	24	47	2	2			2				1	8	1	11	3	24	16	14
	7				1													1			2
III	5	2	1	1		2	1	8	9	7	2	11	13	3	1	8	1	1	2		
	6	31	35	44	34	23	25	1		14	19			27	28	26	32	31	29	2	2
	7			5	16										1			1		13	14
IV	5	2		1		1	1	9	4	1	19	13	13	1	3		1	2	2		
	6	32	34	31	14	25	25	1	6	18	1			28	24	34	32	30	29	2	1

TYPE MATERIAL: **MEXICO**: OAXACA: DISTRITO DE TEHUANTEPEC: *Municipio de Santo Domingo Tehuantepec*: Holotype ♂ (IES), 3 ♂, 29 ♀ paratypes (EMF), 1 ♂, 2 ♀ paratypes (CNAN) [lost?], 8 ♀ paratypes (IES), Colonia Emiliano Zapata, 5 km WSW Tehuantepec [16°19.655'N 95°17.283'W], 11.vi.2002, H. Cabrera [not examined].

ADDITIONAL MATERIAL: **MEXICO**: OAXACA: DISTRITO DE TEHUANTEPEC: *Municipio de Asunción Ixtaltepec*: Chivela [16°42.813'N 94°59.827'W], 210 m, 30.v.1962, J. Martinez, 1 ♂, 1 ♀ (CNAN); Nizanda, 16°39.4902'N 95°00.6342'W, 99 m, 15.ix.2009, R. Paredes, C. Santibáñez, and A. Valdez, deciduous forest, in burrow entrance, UV light detection, 9 ♀ (CNAN), 1 ♀ [leg] (AMCC [LP 10979]); Santo Domingo Tehuantepec [16°19.650'N 95°17.273'W], 80 m, 9.vii.2004, P. Berea, 4 ♂, 11 ♀ (CNAN).

DIAGNOSIS: The following character combination, updated from Armas and Martín-Frías (2003), is diagnostic for *D. formosus*. Total length (adult), 47–65 mm. Base coloration (adult) pale yellow to brown. Carapace anteromedian notch V-shaped (fig. 7A); frontal lobes and interocular surface granular. Pedipalp femur, dorsal surface sparsely granular, comprising larger granules medially (fig. 9A). Pedipalp patella, dorsomedian carina well developed, slightly granular (♂); dorsoexternal carina moderately developed, slightly granular (♂); externomedian carina weakly

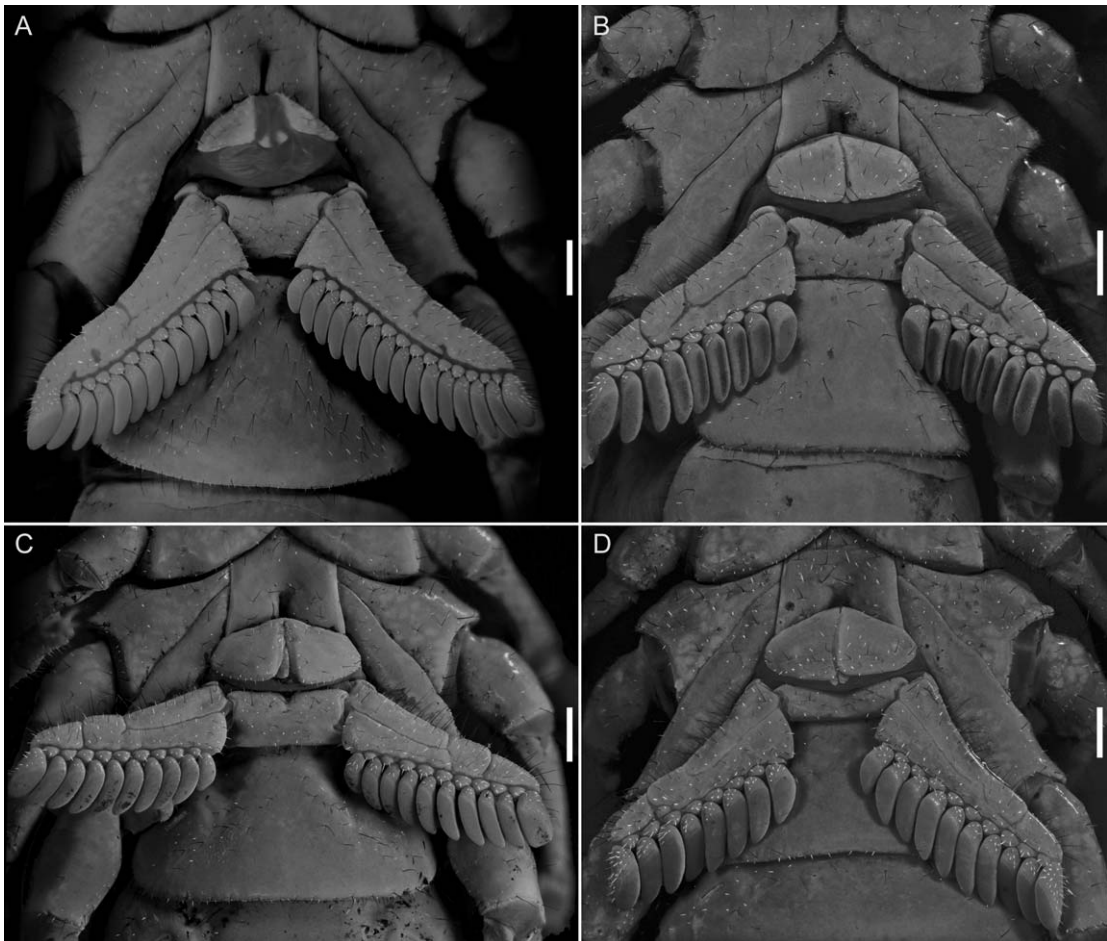


FIGURE 8. *Diplocentrus keyserlingii* group, sternum, genital operculum, and pectines, ventral aspect. A. *Diplocentrus formosus* Armas and Martín-Frías, 2003, ♂ (CNAN). B. *Diplocentrus kraepelini*, n. sp., paratype ♂ (AMNH). C. *Diplocentrus sagittipalpus*, n. sp., paratype ♂ (AMNH). D. *Diplocentrus sissomi*, n. sp., paratype ♂ (AMNH). Scale bars = 1 mm.

developed, granular (♂; fig. 11A); ventromedian carina obsolete (♂, ♀). Pedipalp chela manus, dorsal and external surfaces densely granular (♂, ♀); dorsal marginal carina well developed, comprising large granules; digital carina weakly developed, granular, obscured by granulation on dorsal and external surfaces; fingers gently curved (fig. 12). Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 5/6:5–6/6:6/6:6–7/7 (variation in table 2). Pectinal tooth count, 12–16, mode = 15 (♂; fig. 8A) or 10–14, mode = 12 (♀) (variation in table 1).

Diplocentrus formosus resembles *D. hoffmanni* in the similar counts of spiniform macrosetae on the telotarsi of leg IV, but can be separated from the latter as follows. The dorsal and external surfaces of the pedipalp chela manus (♂) are granular in *D. formosus* but reticulate in *D. hoffmanni*. The pedipalp chela digital carina is weakly developed (♂) in *D. formosus*, but moderately to weakly developed (♂) in *D. hoffmanni*. The pectinal tooth count is higher in *D. formosus* (♂: 12–16; ♀: 10–14) than in *D. hoffmanni* (♂: 9–11; ♀: 7–9). The margin of the

median lobe of the hemispermatophore is entire in *D. formosus*, but crenulate in *D. hoffmanni* (see Sissom, 1994: fig. 22).

SUPPLEMENTARY DESCRIPTION: Based on additional ♂♂ (fig. 13A, B) and ♀♀ (fig. 13C, D) specimens.

Coloration: Carapace brown to brownish orange; moderately infusate throughout, uniformly so around median ocelli, variegated elsewhere. Coxosternum pale orange. Pedipalps orange to reddish brown, carina weakly infusate. Legs uniformly pale orange. Mesosoma brown to dark brown, tergites brown (♂, ♀), densely infusate, sternites pale orange. Metasoma pale brown to orange; carinae weakly infusate. Telson orange to reddish, uniformly infusate.

Carapace: Anterior margin moderately setose; anteromedian notch moderately deep, V-shaped (fig. 7A). Frontal lobes, surface densely granular; other surfaces sparsely granular or shagreened. Three pairs of subequal lateral ocelli.

Pedipalps: Orthobothriotaxic, type C. Femur height greater than width (fig. 10A); dorsal intercarinal surface markedly convex, coarsely and sparsely granular; external intercarinal surface smooth; ventral intercarinal surface flat, smooth; internal intercarinal surface finely and sparsely granular; dorsointernal carina moderately developed, granular, becoming obsolete posteriorly; dorsoexternal carina weakly developed, granular; ventroexternal carina obsolete; ventrointernal carina weakly to moderately developed, granular. Patella, dorsal intercarinal surfaces smooth to slightly granular (♂) or smooth (♀); external and ventral intercarinal surfaces granular (♂, fig. 11A) or smooth (♀); internal intercarinal surface finely granular; proximal tubercle moderately developed, bifurcate; dorsointernal carina weakly developed to obsolete; dorsomedian carina strongly developed, granular (♂) or moderately developed, granular (♀); dorsoexternal carina moderately to weakly developed, granular (♂) or weakly developed, finely granular (♀); externomedian carina weakly developed, granular; ventroexternal carinae moderately developed, granular to crenulate (♂), or weakly developed, smooth to crenulate (♀); ventromedian carina weakly to moderately developed, granular; ventrointernal carina weakly to moderately developed, comprising large granules (♂), or weakly developed, granular to smooth (♀). Chela manus, rounded, height greater than width (♂, ♀), densely (♂) or sparsely (♀) setose; dorsal intercarinal surface granular (♂, fig. 12A) or finely granular (♀, fig. 12B); external intercarinal surface granular (♂) or finely granular (♀); dorsal marginal carina moderately developed, coarsely granular; digital carina weakly developed, granular (♂) or weakly developed to obsolete, granular (♀); dorsal secondary and external secondary carinae weakly developed (♂) or obsolete to weakly developed (♀), granular; ventroexternal carina weakly developed, granular, becoming obsolete proximally; ventromedian carina strongly developed, crenulate proximally, granular medially, becoming obsolete distally, directed toward midpoint of movable finger articulation; ventrointernal carina weakly developed, granular; internodorsal, internomedian and internoventral carinae weakly developed, granular; internal surface with shallow longitudinal depression where chela rests against patella. Chela fixed finger curved; length equal (♂) or subequal (♀) to femur length; dorsal surface smooth and densely setose proximally; external surface flat; internal surface shallowly concave.

Legs: Legs I–IV femora and tibiae, prolateral surfaces shagreened; telotarsi, counts of spiniform macrosetae in pro- and retroventral rows (dextral/sinistral), 5/6 5/6: 5/6 5/6: 6/6 6/6: 6/7 6/7.

Pectines: Tooth count: 15–15 (♂; fig. 8A); 13–13 (♀).

Mesosoma: Tergites I–VI, pretergites smooth, posttergites shagreened. Sternites smooth; VII, dorsosubmedian and dorsolateral carinae weakly developed to obsolete, granular.

Metasoma: Metasomal segments I–V, dorsal intercarinal surfaces smooth; lateral intercarinal surfaces finely granular to smooth; ventral intercarinal surfaces smooth. Segments I–IV, dorsolateral carinae weakly developed, granular; lateral suprmedian carinae weakly to moderately developed, granular; lateral inframedian carinae weakly developed, granular on I–III; weakly developed to obsolete, granular on IV; ventrolateral carinae strongly developed, granular on I and II; moderately to weakly developed, granular on III and IV; ventrosubmedian carinae strongly developed, granular on I and II; moderately developed, granular on III and IV. Segment V length: pedipalp femur length ratio, 1.26 (♂), 1.18 (♀); dorsolateral carina moderately developed, granular to serrate (♂), or weakly developed, granular (♀); lateral inframedian carina weakly developed to obsolete, granular to smooth; ventrolateral carinae moderately developed, granular to serrate; ventromedian carina strongly developed, granular with subspiniform granules; ventral transverse carina strongly developed, comprising eight subspiniform granules; anal arch semicircular; anal subterminal carina strongly developed, comprising 13 subspiniform granules; anal terminal carina moderately developed, granular.

Telson: Telson, width: length ratio, 0.53 (♂), 0.67 (♀). Vesicle, lateral surfaces smooth; ventral surface granular anteriorly. Subaculear tubercle stout, subconical. Aculeus, 1.4 length of subaculear tubercle, strongly curved.

Hemispermatothore: Lamelliform, weakly sclerotized (fig. 9A); total length, 6.5 mm; distal lamella, length, 3.4 mm; capsular region, width, 1.4 mm; median lobe narrow, margin entire.

REMARKS: The original description of *D. formosus* was based on 4 adult males, 38 adult females, 3 immature males and 1 immature female from Tehuantepec, Oaxaca. Armas and Martín-Frías (2003) compared *D. formosus* with *D. hoffmanni*, *D. keyserlingii*, *D. mitlae*, and *D. rectimanus* and placed it in the penultimate couplet of Francke's (1977) key, i.e., in the *keyserlingii* group, comprising species with the pedipalp femur higher than wide. Armas (2006) synonymized *D. formosus* with *Diplocentrus tehuano* Francke, 1977, a species of the *mexicanus* group in which the pedipalp femur is wider than high, without any formal justification. Based on the original descriptions and an examination of the paratypes of *D. tehuano*, the two species are distinct and may be separated as follows. The pedipalp femur is higher than wide, its dorsal surface convex in *D. formosus*, whereas the femur is wider than high, its dorsal surface flat in *D. tehuano*, as in the other members of the *mexicanus* group. As the description of *D. tehuano* was based on 13 adult males and 15 adult females, the variation in spiniform macrosetal counts on the leg telotarsi can be satisfactorily assessed for the two species (4/5:5/5:5/6:6/6 in *D. tehuano* compared with 5/6:5–6/6:6/6:6–7/7 for *D. formosus*) lending further support for their differentiation. Based on the evidence, *D. formosus* is hereby reinstated as a valid species.

DISTRIBUTION: *Diplocentrus formosus* is known from the Tehuantepec district in the Isthmus of Tehuantepec, southern Oaxaca (fig. 3A).

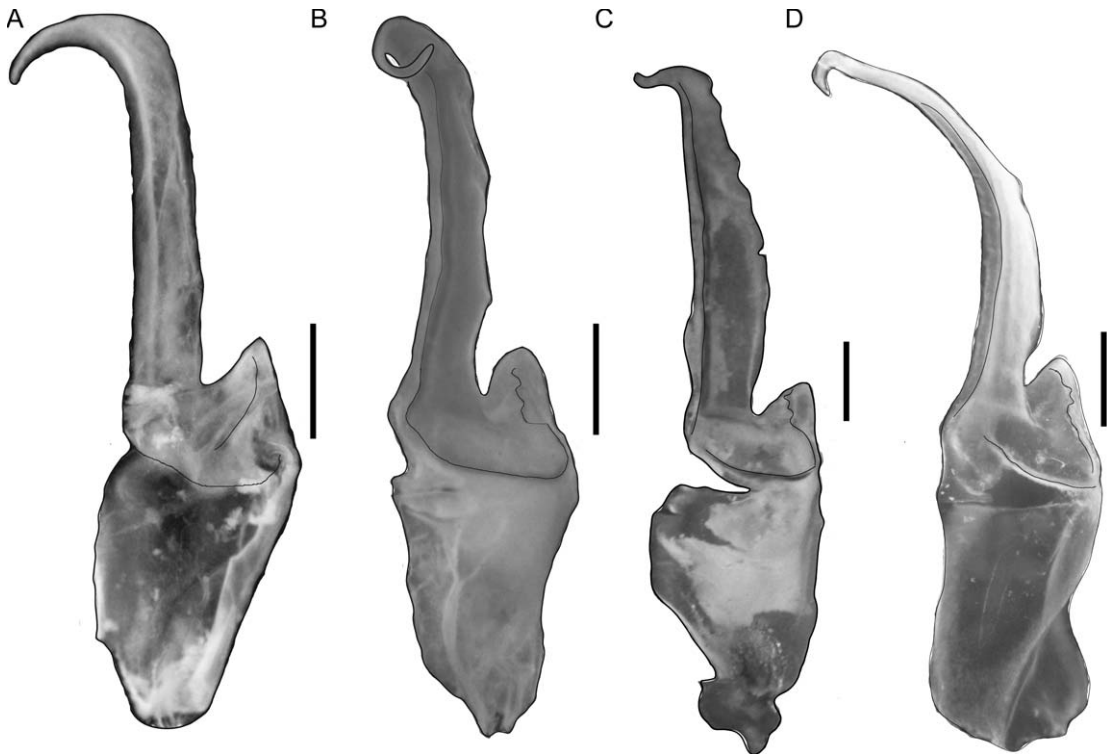


FIGURE 9. *Diplocentrus keyserlingii* group, sinistral hemispermaphore, dorsal aspect. A. *Diplocentrus formosus* Armas and Martín-Frías, 2003, ♂ (CNAN). B. *Diplocentrus kraepelini*, n. sp., paratype ♂ (AMNH). C. *Diplocentrus sagittipalpus*, n. sp., paratype ♂ (AMNH). D. *Diplocentrus sissomi*, n. sp., paratype ♂ (AMNH). Scale bars = 1 mm.

ECOLOGY: According to Armas and Martín-Frías (2003), the type series of *D. formosus* was collected mostly from burrows in a lowland area of thorny forest mixed with tropical deciduous vegetation. The personally collected material reported here was excavated from burrows in riparian vegetation. Burrows, constructed almost horizontally in sandy soil, were ca. 40 cm long, and mostly straight, except when turning around stones in the soil matrix. *Centruroides nigrimanus* (Pocock, 1898) and an undetermined species of *Vaejovis* C.L. Koch, 1831, related to *Vaejovis occidentalis* Hoffmann, 1931, were collected in sympatry. The habitat and habitus of *D. formosus* are consistent with the pelophilous ecomorphotype (Prendini, 2001).

Diplocentrus hoffmanni Francke, 1977

Figures 1C, 4B; tables 1, 2

Diplocentrus hoffmanni Francke, 1977: 150, 185–191, 194, 198, figs. 7, 14, 22, 51–54; Sissom, 1991: 156; Sissom and Walker, 1992: 130; Sissom, 1994: 257, 264, 265, figs. 20–22; Kovařík, 1998: 130; Beutelspacher and Trujillo-Olvera, 1999: 8; Beutelspacher, 2000: 29; Sissom and Fet, 2000: 338; Armas and Martín-Frías, 2003: 74; Francke and Ponce-Saavedra, 2005: 52.

TYPE MATERIAL: MEXICO: OAXACA: DISTRITO DE ETLA: *Municipio de Santiago Tenango*: Holotype ♂, paratype ♀ (AMNH), near Tejocote [17°14'N 97°00'W], 7800 ft, summer 1963, C.M. Bogert, under logs; paratype ♂ (AMNH), Tejocote, 31 mi. NW Oaxaca city, 7600 ft,

9.ix.1962, M.R. Bogert. *Municipio de San Francisco Telixtlahuaca*: Paratype ♂ (AMNH), Telixtlahuaca, 6 mi. N [17°17.667'N 96°54.25'W], 7050 ft, 26.vii.1966, C.M. Bogert, under rocks in moderately dry area with oak and juniper.

ADDITIONAL MATERIAL: **MEXICO: OAXACA: DISTRITO DE ETLA:** *Municipio de San Francisco Telixtlahuaca*: Telixtlahuaca, 6 km N, 17°20.367'N 96°56.121'W, 1915 m, 22.vii.2002, O. Francke, E. González and J. Ponce, SE slope, dry scrub, 1 ♂, 1 ♀ (AMCC [LP 2036]), 1 ♂ (CNAN). **DISTRITO DE ZIMATLAN:** *Municipio de Magdalena Mixtepec*: Magdalena Mixtepec, 16°52.824'N 96°51.056'W, 1710 m, 19–20.vi.2006, O. Francke, G. Villegas, H. Montaña, C. Santibáñez and A. Valdez, 1 ♂, 4 ♀, 4 subad. ♀, 2 juv. (AMNH), 2 ♂, 3 ♀, 4 subad. ♀, 2 juv. (CNAN), 2 ♀ (AMCC [LP 6599]). **DISTRITO DE TLACOLULA:** Mitla, 15 km E, 16°56.606'N 96°17.114'W, 2081 m, 18.vii.2007, O. Francke, H. Montaña, A. Valdez, A. Ballesteros, and C. Santibáñez, pine-oak woodland, 1 ♂ (CNAN), 1 ♂ (AMCC [LP 7615])

DIAGNOSIS: The following character combination, updated from Francke (1977), is diagnostic for *D. hoffmanni*. Total length (adult), up to 55 mm. Base coloration (adult) reddish brown to orange-brown. Carapace anteromedian notch moderately deep, V-shaped; frontal lobes and interocular surface moderately granular. Pedipalp femur, dorsal surface sparsely and moderately granular. Pedipalp patella, dorsomedian carina strongly developed, crenulate (♂); dorsoexternal carina weakly to moderately developed, coarsely granular to crenulate (♂); externomedian carina weakly developed, granular (♂); ventromedian carina obsolete to weakly developed, slightly granular (♂, ♀). Pedipalp chela manus, dorsal surface sparsely granular, surface between dorsal secondary and digital carinae sparsely granular and slightly reticulate (♂) or weakly reticulate (♀); digital and dorsal secondary carinae moderately to weakly developed, granular (♂; fig. 4B) or obsolete, smooth (♀); fingers gently curved. Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 5/5:5/5–6/6:6/6/6–7 (variation in table 2). Pectinal tooth count, 9–11, mode = 11 (♂) or 7–9, mode = 8 (♀) (variation in table 1).

Diplocentrus hoffmanni resembles *D. keyserlingii*, *D. kraepelini*, n. sp., and *D. sissomi*, n. sp., in adult size and coloration but can be distinguished as follows. The pedipalp patella ventromedian carina (♂) is weakly developed to obsolete, the pedipalp chela manus, dorsal surface (♀) weakly reticulate, and the digital carina (♂) granular to smooth in *D. hoffmanni*, whereas the pedipalp patella ventromedian carina (♂) is strongly developed, smooth to granular, the pedipalp chela manus, dorsal surface (♀) smooth, and the digital carina (♂) smooth to crenulate in *D. kraepelini*, n. sp., and *D. sissomi*, n. sp. The pedipalp chela manus, dorsal surface (♂) is slightly granular in *D. hoffmanni* but markedly reticulate in *D. keyserlingii*, and the counts of spiniform macrosetae on the telotarsi of legs III and IV are higher in *D. hoffmanni* (6/6:6/6–7) than in *D. keyserlingii* (5/5:5/6).

DISTRIBUTION: *Diplocentrus hoffmanni* is known from the central valleys and adjacent mountains of Oaxaca in the following municipalities: Magdalena Mixtepec, San Francisco Telixtlahuaca, and Santiago Tenango (fig. 3A).

ECOLOGY: This species was observed doorkeeping at burrow entrances at night with UV detection, and was excavated during the daytime. Burrows, constructed in sandy soil at an angle of ca. 30°–40° to the ground surface, were ca. 20–30 cm long, with turns in places due

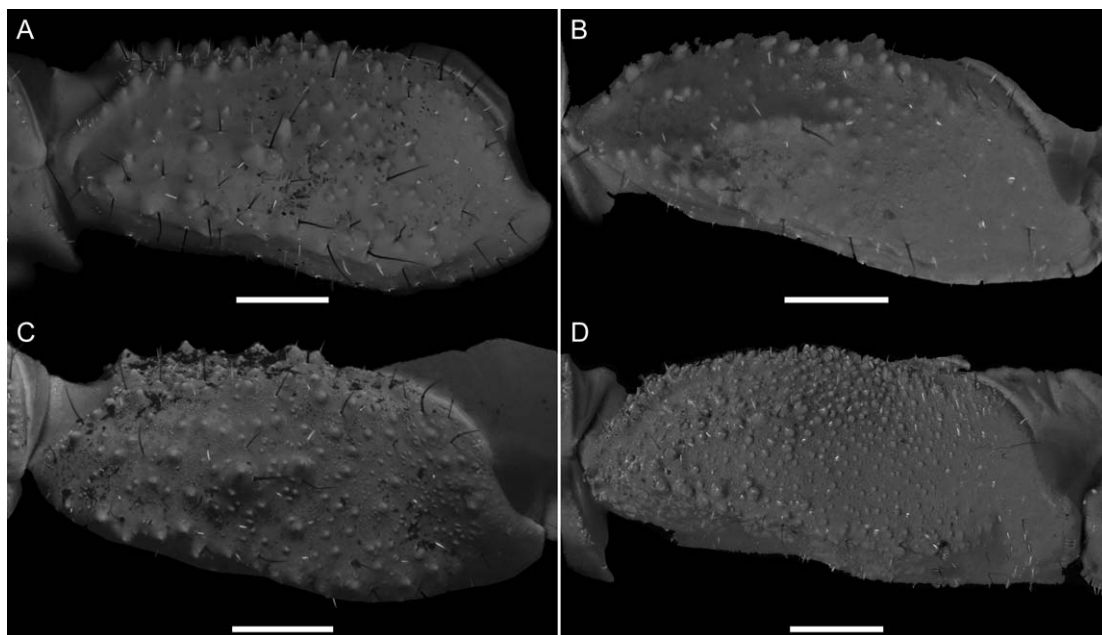


FIGURE 10. *Diplocentrus keyserlingii* group, dextral pedipalp femur, dorsal aspect. A. *Diplocentrus formosus* Armas and Martín-Frías, 2003, ♂ (CNAN). B. *Diplocentrus kraepelini*, n. sp., paratype ♂ (AMNH). C. *Diplocentrus sagittipalpus*, n. sp., paratype ♂ (AMNH). D. *Diplocentrus sissomi*, n. sp., paratype ♂ (AMNH). Scale bars = 1 mm.

to the presence of stones in the soil matrix (fig. 1A). The area where this species was collected was heavily disturbed, but there were remnants of oak forest. The habitat and habitus of *D. hoffmanni* are consistent with the pelophilous ecomorphotype (Prendini, 2001).

Diplocentrus keyserlingii Karsch, 1880

Figure 5A; tables 1, 2

Diplocentrus keyserlingii Karsch, 1880: 57; Stahnke, 1981: 34–44; Sissom, 1991: 156; Sissom and Walker, 1992: 130; Sissom, 1994: 257–261; Kovařík, 1998: 130; Sissom and Jackman, 1997: 151; Beutelspacher and Trujillo-Olvera, 1999: 9 (part); Beutelspacher, 2000: 29; Sissom and Fet, 2000: 338; Stockwell and Baldwin, 2001: 304 (part); Armas and Martín-Frías, 2003: 74.

Diplocentrus whitei: Kraepelin, 1894: 13–15 (part, misidentification).

Diplocentrus keyserlingi: Kraepelin, 1899: 102 (part); Banks, 1910: 185, 188; Herrera, 1917: 270; 1921: 159, figs. 30–33 (part); Ewing, 1928: 5; Gertsch, 1939: 17; Pelaez, 1962: 72 (part); Stahnke, 1970a: 25; Bücherl, 1971: 324; Guijosa, 1973: 145; Rowland and Reddell, 1976: 5; Moritz and Fischer, 1980: 316; Francke and Ponce-Saavedra, 2005: 49, 52.

Diplocentrus keyserlingi keyserlingi (not conspecific): Hoffmann, 1931: 313–317; 1938: 317.

Didymocentrus keyserlingii: Werner, 1934: 275.

Diplocentrus moritzi: Stahnke, 1981: 44, figs. 3, 4 (synonymized by Sissom, 1991: 156).

Diplocentrus reticulatus Francke, 1977: 150, 191–194, 198, figs. 8, 13, 24, 55–58 (synonymized by Sissom, 1991: 156); Beutelspacher and Trujillo-Olvera, 1999: 8; Beutelspacher, 2000: 33.

TYPE MATERIAL: **MEXICO**: OAXACA: Lectotype ♂, paralectotype ♂ (ZMB 3248) [designated by Stahnke, 1981: 34; not examined]. DISTRITO DE ETLA: *Municipio de Santiago Ten-*

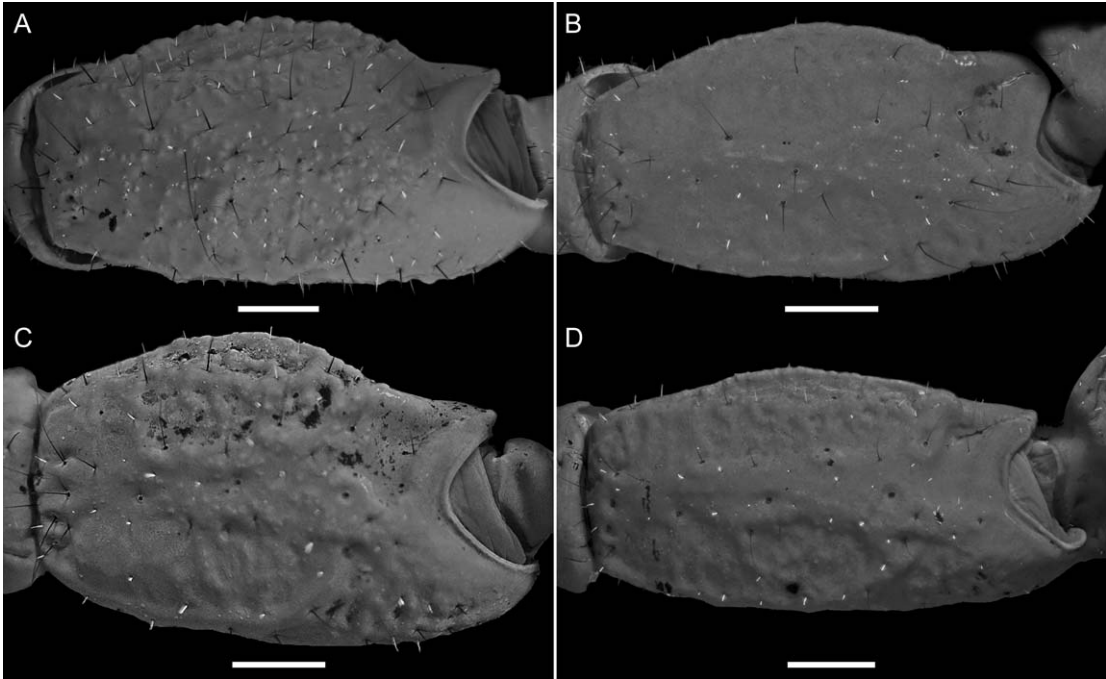


FIGURE 11. *Diplocentrus keyserlingii* group, dextral pedipalp patella, external aspect. **A.** *Diplocentrus formosus* Armas and Martín-Frías, 2003, ♂ (CNAN). **B.** *Diplocentrus kraepelini*, n. sp., paratype ♂ (AMNH). **C.** *Diplocentrus sagittipalpus*, n. sp., paratype ♂ (AMNH). **D.** *Diplocentrus sissomi*, n. sp., paratype ♂ (AMNH). Scale bars = 1 mm.

ango: Holotype ♂, paratype ♂ [*Diplocentrus reticulatus*] (AMNH), near Tejocote [17°14'N 97°00'W], 7800 ft, summer 1963, C.M. Bogert, under logs. DISTRITO DE IXTLÁN DE JUÁREZ: *Municipio de Santa Catarina Ixtepeji*: Paratype ♂ [*Diplocentrus reticulatus*] (AMNH), El Punto, road to Ixtlán de Juarez [17°13.30'N 96°35.03'W], 19.viii.1961, C.M. and M.R. Bogert.

ADDITIONAL MATERIAL: **MEXICO**: OAXACA: DISTRITO DE ETLA: *Municipio de Santa María Peñoles*: Santa Catarina Estetla, 17°01.6'N 97°05.766'W, 20.ix.2007, P. Lara, 1 ♂ (CALA). DISTRITO DE ZAACHILA: *Municipio de Santa Inés del Monte*: Santa Inés del Monte, 3 km E, 16°56.445'N 96°51.6312'W, 2665 m, 12.xii.2005, O. Francke, H. Montaño, C. Santibáñez, and A. Valdez, 1 ♂, 1 ♀ (CNAN), 2 ♀ (AMNH), 1 ♀ (AMCC [LP 6517]); Santa Inés del Monte, 16°56.442'N 96°51.629'W, 2270 m, 19.ix.2009, R. Paredes, C. Santibáñez, A. Valdez, and J. Cruz, 1 ♂, 5 juv. (CNAN), 1 juv. [leg] (AMCC [LP 11052]).

DIAGNOSIS: The following character combination, updated from Francke (1977), is diagnostic for *D. keyserlingii*. Total length (adult), ca. 45 mm. Base coloration (adult) reddish brown to brown. Carapacial anteromedian notch moderately deep, V-shaped; frontal lobes and interocular surface moderately granular, other surfaces finely granular. Pedipalp femur, dorsal surface moderately granular. Pedipalp patella, dorsomedian carina strongly developed, crenulate to smooth (♂); dorsoexternal carina moderately developed, smooth to slightly crenulate (♂); externomedian carina weakly developed to obsolete, smooth (♂); ventromedian carina obsolete to weakly developed, slightly granular (♂, ♀). Pedipalp chela manus, dorsal surface markedly reticulate (♂; fig. 5A) or smooth (♀); digital carina strongly developed, smooth (♂)

or obsolete, smooth (♀); dorsal secondary carina moderately developed, smooth to slightly crenulate; fingers gently curved (fig. 5A). Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 4/5:5/5:5/5:5/6 (variation in table 1). Pectinal tooth count, 7–9, mode = 7 (♂) or 6–8, mode = 7 (♀) (variation in table 2).

Diplocentrus keyserlingii resembles *D. kraepelini*, n. sp., *D. rectimanus*, and *D. sagittipalpus*, n. sp., in adult size and coloration but can be distinguished as follows. The counts of spiniform macrosetae on the telotarsi of legs III and IV are lower in *D. keyserlingii* (5/5:5/6) than in *D. kraepelini*, n. sp. (6/6:6/6), *D. rectimanus* (6/6:6/6), and *D. sagittipalpus*, n. sp. (6/6:6/6). The pectinal tooth count (♂) is lower in *D. keyserlingii* (7–9) than in *D. sagittipalpus*, n. sp. (9–12). The pedipalp chela manus (♂) is rounded, the fingers shorter than the manus, in *D. keyserlingii*, but slender, the fingers longer than the manus, in *D. rectimanus*, and the manus, dorsal surface (♀) is smooth in *D. keyserlingii* but granular in *D. rectimanus*.

DISTRIBUTION: *Diplocentrus keyserlingii* is known only from the central valleys and adjacent mountains (part of the Sierra Norte) of Oaxaca in the following municipalities: Santa Catarina Ixtepeji, Santa Inés del Monte, Santa María Peñoles, and Santiago Tenango (fig. 3B).

ECOLOGY: This species was collected under logs and stones, and excavated from burrows constructed at an angle of ca. 20° to the ground surface, ca. 20 cm deep and fairly straight with some turns due to the presence of stones in the soil matrix. The dominant vegetation in the area was oak forest. *Centruroides nigrovariatus* (Pocock, 1898) was collected in sympatry. The habitat and habitus of *D. keyserlingii* are consistent with the pelophilous ecomorphotype (Prendini, 2001).

Diplocentrus kraepelini, n. sp.

Figures 7B, 8B, 9B, 10B, 11B, 14, 15; tables 1–3

TYPE MATERIAL: MEXICO: OAXACA: DISTRITO DE COIXTLAHUACA: Municipio de San Cristóbal Suchixtlahuaca: Holotype ♂ (CNAN-T0671), 2 ♂, 3 ♀, 2 subad. ♀, 2 juv. paratypes (AMNH), 1 ♂, 3 ♀, 1 subad. ♂, 2 juv. paratypes (CNAN-T0672), 1 ♀ paratype (AMCC [LP 6426]), Km 2 road San Cristóbal Suchixtlahuaca–Santiago Tejupan, 17°42.240'N 97°23.667'W, 2290 m, 28.vi.2006, O. Francke, G. Villegas, H. Montaña, and A. Valdez; 1 subad. ♀ paratype (CNAN), 1 subad. ♀ paratype [leg] (AMCC [LP 10973]), Suchixtlahuaca, 8 km NE, 17°42.124'N 97°23.776'W, 2030 m, 25.iii.2010, O. Francke, A. Valdez, C. Santibáñez, and J. Cruz, oak forest, under rock, daytime rock rolling.

ADDITIONAL MATERIAL: MEXICO: OAXACA: DISTRITO DE TEPOSOLULA: Municipio San Bartolo Soyaltepec: Caballo Blanco [17°35.432'N 97°18.414'W], 12.vii.1963, G. Sludder, under logs, 1 ♂ (AMNH).

ETYMOLOGY: This species is dedicated to Karl Kraepelin for his contributions to scorpiology.

DIAGNOSIS: The following character combination is diagnostic for *D. kraepelini*, n. sp. Total length (adult), 50–55 mm. Base coloration (adult) brown to orange-brown. Carapace antero-medial notch moderately deep, U-shaped (fig. 7B). Pedipalp femur, dorsal surface finely and sparsely granular medially (fig. 9B). Pedipalp patella, dorsomedian carina moderately developed, crenulate (♂); dorsoexternal carina weakly developed to obsolete, smooth to slightly crenulate (♂); externomedian carina weakly developed, smooth (♂; fig. 11B); ventromedian

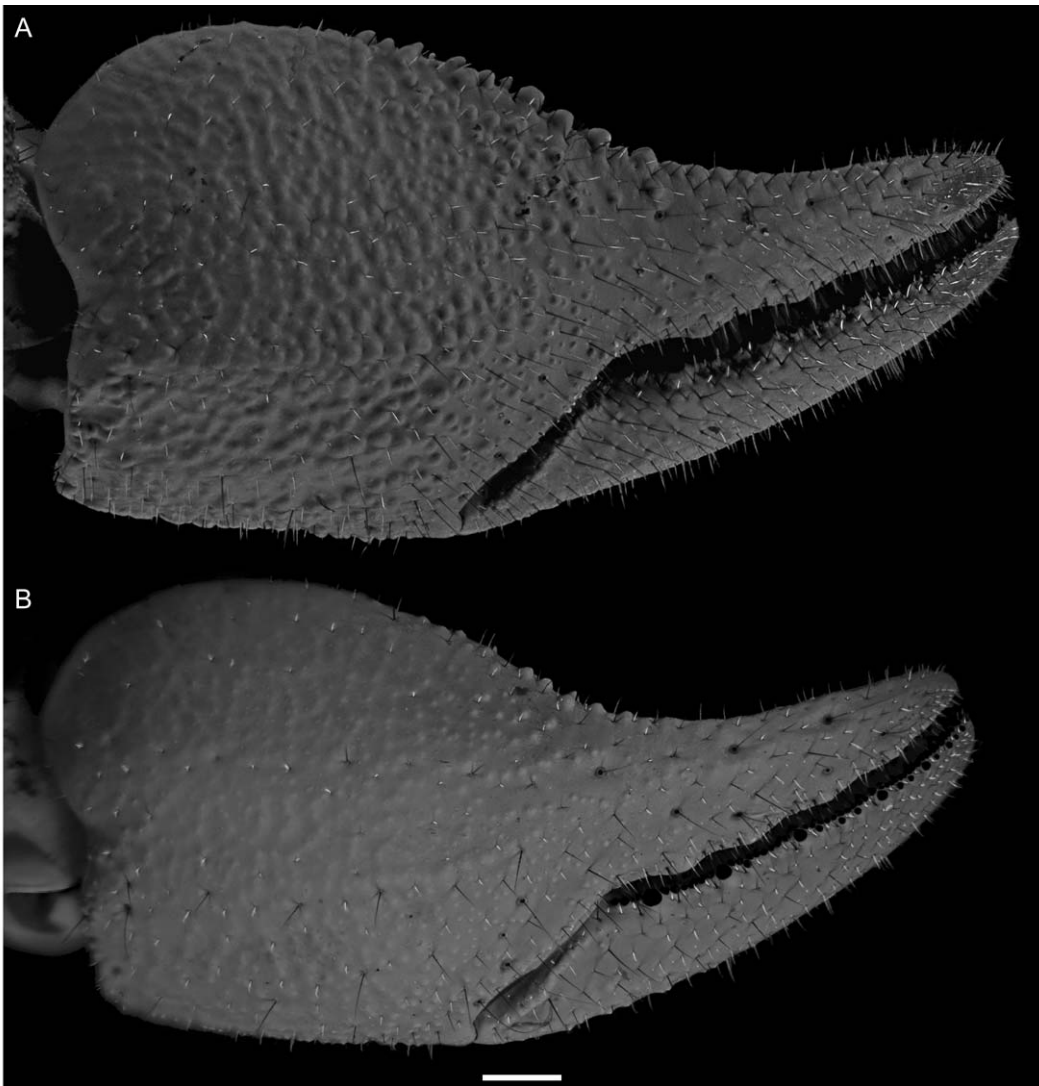


FIGURE 12. *Diplocentrus formosus* Armas and Martín-Frías, 2003, dextral pedipalp chela, dorsoexternal aspect. A. ♂ (CNAN). B. ♀ (CNAN). Scale bar = 1 mm.

carina moderately developed, smooth to slightly crenulate (♂, ♀). Pedipalp chela manus, dorsal surface markedly reticulate (♂; fig. 14A) or smooth (♀; fig. 14B); digital carina strongly developed, smooth to crenulate (♂) or weakly developed to obsolete, smooth (♀); dorsal secondary carina moderately to weakly developed, smooth (♂) or weakly developed to obsolete, smooth (♀); fingers markedly curved. Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 4/5:5/5:6/6:6/6 (variation in table 2). Pectinal tooth count, 9–11, mode = 10 (♂) or 7–9, mode = 8 (♀) (variation in table 1).

Diplocentrus kraepelini, n. sp., *D. keyserlingii* and *D. rectimanus* possess similar counts of pectinal teeth and telotarsal spiniform macrosetae, but may be distinguished as follows. The pedipalp chela movable finger length is greater than the length of the carapace or metasomal

Table 3. Measurements (mm) of male and female type specimens of *Diplocentrus kraepelini*, n. sp., *Diplocentrus sagittipalpus*, n. sp., and *Diplocentrus sissomi*, n. sp., from Oaxaca, Mexico, in the CNAN.

		<i>D. kraepelini</i> , n. sp.		<i>D. sagittipalpus</i> , n. sp.		<i>D. sissomi</i> , n. sp.			
		Holotype	Paratype	Holotype	Paratype	Holotype	Paratype		
		♂	♀	♂	♀	♂	♀		
Total	length	49.9	48.9	52.1	47.1	46.9	51.0		
Carapace	length	6.5	6.0	6.6	6.2	6.0	6.9		
	width	6.7	6.7	6.8	6.5	7.2	7.7		
Chelicera	length	4.0	3.8	4.5	4.5	4.2	4.9		
	Manus	width	1.5	2.0	1.7	1.5	1.5	1.9	
	Movable finger	length	3.0	3.2	2.5	2.9	2.2	2.4	
Pedipalp	Fixed finger	length	1.7	2.4	1.6	1.5	1.4	1.9	
	length	23.3	20.6	21.9	18.9	22.7	22.6		
	Femur	length	5.1	4.5	5.0	4.2	5.3	5.1	
		width	2.0	2.1	2.0	2.0	2.0	2.0	
		height	2.4	2.8	2.8	2.5	2.6	3.0	
	Patella	length	5.5	4.9	5.4	4.4	5.7	5.4	
		width	2.0	2.5	1.8	1.8	1.2	2.3	
		height	3.0	3.0	3.2	3.0	3.0	3.0	
	Chela manus	length	12.7	11.2	11.5	10.3	11.7	12.1	
		width	3.2	3.4	3.0	3.0	3.9	4.0	
height		5.4	5.0	5.2	5.0	5.7	5.7		
Fixed finger	length	6.0	4.7	4.8	4.4	4.9	5.0		
	Movable finger	length	8.1	6.5	7.5	6.4	7.2	7.5	
Mesosoma	length	15.3	16.7	16.3	17.1	14.7	16.1		
Metasoma	length	22.7	21.5	23.2	18.8	26.2	23.2		
	Segment I	length	3.4	3.3	3.6	3.1	4.0	3.4	
		width	3.9	4.4	4.5	3.9	4.4	4.4	
	Segment II	length	3.6	3.5	3.9	3.3	4.6	3.7	
		width	3.5	4.0	4.1	3.5	4.0	4.0	
	Segment III	length	4.2	3.9	4.3	3.5	5.1	4.4	
		width	3.4	3.8	3.9	3.4	3.8	3.9	
	Segment IV	length	5.0	4.8	5.0	4.2	5.6	5.0	
		width	3.3	3.7	3.7	3.5	3.4	3.6	
	Segment V	length	6.5	6.0	6.4	4.7	7.4	6.4	
		width	2.7	3.0	2.9	2.9	2.8	3.1	
		height	2.4	2.6	2.5	2.4	2.2	2.2	
	Telson	length	5.4	4.7	6.0	5.4	0.0	4.8	
		Vesicle	length	5.4	4.7	4.6	3.9	5.0	4.8
			width	3.0	3.3	2.5	2.7	2.6	3.3
height			2.5	2.5	2.3	2.1	2.0	2.7	

segment V in *D. kraepelini*, n. sp., and *D. rectimanus*, but less than or subequal to the length of the carapace or metasomal segment V in *D. keyserlingii*. The counts of spiniform macrosetae on the telotarsi of legs I and II are lower (4/5) in *D. kraepelini*, n. sp., than in *D. rectimanus* (5/5), whereas the counts on the telotarsi of legs III and IV are higher (6/6:6/6) in *D. kraepelini*, n. sp., than in *D. keyserlingii* (5/5:5/6). The ventromedian carina is moderately developed, smooth to slightly crenulate in *D. kraepelini*, n. sp., but obsolete in *D. rectimanus*. The pedipalp chela fingers are markedly curved in *D. kraepelini*, n. sp., but straight to gently curved in *D. rectimanus*. The pedipalp chela manus, dorsal surface (♀) is smooth in *D. kraepelini*, n. sp., but granular in *D. rectimanus*.

Diplocentrus kraepelini, n. sp., resembles *D. mitlae* in size and coloration, but may be distinguished from the latter as follows. The pedipalp chela manus (♂), dorsal and external surfaces are reticulate and the digital carina strongly developed in *D. kraepelini*, n. sp., whereas the dorsal and external surfaces are smooth and the digital carina weakly developed in *D. mitlae*. The count of spiniform macrosetae on the telotarsi of legs I and II is higher in *D. kraepelini*, n. sp. (6/6), than in *D. mitlae* (5/5).

DESCRIPTION: Based on holotype ♂ and paratype ♂ (fig. 15A, B) with differences in paratype ♀ (fig. 15C, D) noted. Measurements in table 3.

Coloration: Carapace brown to orange; moderately infusate throughout, uniformly so around median ocelli, variegated elsewhere. Coxosternum pale orange. Pedipalps orange to reddish brown, carinae darker. Legs pale brown to pale orange, uniformly infusate. Mesosoma brown; tergites brown (♂) or pale brown (♀), densely infusate; sternites pale orange. Metasoma pale orange to brown; carinae weakly to moderately infusate. Telson orange to reddish, uniformly infusate.

Carapace: Anterior margin moderately setose; anteromedian notch moderately deep, U-shaped (fig. 7B). Frontal lobes and interocular surface moderately granular; other surfaces sparsely granular or shagreened. Three pairs of subequal lateral ocelli.

Pedipalps: Orthobothriotaxic, type C. Femur height greater than width (fig. 10B); dorsal intercarinal surface shallowly convex, finely and sparsely granular medially; external intercarinal surface smooth; ventral intercarinal surface flat, smooth; internal intercarinal surface coarsely and densely granular; dorsointernal carina strongly developed, granular; dorsoexternal carina weakly developed, granular proximally and smooth distally; ventroexternal carina obsolete to weakly developed; ventrointernal carina moderately developed, granular proximally, becoming obsolete distally. Patella, dorsal intercarinal surfaces slightly reticulate (♂) or smooth (♀); external and ventral intercarinal surfaces slightly reticulate (fig. 11B); internal intercarinal surface smooth; proximal tubercle moderately developed, bifurcate; dorsointernal carina weakly developed to obsolete; dorsomedian carina moderately developed, crenulate (♂) or weakly developed, smooth (♀); dorsoexternal carina weakly developed, smooth to slightly crenulate (♂) or obsolete, smooth (♀); externomedian weakly developed, smooth; ventroexternal carinae weakly to moderately developed, smooth; ventromedian carina moderately developed, smooth to slightly crenulate; ventrointernal carina strongly developed, comprising large granules. Chela manus, slender, height subequal to width (♂) or rounded, height greater

than width (♀), densely (♂) or sparsely (♀) setose; dorsal intercarinal surface moderately reticulate (♂; fig. 14A) or smooth (♀; fig. 14B); external intercarinal surface smooth; dorsal marginal carina moderately developed, coarsely granular; digital carina strongly developed (♂) or obsolete to weakly developed (♀), smooth; dorsal secondary and external secondary carinae weakly to moderately developed (♂) or obsolete to weakly developed (♀), smooth; ventroexternal carina weakly developed, smooth distally, becoming obsolete proximally; ventromedian carina strongly developed, smooth proximally, becoming obsolete distally, directed toward midpoint of movable finger articulation; ventrointernal carina weakly to moderately developed, smooth; internodorsal carina weakly developed, granular; internomedian and internoventral carinae weakly developed, smooth; internal surface with shallow longitudinal depression where chela rests against patella. Chela fixed finger curved; length equal (♂) or subequal (♀) to femur length and patella length; dorsal surface smooth and densely setose proximally; external surface flat; internal surface shallowly concave.

Legs: Legs I–IV femora and tibiae, prolateral surfaces shagreened; telotarsi, counts of spiniform macrosetae in pro- and retroventral rows (dextral/sinistral), 4/5 4/5: 5/5 5/5: 6/6 6/6: 6/6 6/6.

Pectines: Tooth count: 10–10 (♂; fig. 8B); 8–9 (♀).

Mesosoma: Tergites I–VI, pretergites smooth, posttergites granular; VII granular. Sternites smooth; VII, dorsosubmedian and dorsolateral carinae weakly developed, crenulate.

Metasoma: Metasomal segments I–V, dorsal intercarinal surfaces weakly reticulate on segments I–IV, smooth on V; lateral intercarinal surfaces reticulate; ventral intercarinal surfaces smooth on I–III, sparsely granular on IV and V. Segments I–IV, dorsolateral carinae moderately developed (♂) to weakly developed (♀), granular; lateral supramedian carinae weakly to moderately developed on I, moderately developed, slightly granular to crenulate on II–IV; lateral inframedian carinae moderately developed, slightly granular to crenulate on I and II, weakly to moderately developed, slightly granular on III and IV; ventrolateral carinae moderately developed, crenulate to smooth on I–III, weakly developed, slightly granular on IV; ventrosubmedian carinae moderately developed, slightly crenulate to smooth on I–III, weakly developed, slightly crenulate to smooth on IV. Segment V length:pedipalp femur length ratio, 1.27 (♂), 1.39 (♀); dorsolateral and lateral inframedian carinae weakly to moderately developed, crenulate; ventrolateral carinae moderately developed, crenulate; ventromedian carina moderately developed, granular, with subspiniform granules posteriorly; ventral transverse carina moderately developed, comprising six subspiniform granules; anal arch semicircular; anal subterminal carina strongly developed, comprising 10 subspiniform granules; anal terminal carina moderately developed, granular.

Telson: Telson, width:length ratio, 0.56 (♂), 0.70 (♀). Vesicle, lateral surfaces smooth; ventral surface granular anteriorly. Subaculear tubercle stout, subconical. Aculeus, 1.5 length of subaculear tubercle, strongly curved.

Hemispermaphore: Lamelliform, weakly sclerotized (fig. 9B); total length, 6.5 mm; distal lamella, length, 3.5 mm; capsular region, width, 1.6 mm; median lobe narrow, margin entire.

DISTRIBUTION: *Diplocentrus kraepelini*, n. sp., is known only from the type locality in the San Cristóbal Suchixtlahuaca municipality of Oaxaca (fig. 3A).



FIGURE 13. *Diplocentrus formosus* Armas and Martín-Frías, 2003, habitus, dorsal (A, C) and ventral (B, D) aspect. A, B. ♂ (CNAN). C, D. ♀ (CNAN). Scale bars = 10 mm.

ECOLOGY: This species was observed doorkeeping at burrow entrances at night with UV detection, and was excavated during the daytime. The burrows, constructed at an angle of ca. 30° to the ground surface, were ca. 30 cm long, and mostly straight with some turns around stones in the soil matrix. The dominant vegetation in the area was oak forest. An undetermined species of *Centruroides* Marx, 1890, related to *C. nigrovariatus*, *Vaejovis dzahui* Santibáñez-López and Francke, 2010, and an undetermined species of *Vaejovis* were collected in sympatry. The habitat and habitus of *D. kraepelini*, n. sp., are consistent with the pelophilous ecomorphotype (Prendini, 2001).

Diplocentrus mitlae Francke, 1977

Figures 1D, 5B; tables 1, 2

Diplocentrus mitlae Francke, 1977: 150, 194–198, figs. 4, 16, 23, 59–62; Beutelspacher and Trujillo-Olvera, 1999: 9; Beutelspacher, 2000: 33; Sissom and Fet, 2000: 341; Armas and Martín-Frías, 2003: 74.

TYPE MATERIAL: **MEXICO:** OAXACA: DISTRITO DE TLACOLULA: *Municipio de San Pablo Villa de Mitla*: Holotype ♂ (AMNH), Mitla, 6 mi. N [16°55.252'N 96°21.997'W], 1889 m, 1. ix.1962, M.R. Bogert.

ADDITIONAL MATERIAL: **MEXICO:** OAXACA: DISTRITO DE TLACOLULA: *Municipio de San Pablo Villa de Mitla*: San José del Paso, 1 km N, 16°55.935'N 96°17.220'W, 1880 m, 17.i.2007, C. Santibáñez and N. Gomez, 2 ♀, 1 juv. (CNAN); San José del Paso, 2 km N, 16°55.735'N 96°17.867'W, 1937 m, 15.ix.2009, R. Paredes, C. Santibáñez, and A. Valdez, 2 ♂, 2 juv. (CNAN), 1 subad. ♂ [leg] (AMCC [LP 11034]), 1 ♂ [leg] (AMCC [LP 11465]).

DIAGNOSIS: The following character combination, updated from Francke (1977), is diagnostic for *D. mitlae*. Total length (adult), 50–60 mm. Base coloration (adult) reddish to copper red (fig. 1D). Carapace anteromedian notch shallow, V-shaped. Pedipalp femur, dorsal surface sparsely granular (♂) or smooth (♀). Pedipalp patella (♂, ♀), dorsomedian, dorsoexternal, externomedian and ventromedian carinae weakly developed to obsolete, smooth. Pedipalp chela manus (♂, ♀) slender, dorsal surface smooth; digital and dorsal secondary carinae weakly developed to obsolete, smooth (fig. 5B); fingers longer than manus. Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 4/4:4/5:5/5:5/5 (variation in table 2). Pectinal tooth count, 7–10, mode = 9 (♂) or 7–8, mode = 8 (♀) (variation in table 1).

Diplocentrus mitlae resembles *D. rectimanus* and *D. sagittipalpus*, n. sp., in adult size and coloration but can be distinguished as follows. The pedipalp chela dorsal surface is smooth (♂, ♀) in *D. mitlae* but reticulate (♂) or granular (♀) in *D. rectimanus*, and granular-reticulate (♂) or granular (♀) in *D. sagittipalpus*, n. sp. The pedipalp chela digital carina (♂) is weakly developed in *D. mitlae* but strongly developed in *D. rectimanus* and *D. sagittipalpus*, n. sp. The counts of spiniform macrosetae on the telotarsi of legs III and IV are lower (5/5:5/5) in *D. mitlae* than in *D. rectimanus* and *D. sagittipalpus*, n. sp. (6/6:6/6).

DESCRIPTION OF THE FEMALE: The original description of *D. mitlae* was based on the holotype male, and the female remained unknown until now.

Coloration: Carapace brown to reddish orange; moderately infusate throughout, uniformly so around median ocelli, variegated elsewhere. Coxosternum pale yellow. Pedipalps orange to reddish brown, carinae darker. Legs pale brown to pale orange, uniformly infusate. Mesosoma brown to reddish brown; tergites brown, densely infusate; sternites pale yellow. Metasoma pale brown to reddish brown; carinae weakly to moderately infusate. Telson orange to reddish, uniformly infusate.

Carapace: Anterior margin moderately setose; anteromedian notch moderately deep, V-shaped. Frontal lobes and interocular surface weakly granular; other surfaces sparsely granular or shagreened. Three pairs of subequal lateral ocelli.

Pedipalps: Orthobothriotaxic, type C. Femur height greater than width; dorsal intercarinal surface markedly convex, sparsely granular medially; external intercarinal surface smooth; ventral intercarinal surface flat, smooth; internal intercarinal surface finely and sparsely granular; dorsointernal carina moderately developed, granular; dorsoexternal carina weakly developed, granular proximally and smooth distally; ventroexternal carina obsolete to weakly developed; ventrointernal carina moderately developed, granular proximally, becoming obsolete distally. Patella, all intercarinal surfaces smooth; proximal tubercle moderately developed; dorsointernal carina weakly developed to obsolete; dorsomedian carina weakly developed, smooth; dorsoexternal carina obsolete; externomedian obsolete; ventroexternal carinae obsolete; ventromedian carina obsolete; ventrointernal carina obsolete. Chela manus, rounded, height greater than width, sparsely setose; dorsal and external intercarinal surfaces smooth; dorsal marginal carina weakly developed to obsolete, smooth; digital carina obsolete; dorsal secondary and external secondary carinae obsolete; ventroexternal carina weakly developed to obsolete, smooth distally, becoming obsolete proximally; ventromedian carina weakly developed to obsolete, smooth proximally, becoming obsolete distally, directed toward midpoint of movable finger articulation; ventrointernal carina weakly developed to obsolete, smooth; internodorsal, internomedian and internoventral carinae weakly developed to obsolete, smooth; internal surface with shallow longitudinal depression where chela rests against patella. Chela fixed finger curved; length subequal to femur length and patella length; dorsal surface smooth and moderately setose proximally; external surface flat; internal surface shallowly concave.

Legs: Legs I–IV femora and tibiae, prolateral surfaces shagreened; telotarsi, counts of spiniform macrosetae in pro- and retroventral rows (dextral/sinistral), 4/4 4/4: 4/5 4/5: 5/5 5/5: 5/5 5/5.

Pectines: Tooth count: 7–8.

Mesosoma: Tergites I–VI, pretergites smooth to shagreened, posttergites granular; VII granular. Sternites smooth; VII, dorsosubmedian and dorsolateral carinae weakly developed, crenulate to granular.

Metasoma: Metasomal segments I–V, dorsal intercarinal surfaces minutely granular distally on segments I and II; smooth on III and V; lateral intercarinal surfaces smooth; ventral intercarinal surfaces smooth on I–V. Segments I–IV, dorsolateral carinae weakly developed, granular on I and II; weakly developed to obsolete, smooth on III and IV; lateral suprmedian carinae moderately developed, crenulate to slightly granular on I and II, moderately developed, smooth on III and IV; lateral inframedian carinae moderately developed, slightly granular to crenulate on I–III, weakly developed, smooth on IV; ventrolateral carinae moderately to strongly devel-

oped, granular on I and II, weakly developed, slightly granular to crenulate on III and IV; ventrosubmedian carinae moderately to strongly developed, granular to slightly crenulate on I and II, weakly developed, slightly crenulate to smooth on III and IV. Segment V length:pedipalp femur length ratio, 1.48; dorsolateral and lateral inframedian carinae weakly developed to obsolete, smooth; ventrolateral carinae moderately developed, granular; ventromedian carina moderately developed, granular, with subspiniiform granules posteriorly; ventral transverse carina moderately developed, comprising six subspiniiform granules; anal arch semicircular; anal subterminal carina strongly developed, comprising 12 granules; anal terminal carina moderately developed, granular.

Telson: Telson, width:length ratio, 0.62. Vesicle, lateral surfaces smooth; ventral surface granular anteriorly. Subaculear tubercle stout, subconical. Aculeus, 1.4 length of subaculear tubercle, strongly curved.

DISTRIBUTION: *Diplocentrus mitlae* is known only from the central valleys and adjacent mountains of Oaxaca in the San Pablo Villa de Mitla municipality (fig. 3B).

ECOLOGY: This species was collected under stones and from burrows, ca. 20 cm long, at the base of stones, in an area where the dominant vegetation was oak forest. *Centruroides nigrimanus* and *Vaejovis oaxaca* Santibáñez-López and Sissom, 2010, were collected in sympatry. The habitat and habitus of *D. mitlae* are consistent with the pelophilous ecomorphotype (Prendini, 2001).

Diplocentrus rectimanus Pocock, 1898

Figures 1E, 6A; tables 1, 2

Diplocentrus rectimanus Pocock, 1898: 390, 391; Francke, 1977: 150, 179–185, 190, 194, 198, figs. 6, 15, 21, 45–50; Sissom, 1991: 156; Sissom and Walker, 1992: 130; Sissom, 1994: 257, 262–264, figs. 18, 19, 28, 30; Kovařík, 1998: 131; Beutelspacher and Trujillo-Olvera, 1999: 8; Beutelspacher, 2000: 33; Sissom and Fet, 2000: 342; Armas and Martín-Frías, 2003: 74; Francke and Ponce-Saavedra, 2005: 52; Santibáñez-López and Francke, 2008: 59.

Diplocentrus keyserlingi: Kraepelin, 1899: 102 (part); Pocock, 1902: 4, fig. 4a–c; Herrera, 1917: 270; 1921: 159, figs. 30–33 (part); Hoffmann, 1931: 312, 313 (part); Pelaez, 1962: 72 (part).

Diplocentrus moritzi Stahnke, 1981: 44, figs. 3, 4 (synonymized by Sissom, 1991: 156).

TYPE MATERIAL: **MEXICO**: OAXACA: Holotype ♂, paratype ♂ [*Diplocentrus moritzi*] (ZMB 3248) [not examined]. **DISTRITO DE ETLA**: *Municipio de San Felipe Tejalapam*: Holotype ♂ (BMNH), Jalapa del Valle [17°06.274'N 96°50.357'W], 1640 m [not examined].

ADDITIONAL MATERIAL: **MEXICO**: OAXACA: Oaxaca, 19.vi.1947, B. Malkin, 1 ♀ (AMNH). **DISTRITO CENTRO**: *Municipio de Oaxaca de Juárez*: Ejido Guadalupe Victoria, 17°04.006'N 96°43.20'W, 1700 m, 12.vii.2009, J. Cruz, 1 ♂ (CNAN). *Municipio de Santa Cruz Xoxocotlán*: Monte Albán, [17°02.639'N 96°46.048'W], 30.i.1940, 1 ♂, 3 ♀ (CNAN). *Municipio de Soledad ETLA*: San Gabriel, 7 km N [17°13.65'N 96°44.697'W], 2125 m, 22.vii.2002, O. Francke, E. González and J. Ponce, SW facing slopes with oaks, in burrows in open ground, 2 ♂, 3 ♀ (AMCC [LP 2032]), 1 ♂, 2 ♀ (CNAN); San Miguel ETLA, 9.3 km N (road to las Guacamayas), 17°13.438'N 96°44.301'W, 2196 m, 15.xi.2005, O. Francke, M. Córdova, A. Jaimes, G. Montiel, and C. Santibáñez, 5 ♀ (AMNH), 1 ♀, 2 juv. (AMCC [LP 6540]); San Miguel ETLA, 9

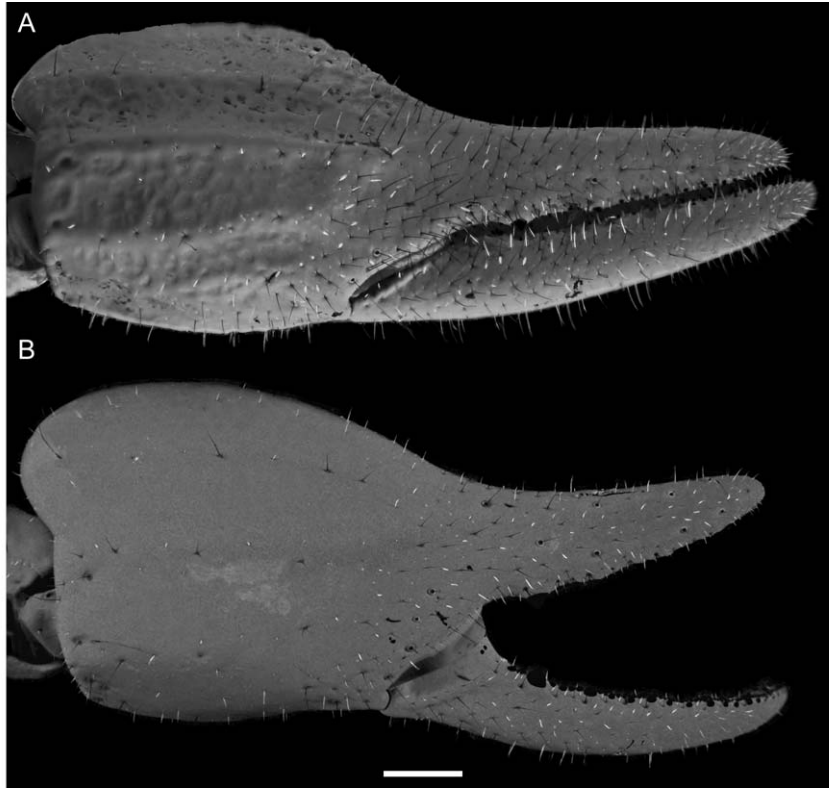


FIGURE 14. *Diplocentrus kraepelini*, n. sp., dextral pedipalp chela, dorsoexternal aspect. **A.** Paratype ♂ (AMNH). **B.** Paratype ♀ (AMNH). Scale bar = 1 mm.

km N, 17°13.486'N 96°44.315'W, 2197 m, 26.iii.2010, O. Francke, J. Cruz, C. Santibáñez, and A. Valdez, pine forest, under rocks, daytime rock rolling, 1 ♂, 1 ♀ (CNAN), 1 ♀ [leg] (AMCC [LP 11036]). DISTRITO DE TLACOLULA: *Municipio de Santiago Matatlán*: San Pablo Guila, 16°48.1'N 96°26.4'W, E. Luna, 1 ♂ (CALA). *Municipio de San Lorenzo Albarradas*: Cerro Guirone, N slope [16°54.383'N 96°16.567'W], 7200–7500 ft, 12.vi.1970, M.R. Bogert, 1 ♀ (AMNH); Mitla, 4.5 km E, 17°15.642'N 96°32.427'W, 23.vii.2002, J. Ponce, in burrow under stone, 1 ♀ (AMCC [LP 2030]).

DIAGNOSIS: The following character combination, updated from Francke (1977), is diagnostic for *D. rectimanus*. Total length (adult), 45–69 mm. Base coloration (adult) dark reddish (fig. 1E). Carapace anteromedian notch shallow, V-shaped. Pedipalp femur, dorsal surface sparsely granular. Pedipalp patella, dorsomedian carina moderately developed, crenulate (♂); dorsoexternal and externomedian carinae weakly developed to obsolete, smooth (♂); ventromedian carina obsolete (♂, ♀). Pedipalp chela manus, dorsal surface reticulate (♂) or granular (♀); digital carina strongly developed, smooth to slightly crenulate (♂); fingers straight to gently curved (fig. 6A). Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 5/5:5/5:6/6:6/6 (variation in table 2). Pectinal tooth count, 9–12, mode = 10 (♂) or 8–9, mode = 8 (♀) (variation in table 1).

Diplocentrus rectimanus resembles *D. mitlae* and *D. sagittipalpus*, n. sp., in adult size and coloration but can be distinguished as follows. The pedipalp chela dorsal surface is reticulate (♂) or granular (♀) in *D. rectimanus* but smooth (♂, ♀) in *D. mitlae*, and the counts of spiniform macrosetae on the telotarsi of legs III and IV are higher (6/6) in *D. rectimanus* than in *D. mitlae* (5/5). The base coloration is brown to pale brown in *D. rectimanus* but reddish to ferruginous in *D. sagittipalpus*, n. sp., and the pedipalp patella dorsoexternal carina is obsolete in *D. rectimanus* but moderately developed and crenulate to weakly granular in *D. sagittipalpus*, n. sp.

REMARKS: Pocock (1898, 1902) listed the type locality as “Jalapa,” but there is more than one locality in Mexico by that name. Hoffmann (1931) assumed that the type locality was Jalapa, Veracruz. However, Francke (1977) concluded that the type locality is probably Jalapa del Valle (16 km W of Oaxaca City), based on the collection of conspecific specimens from several localities in the central valleys of Oaxaca, in the vicinity of this locality.

DISTRIBUTION: *Diplocentrus rectimanus* is known only from the central valleys and adjacent mountains of Oaxaca in the following municipalities: Oaxaca de Juárez, Santa Cruz Xoxocotlán, San Felipe Tejalapam, Santiago Tenango, San Lorenzo Albarradas, San Bartolo Soyaltepec, San Pablo Villa de Mitla, and Soledad Etla (fig. 3B).

ECOLOGY: This species was collected from burrows under rocks, ca. 20 cm long and with many turns due to the presence of small stones in the soil matrix, in an area where the dominant vegetation was pine-oak forest. *Centruroides nigrovariatus* was collected in sympatry. The habitat and habitus of *D. rectimanus* are consistent with the pelophilous ecomorphotype (Prendini, 2001).

Diplocentrus sagittipalpus, n. sp.

Figures 7C, 8C, 9C, 10C, 11C, 16, 17; tables 1–3

TYPE MATERIAL: **MEXICO:** OAXACA: DISTRITO DE IXTLÁN DE JUÁREZ: *Municipio de Santa María Jalteanguis*: Holotype ♂ (CNAN-T0676), 9 ♂, 1 ♀ paratypes (CNAN-T0677), 5 ♂ paratypes (AMNH), Campamento las Flores, 17°21.036'N 96°31.829'W, 2309 m, 16.vi.2007, C. Santibáñez and A. Valdez; paratype ♀ (CNAN), paratype ♀ [leg] (AMCC [LP 10975]), Campamento las Flores, 17°21.0564'N 96°31.8732'W, 2320 m, 22.iv.2010, A. Valdez, C. Santibáñez, J. Cruz, and D. Barrales, pine-oak forest, on the ground, UV light detection. *Municipio de Santa Catarina Ixtepeji*: 2 ♀, 6 juv. paratypes (AMCC [LP 2029]), 7 juv. paratypes (CNAN), Highway 175, S of Ixtlán, 17°15.642'N 96°32.427'W, 2075 m, 21.vii.2002, L. Prendini, E. González, O. Francke, and J. Ponce, in burrows under stones; paratype ♀ (CNAN), 1 juv. paratype (AMCC [LP 11466]), Ixtepeji, 8.4 km del Punto, 17°16.059'N 96°35.275'W, 4.vii.2008, O. Francke, A. Quijano, and C. Santibáñez.

ADDITIONAL MATERIAL: **MEXICO:** OAXACA: DISTRITO DE IXTLÁN DE JUÁREZ: *Municipio de Santa Catarina Ixtepeji*: El Cumbre, on ridge E Cerro San Felipe, road to Ixtlán de Juárez [17°14.336'N 96°29.486'W], 8000–9000 ft, 28.ix.1961, C.M. and M.R. Bogert, 1 ♂ (AMNH); El Punto, road to Ixtlán de Juárez [17°12.779'N 96°35.176'W], 19.viii.1961, C.M. and M.R. Bogert, 4 ♂ (AMNH); El Punto, 1–5 mi. NE, road to Ixtlán de Juárez [17°12.779'N 96°35.176'W], 7500 ft, 3.ix.1961, Miller and Bogert, 1 ♂ (AMNH); Ixtlán de Juárez, 2 mi. E [17°19.929'N 96°29.486'W], 7600 ft, 20.vii.1963, G. Sludder, 1 ♂ (AMNH).



FIGURE 15. *Diplocentrus kraepelini*, n. sp., habitus, dorsal (A, C) and ventral (B, D) aspect. A, B. Paratype ♂ (AMNH). C, D. Paratype ♀ (AMNH). Scale bars = 10 mm.

ETYMOLOGY: The specific epithet describes the arrow-shaped pedipalp, characteristic of this species.

DIAGNOSIS: The following character combination is diagnostic for *D. sagittipalpus*, n. sp. Total length (adult), 45–55 mm. Base coloration (adult) reddish brown to dark brown. Carapace, anteromedian notch moderately deep, V-shaped, and granular (fig. 7C). Pedipalp femur, dorsal surface finely and sparsely granular (fig. 9C). Patella dorsomedian and dorsoexternal carinae moderately developed, crenulate to weakly granular (♂); externomedian carina weakly to moderately developed, smooth to slightly crenulate (♂; fig. 11C); ventromedian carina weakly developed, granular (♂, ♀). Pedipalp chela, dorsal surface granular-reticulate (♂) or granular (♀); digital carina strongly developed, smooth (♂; fig. 16A) or granular (♀; fig. 16B); fingers straight (♂). Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 5/5:5/5:6/6:6/6 (variation in table 1). Pectinal tooth count, 9–12, mode = 10 (♂) or 8–9, mode = 8 (♀) (variation in table 2).

Diplocentrus sagittipalpus, n. sp., resembles *D. kraepelini*, n. sp., and *D. rectimanus* in size and coloration but can be distinguished as follows. The pedipalp patella dorsoexternal carina is moderately developed, crenulate to weakly granular in *D. sagittipalpus*, n. sp., but weakly developed and smooth in *D. kraepelini*, n. sp., and *D. rectimanus*. The pedipalp chela manus (♀), dorsal surface is reticulate and the digital carina granular in *D. sagittipalpus*, n. sp., whereas the dorsal surface and digital carina are smooth in *D. kraepelini*, n. sp. The pedipalp chela fingers are curved in *D. kraepelini*, n. sp., but straight in *D. sagittipalpus*, n. sp. The base coloration (adult) is reddish to ferruginous, with the pedipalps and carapace similar in coloration, in *D. sagittipalpus*, n. sp., but brown to pale brown, with the pedipalps paler than the carapace, in *D. rectimanus*. The pedipalp patella dorsal external carina (♂) is moderately developed and crenulate to weakly granular in *D. sagittipalpus*, n. sp., but obsolete in *D. rectimanus*. The pedipalp chela fingers (♂) are straight in *D. sagittipalpus*, n. sp., but gently curved in *D. rectimanus*. The distal lamella of the hemispermatophore is broad in *D. sagittipalpus*, n. sp., and in *D. rectimanus* (see Sissom, 1994: fig. 18), whereas it is slender with a curved tip in *D. kraepelini*, n. sp.

DESCRIPTION: Based on holotype ♂ and paratype ♂ (fig. 17A, B) with differences in paratype ♀ (fig. 17C, D) noted. Measurements in table 3.

Coloration: Carapace reddish brown to orange (♂) or dark reddish (♀); moderately infusate throughout, uniformly so around median ocelli, variegated elsewhere. Coxosternum pale orange. Pedipalps orange to pale brown, patella slightly infusate, chela reddish orange to pale brown (♂) or dark reddish (♀), carinae darker. Legs brown to reddish brown, uniformly and faintly infusate. Mesosoma pale orange to brown (♂) or dark brown to brown (♀); tergites moderately (♂) to densely (♀) infusate; sternites pale yellow to orange. Metasoma light orange to reddish brown. Telson pale orange to brown, uniformly infusate.

Carapace: Anterior margin moderately setose; anteromedian notch moderately deep, V-shaped (fig. 7C). Frontal lobes and interocular surface moderately to densely granular; surfaces around median ocular tubercle shagreened; other surfaces uniformly finely granular. Three pairs of subequal lateral ocelli.

Pedipalps: Orthobothriotaxic, type C. Femur height greater than width (fig. 10C); dorsal intercarinal surface moderately convex, finely and sparsely granular; external intercarinal surface

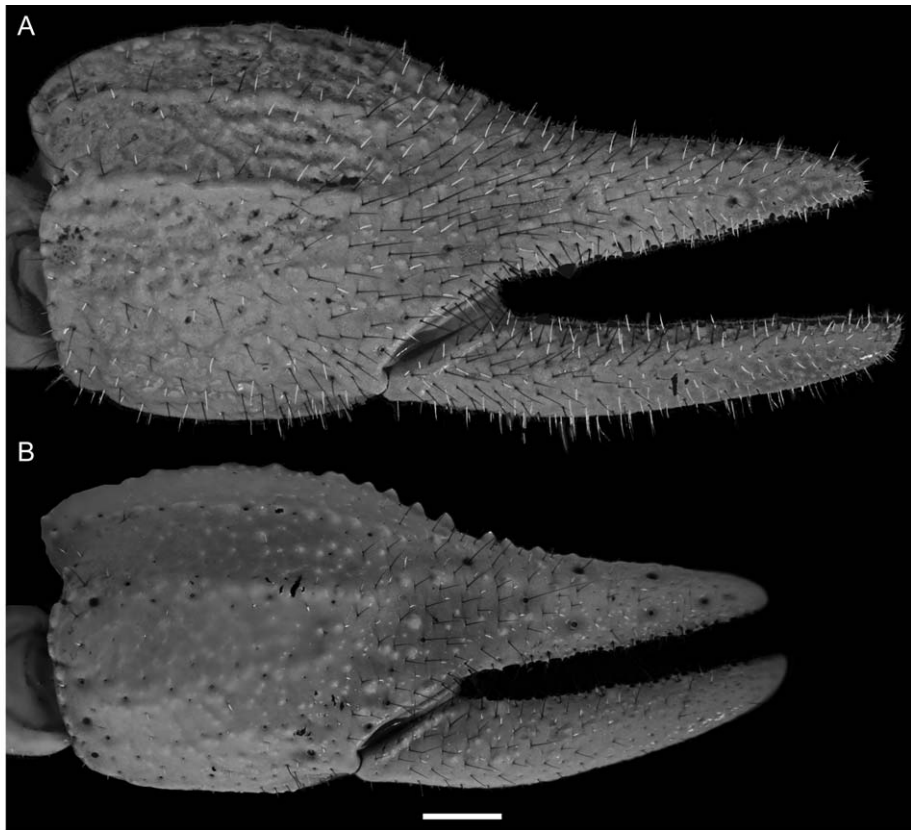


FIGURE 16. *Diplocentrus sagittipalpus*, n. sp., dextral pedipalp chela, dorsoexternal aspect. A. Paratype ♂ (AMNH). B. Paratype ♀ (AMNH). Scale bar = 1 mm.

smooth; ventral intercarinal surface flat, shagreened; internal intercarinal surface coarsely and densely granular; dorsointernal carina strongly developed, comprising several spiniform granules; dorsoexternal carina weakly developed, comprising few spiniform granules; ventroexternal carina obsolete; ventrointernal carina moderately developed, comprising large spiniform granules. Patella, dorsal and external intercarinal surfaces slightly granular-reticulate (fig. 11C); ventral intercarinal surface granular between ventrointernal and ventromedian carinae, smooth to slightly reticulate between ventromedian and ventroexternal carinae (♂) or entirely smooth (♀); internal intercarinal surface finely and sparsely granular; proximal tubercle strongly developed, comprising three large granules; dorsointernal carina obsolete; dorsomedian carina moderately developed, slightly granular to crenulate; dorsoexternal carina moderately developed, slightly granular to crenulate (♂) or obsolete to weakly developed, smooth (♀); externomedian and ventroexternal carinae weakly to moderately developed, smooth to slightly crenulate; ventromedian carina weakly developed, granular (♂) or obsolete to weakly developed, smooth (♀); ventrointernal carina weakly to moderately developed, granular. Chela manus, slender (♂) or rounded (♀), height greater than width, densely (♂) or sparsely (♀) setose; dorsal intercarinal surface granular-reticulate (♂) or granular (♀); external intercarinal surface granular (fig. 16B); dorsal marginal carina moderately developed, coarsely granular (♂), often with large subspini-

form granules (♀); digital carina strongly developed, crenulate (♂) or moderately developed, granular (♀); dorsal secondary carina weakly to moderately developed, crenulate (♂) or granular (♀); external secondary carina weakly developed, smooth to crenulate (♂) or weakly to moderately developed, granular (♀); ventroexternal carina weakly to moderately developed, crenulate; ventromedian carina obsolete to weakly developed, crenulate, directed toward midpoint of movable finger articulation; ventrointernal carina obsolete to weakly developed, smooth to slightly crenulate; internoventral, internomedian and internodorsal carinae weakly developed, smooth to slightly granular; internal surface with shallow longitudinal depression where chela rests against patella. Chela fixed finger straight (♂) or curved (♀); length equal to (♂) or less than (♀) femur length and patella length; dorsal surface smooth and densely setose proximally; external surface flat; internal surface flat to shallowly concave.

Legs: Legs I–IV femora and tibiae, prolateral surfaces shagreened; telotarsi, counts of spiniform macrosetae in pro- and retroventral rows (dextral/sinistral), 5/5 5/5:5/5 5/5:5/6 5/6:6/6 6/6.

Pectines: Tooth count: 10–11 (♂; fig. 8C); 8–9 (♀).

Mesosoma: Tergites I–VI, smooth, VII granular (♂) or coarsely granular (♀). Sternites smooth; VII, dorsosubmedian carinae obsolete to weakly developed, smooth in anterior half of segment, dorsolateral carinae weakly to moderately developed, smooth, extending three quarters of segment length.

Metasoma: Metasomal segments I–V, dorsal intercarinal surfaces moderately to weakly granular anteriorly on segments I–III, weakly granular to smooth on IV and V; lateral intercarinal surfaces moderately to weakly granular on I–III, moderately granular or granular-reticulate on IV and V; ventral intercarinal surfaces smooth to shagreened on I–IV, sparsely granular on V. Segments I–IV, dorsolateral carinae obsolete to weakly developed, granular (♂) or weakly granular (♀); lateral suprmedian carinae weakly to moderately developed, granular on I–III, weakly developed, granular on IV; lateral inframedian carinae weakly to moderately developed, granular to slightly crenulate on I–III, weakly developed, granular on IV; ventrolateral carinae strongly developed, granular to crenulate on I–III, weakly to moderately developed, granular to crenulate on IV; ventrosubmedian carinae strongly developed, granular to crenulate on I–III, weakly to moderately developed, slightly granular to crenulate on IV. Segment V length:pedipalp femur length ratio, 1.28 (♂), 1.11 (♀); dorsolateral carinae weakly developed, slightly granular to smooth; lateral median carinae obsolete to weakly developed, smooth; ventrolateral carinae moderately developed, granular, with few subspiniform granules contiguous with transverse carina; ventromedian carina strongly developed, granular, with subspiniform granules; ventral transverse carina comprising four large subspiniform granules; anal arch semicircular; anal subterminal carina moderately developed, comprising 12 granules; anal terminal carina obsolete, weakly granular.

Telson: Telson, width:length ratio, 0.54 (♂), 0.78 (♀). Vesicle, lateral surfaces shagreened. Subaculear tubercle stout, subconical. Aculeus length twice that of subaculear tubercle, strongly curved.

Hemispermaphore: Lamelliform, weakly sclerotized (fig. 9C); total length, 7.5 mm; distal lamella, length, 3.9 mm; capsular region, width, 1.6 mm; median lobe narrow, margin crenulate.



FIGURE 17. *Diplocentrus sagittipalpus*, n. sp., habitus, dorsal (A, C) and ventral (B, D) aspect. A, B. Paratype ♂ (AMNH). C, D. Paratype ♀ (AMNH). Scale bars = 10 mm.

DISTRIBUTION: *Diplocentrus sagittipalpus*, n. sp., is known from six localities in the Sierra Norte of Oaxaca (fig. 3A).

ECOLOGY: This species was collected with UV light detection at night on short grass plains in a deforested area surrounded by pine-oak forest. No burrows were observed. An undescribed species of *Vaejovis* was collected in sympatry. The habitat and habitus of *D. sagittipalpus*, n. sp., are consistent with the pelophilous ecomorphotype (Prendini, 2001).

***Diplocentrus sissomi*, n. sp.**

Figures 1B, F, 7D, 8D, 9D, 10D, 11D, 18, 19; tables 1–3

TYPE MATERIAL: **MEXICO: OAXACA: DISTRITO DE MIAHUATLÁN:** *Municipio de San Cristóbal Amatlán*: Holotype ♂ (CNAN-T0678), 3 ♂, 8 ♀, 3 juv. paratypes (CNAN-T0679), 3 ♂, 7 ♀, 2 subad. ♀, 5 juv. paratypes (AMNH), 1 ♀, 22 juv. paratypes (AMCC [LP 6531]), 1 ♀, 18 juv. paratypes (AMCC [LP 6538]), 1 ♀, 12 juv. paratypes (AMCC [LP 6539]), 1 ♀, 2 juv. paratypes (AMCC [LP 6541]), San Lorenzo Mixtepec, 1 km N, 16°17.493'N 96°20.910'W, 2120 m, 23.vi.2006, O. Francke, G. Villegas, H. Montaña, A. Valdez, and C. Santibáñez. *Municipio de San Juan Mixtepec*: San Juan Mixtepec, 16°16.6'N 96°17.95'W, April, 2002, E. Aldasoro, 2 ♂ paratypes (CALA).

ETYMOLOGY: This species is dedicated to W. David Sissom, West Texas A&M University, in recognition of his contributions to the systematics of *Diplocentrus*.

DIAGNOSIS: The following character combination is diagnostic for *D. sissomi*, n. sp. Total length (adult), 47–60 mm. Base coloration (adult) red to reddish orange (fig. 1B, F). Carapace anteromedian notch shallow, V-shaped; frontal lobes and interocular surface moderately granular (fig. 7D). Pedipalp femur, dorsal surface sparsely granular (fig. 9D). Pedipalp patella, dorsomedian carina moderately developed, smooth (♂); dorsoexternal carina moderately developed, crenulate (♂); externomedian carina weakly to moderately developed, smooth to weakly crenulate (♂; fig. 11D); ventromedian carina weakly developed, smooth to weakly granular (♂, ♀). Pedipalp chela, dorsal surface reticulate (♂) or smooth (♀); digital carina strongly developed (♂) or weakly developed (♀), smooth; fingers straight (♂; fig. 18A) or curved (♀; fig. 18B). Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 5/5:5/6:6/6:6/6 (variation in table 1). Pectinal tooth count, 8–10, mode = 10 (♂) or 6–10, mode = 8 (♀) (variation in table 2).

Diplocentrus sissomi, n. sp., resembles *D. kraepelini*, n. sp., *D. rectimanus*, and *D. sagittipalpus*, n. sp., in adult coloration, and the counts of pectinal teeth and telotarsal spiniform macrosetae, but differs from these species as follows. The carapace anteromedian notch is shallow and V-shaped in *D. sissomi*, n. sp., but moderately deep and U-shaped in *D. kraepelini*, n. sp. The counts of spiniform macrosetae on the telotarsi of legs I and II are higher (5/5:5/6) in *D. sissomi*, n. sp., than in *D. kraepelini*, n. sp. (4/5:5/5). The pedipalp patella dorsoexternal carina is moderately developed and crenulate in *D. sissomi*, n. sp., but weakly developed to obsolete and smooth in *D. kraepelini*, n. sp., and *D. rectimanus*. The pedipalp chela fixed finger is moderately curved (♂) and the chela manus digital carina smooth (♀) in *D. sissomi*, n. sp., whereas the fixed finger is straight (♂) and the digital carina granular

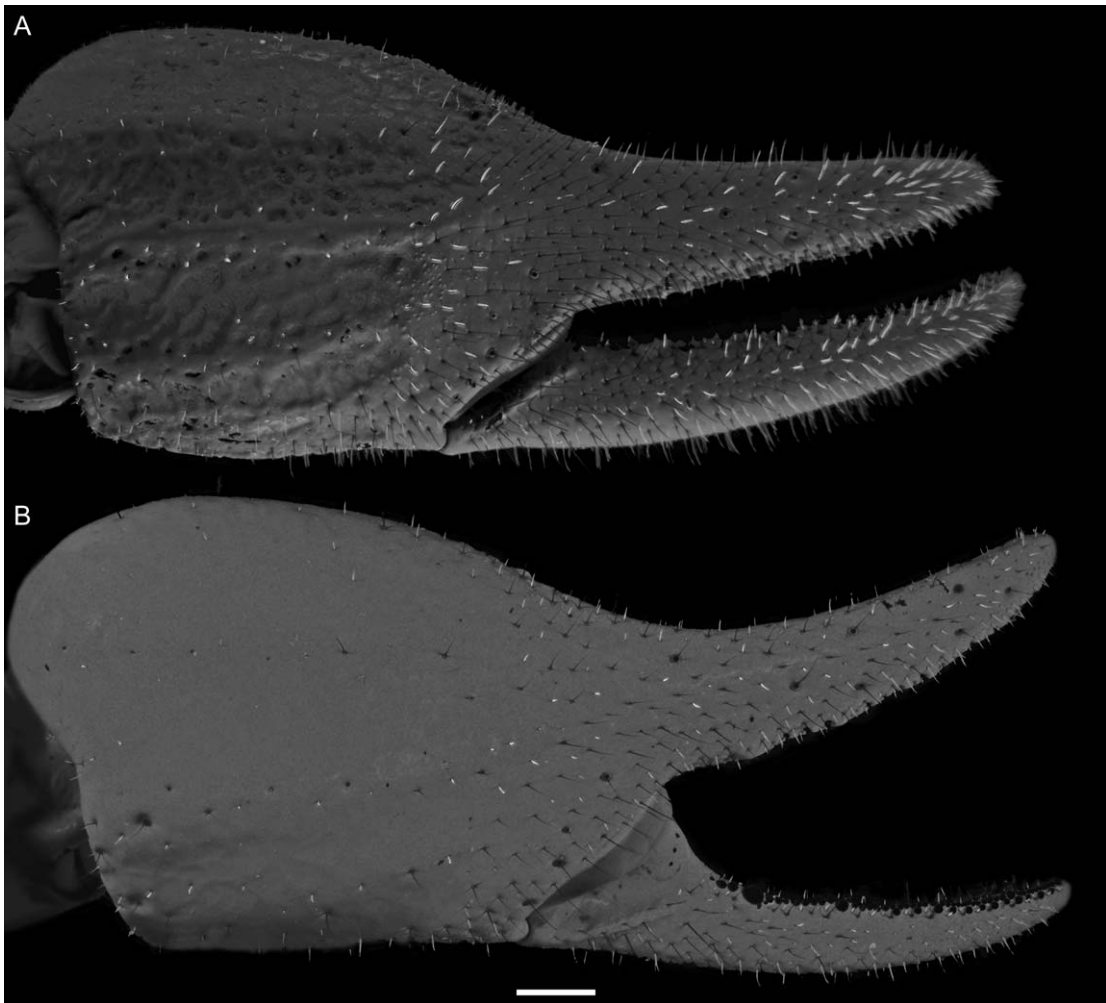


FIGURE 18. *Diplocentrus sissomi*, n. sp., dextral pedipalp chela, dorsoexternal aspect. A. Paratype ♂ (AMNH). B. Paratype ♀ (AMNH). Scale bar = 1 mm.

(♀) in *D. rectimanus* and *D. sagittipalpus*, n. sp. The distal lamella of the hemispermatophore is slender in *D. sissomi*, n. sp., and *D. kraepelini*, n. sp., but broad in *D. rectimanus* and *D. sagittipalpus*. The total length: hemispermatophore length ratio is 5.51 in *D. sissomi*, n. sp. (paratype), 6.94 in *D. sagittipalpus*, n. sp. (paratype), and 7.67 in *D. kraepelini*, n. sp. (paratype).

DESCRIPTION: Based on holotype ♂ and paratype ♂ (fig. 19A, B) with differences in paratype ♀ (fig. 19C, D) noted. Measurements in table 3.

Coloration: Carapace brown (♂) or pale brown (♀); moderately infuscate throughout, uniformly so around median ocelli, variegated elsewhere. Coxosternum cream to pale orange. Pedipalps brown to reddish brown, carinae darker; patella faintly infuscate; chela, carinae, and fingers infuscate. Legs pale brown to yellow, uniformly infuscate. Mesosoma orange (♂) or pale

orange (♀); tergites moderately (♂) to densely (♀) infusate; sternites orange to pale orange. Metasoma pale brown. Telson brownish orange, uniformly infusate.

Carapace: Anterior margin moderately setose; anteromedian notch moderately deep, V-shaped (fig. 7D). Frontal lobes and interocular surface moderately granular; other surfaces shagreened. Three pairs of subequal lateral ocelli.

Pedipalps: Orthobothriotaxic, type C. Femur height greater than width (fig. 10D); dorsal intercarinal surface shallowly convex, sparsely granular; external intercarinal surface finely and sparsely granular; ventral intercarinal surface flat, shagreened; internal intercarinal surface coarsely and densely granular; dorsointernal carina strongly developed, granular; dorsoexternal carina moderately developed, granular proximally, crenulate distally; ventroexternal carina weakly developed, granular; ventrointernal carina strongly developed, granular. Patella, dorsal and external intercarinal surfaces weakly to moderately reticulate (fig. 11D); ventral intercarinal surface smooth to slightly reticulate along ventroexternal carina; internal intercarinal surface moderately granular; proximal tubercle moderately developed, bifurcate; dorsointernal carina weakly developed to obsolete; dorsomedian carina moderately developed, smooth; dorsoexternal carina moderately developed, crenulate (♂) or obsolete (♀); externomedian carina weakly to moderately developed, smooth to slightly crenulate (♂) or obsolete (♀); ventroexternal carina moderately developed, crenulate; ventromedian carina weakly to moderately developed, smooth to slightly granular; ventrointernal carina strongly developed, comprising large granules. Chela manus slender, height subequal to width (♂) or rounded, height greater than width (♀), densely (♂) or sparsely (♀) setose; dorsal intercarinal surface markedly reticulate (♂) or smooth (♀); external intercarinal surface slightly reticulate (♂) or smooth to slightly shagreened (♀; fig. 18A); dorsal marginal carina weakly to moderately developed, granular; digital carina strongly developed (♂) or weakly developed (♀), smooth; dorsal secondary carina weakly to moderately developed, smooth to slightly crenulate (♂) or obsolete (♀; fig. 18B); external secondary carina moderately developed, crenulate (♂) or obsolete (♀); ventroexternal and ventromedian carinae strongly developed, crenulate; ventromedian carina directed toward midpoint of movable finger articulation; ventrointernal carina strongly developed, granular; internoventral, internomedian, and internodorsal carinae moderately developed, granular; internal surface with shallow longitudinal depression where chela rests against patella. Chela fixed finger moderately curved; length less than femur length and patella length; dorsal surface smooth and densely setose proximally; external surface flat; internal surface shallowly concave.

Legs: Legs I–IV femora and tibiae, prolateral surfaces shagreened; telotarsi, counts of spiniform macrosetae in pro- and retroventral rows (dextral/sinistral), 5/5 5/5:5/6 5/6:6/6 6/6:6/6 6/6.

Pectines: Tooth count: 10–10 (♂; fig. 8D); 8–9 (♀).

Mesosoma: Tergites I–VI, pretergites smooth, posttergites granular, VII granular. Sternites smooth; VII, dorsosubmedian and dorsolateral carinae obsolete anteriorly, more strongly developed and crenulate posteriorly.

Metasoma: Metasomal segments I–V, dorsal and lateral intercarinal surfaces shagreened; ventral intercarinal surfaces smooth on I and II, shagreened on IV and V. Segments I–IV, dor-

solateral carinae obsolete to weakly developed, granular on I, weakly developed, granular on II, weakly to moderately developed, granular on III and IV; lateral suprmedian carinae strongly developed, granular to crenulate on I, strongly developed, granular on II–IV; lateral inframedian carinae moderately developed, slightly serrate to crenulate on I, crenulate on II, slightly crenulate to granular on III and IV; ventrolateral carinae moderately developed, serrate to crenulate (♂) or granular to slightly crenulate (♀) on I and II, strongly developed, crenulate (♂) or moderately developed, granular to slightly crenulate (♀) on III, moderately developed, granular on IV; ventrosubmedian carinae moderately developed, crenulate (♂) or granular to slightly crenulate (♀) on I–III, weakly developed, granular to slightly crenulate on IV. Segment V length:pedipalp femur length ratio, 1.40 (♂), 1.25 (♀); dorsolateral carinae moderately developed, granular to slightly serrate; lateral inframedian carinae moderately developed, granular; ventromedian carina strongly developed, granular, with subspiniiform granules; ventral transverse carina moderately developed, incomplete, comprising four large, subspiniiform granules; anal arch semicircular; anal subterminal carina moderately developed, comprising 11 granules; anal terminal carina moderately developed, granular.

Telson: Telson, width:length ratio, 0.5 (♂), 0.69 (♀). Vesicle, lateral surfaces shagreened; ventral surface granular anteriorly. Subaculear tubercle stout, subconical. Aculeus, 1.5 length of subaculear tubercle, strongly curved.

Hemispermatothore: Lamelliform, weakly sclerotized (fig. 9D); total length, 8.5 mm; distal lamella, length, 4.6 mm; capsular region, width, 1.7 mm; median lobe narrow, margin crenulate.

DISTRIBUTION: *Diplocentrus sissomi*, n. sp., is known only from the type locality in the San Cristóbal Amatlán municipality of Oaxaca (fig. 3B).

ECOLOGY: This species was collected during daytime, under logs and in burrows, ca. 30–40 cm long by 20–25 cm deep, and often curved due to the presence of small stones in the soil matrix (fig. 1B, F), in an area where the dominant vegetation was mixed pine-oak forest. *Vaejovis oaxaca* was collected in sympatry. The habitat and habitus of *D. sissomi*, n. sp., are consistent with the pelophilous ecomorphotype (Prendini, 2001).

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Figure 6B; tables 1, 2

Diplocentrus tenango Santibáñez-López and Francke 2008: 54–59.

TYPE MATERIAL: **MEXICO**: OAXACA: DISTRITO DE TEHUANTEPEC: *Municipio de San Miguel Tenango*: Holotype ♂ (CNAN-T0273), 2 ♀ paratypes (CNAN-T0274, 275), 2 juv. paratypes (CNAN-T0276, 277), 2 ♀, 1 juv. paratypes (AMNH), 1 ♀, 1 subad. ♀, 3 juv. ♀ paratypes (AMCC [LP 3693]), San Miguel Tenango, 0.5 km W, 16°15.515'N 95°35.9533'W, 1571 m, 2.xi.2004, O. Francke, G. Villegas, and R. Paredes, UV light detection at night.

DIAGNOSIS: The following character combination, updated from Santibáñez-López and Francke (2008), is diagnostic for *D. tenango*. Total length (adult), 40–50 mm. Base coloration (adult) dark brown to reddish brown. Carapace anteromedian notch moderately deep, V-shaped; margins weakly granular. Pedipalp femur, dorsal surface sparsely granular, especially medially.



FIGURE 19. *Diplocentrus sissomi*, n. sp., habitus, dorsal (A, C) and ventral (B, D) aspect. A, B. Paratype ♂ (AMNH). C, D. Paratype ♀ (AMNH). Scale bars = 10 mm.

Patella dorsomedian carina strongly developed, crenulate (δ); dorsoexternal carina moderately developed, smooth to crenulate (δ); externomedian carina weakly to moderately developed, smooth to crenulate (δ); ventromedian carina strongly developed, crenulate (δ) or weakly developed, smooth (♀). Pedipalp chela manus, dorsal surface reticulate (δ ; fig. 6B) or weakly reticulate (♀); digital carina strongly developed, smooth (δ) or moderately developed, smooth to crenulate (♀). Legs I–IV telotarsi, counts of spiniform macrosetae in pro- and retroventral rows, 6/6:6/6:7/7:7/7 (variation in table 1). Pectinal tooth count, 12–13, mode = 13 (δ) or 10–11, mode = 11 (♀) (variation in table 2).

Diplocentrus tenango is most similar to *D. keyserlingii*, *D. rectimanus*, and *D. sissomi*, n. sp., from which it may be distinguished as follows. The pedipalp patella ventromedian carina (δ , ♀) is strongly developed and crenulate in *D. tenango*, obsolete in *D. keyserlingii* and *D. rectimanus*, and weakly developed and smooth to slightly granular in *D. sissomi* sp. n. The pedipalp chela manus (δ) is rounded, with short, curved fingers in *D. tenango* but slender, with long, straight fingers in *D. rectimanus*. The counts of spiniform macrosetae on the telotarsi of legs III and IV are higher (7/7:7/7) in *D. tenango* than in *D. keyserlingii* (5/5:5/6), *D. rectimanus* (6/6:6/6), and *D. sissomi*, n. sp. (5/5:5/6). The pectinal tooth count is higher in *D. tenango* (δ : 12–13; ♀ : 10–11) than in *D. keyserlingii* (δ : 7–9; ♀ : 6–8) and *D. sissomi*, n. sp. (δ : 8–10; ♀ : 6–10).

DISTRIBUTION: *Diplocentrus tenango* is known only from the type locality in the San Miguel Tenango municipality of Oaxaca (fig. 3B).

ECOLOGY: This species was collected from burrows in road cuts along a logging track in pine forest. *Centruroides hoffmanni* Armas, 1996, was collected in sympatry. The habitat and habitus of *D. tenango* are consistent with the pelophilous ecomorphotype (Prendini, 2001).

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REFERENCES

- Armas, L.F. 2006. Name-bearing types of scorpions deposited at the Institute of Ecology and Systematics, Havana, Cuba (Arachnida: Scorpiones). *Euscorpius* 33: 1–14.
- Armas, L.F., and E. Martín-Frías. 2000. Cuatro especies nuevas de *Diplocentrus* (Scorpiones: Diplocentridae) de México. *Anales de la Escuela Nacional de Ciencias Biológicas* 46: 25–40.
- Armas, L.F., and E. Martín-Frías. 2003. Dos nuevas especies de *Diplocentrus* Peters, 1861 (Scorpiones: Diplocentridae) de México. *Revista Ibérica de Aracnología* 7: 71–77.
- Banks, N. 1910. The scorpions of California. *Pomona College Journal of Entomology* 2: 185–190.
- Beutelspacher, C.R. 2000. Catálogo de los Alacranes de México. Morelia, Michoacán: Universidad Michoacana de San Nicolás de Hidalgo, 175 pp.
- Beutelspacher, C.R. and M. Trujillo-Olvera. 1999. Una especie nueva de *Diplocentrus* Peters (Scorpiionida: Diplocentridae) de Chiapas, México. *Revista Nicaragüense de Entomología* 50: 1–11.
- [Birula, A.A.] Byalynitskii-Birulya, A.A. 1917a. Arachnoidea arthrogastra Caucasia. Pars I. Scorpiones. *Zapiski Kavkazskogo Muzeya (Mémoires du Musée du Caucase)*. Tiflis, Georgia: Imprimerie de la Chancellerie du Comité pour la Transcaucasie A (5), 253 pp. [in Russian; published August 1917; English translation: 1964. *Arthrogastric Arachnids of Caucasia*. 1. Scorpions. Jerusalem: Israel Program for Scientific Translations, 170 pp.]
- [Birula, A.A.] Byalynitskii-Birulya, A.A. 1917b. Faune de la Russie et des pays limitrophes fondée principalement sur les collections du Musée Zoologique de l'Académie des Sciences de Russie. Arachnides (Arachnoidea). Petrograd [St. Petersburg]: Russian Academy of Sciences, Museum of Zoology 1 (1): xx, 227 pp. [in Russian; introduction dated October 1917; English translation: 1965. *Fauna of Russia and Adjacent Countries*. Arachnoidea. Vol. I. Scorpions. Jerusalem: Israel Program for Scientific Translations, xix, 154 pp.]
- Bücherl, W. 1971. Classification, biology and venom extraction of scorpions. In W. Bücherl and E. Buckley (editors), *Venomous animals and their venoms*, vol. 3: 317–348. New York: Academic Press.
- Caporiacco, L. di. 1938. Aracnida del Messico, di Guatemala e Honduras Britannico. *Atti della Società Italiana di Scienze Naturali* 77 (3): 251–282.
- Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) 2011. Geoinformación, metadatos y mapoteca digital. Internet resource (<http://www.conabio.gob.mx/informacion/gis/>), accessed March 2011.
- Ewing, H.E. 1928. The scorpions of the western part of the United States; with notes on those occurring in northern Mexico. *Proceedings of the U.S. National Museum* 73: 1–24.
- Francke, O.F. 1977. Scorpions of the genus *Diplocentrus* from Oaxaca, Mexico (Scorpionida, Diplocentridae). *Journal of Arachnology* 4: 145–200.
- Francke, O.F. 1978. Systematic revision of diplocentrid scorpions from circum-Caribbean lands. *Special Publications of the Museum, Texas Tech University* 14: 1–92.
- Francke, O.F. 1985. *Conspectus genericus scorpionorum 1758–1982* (Arachnida: Scorpiones). *Occasional Papers of the Museum, Texas Tech University* 98: 1–32.
- Francke, O.F. 2007. Alacranes (Arachnida: Scorpiones) de Frontera Corozal, en la selva Lacandona, Chiapas, México, con la descripción de una nueva especie de *Diplocentrus* (Diplocentridae). *Revista Mexicana de Biodiversidad* 78: 69–77.
- Francke, O.F., and J. Ponce-Saavedra. 2005. A new species of *Diplocentrus* (Arachnida: Scorpiones) from Michoacán, Mexico. *Revista Mexicana de Biodiversidad* 76: 49–53.

- Francke, O.F., and A. Quijano-Ravell. 2009. Una especie nueva de *Diplocentrus* (Scorpiones: Diplocentridae) del estado de Michoacán, México. *Revista Mexicana de Biodiversidad* 80: 659–663.
- Fritts, D.A., and W.D. Sissom. 1996. Two new *Diplocentrus* (Scorpiones, Diplocentridae) from Mexico. *Entomological News* 107: 39–48.
- Gertsch, W.J. 1939. Report on a collection of Arachnida from the Chisos Mountains. *Contributions from the Baylor University Museum* 24: 17–26.
- Guijosa, S. 1973. Una nueva especie de *Diplocentrus* en México. *Anales de la Escuela Nacional de Ciencias Biológicas* 20: 145–156.
- Hadley, A. 2008. CombineZM. Internet resource (<http://hadleyweb.pwp.blueyonder.co.uk/>), accessed September 2011.
- Herrera, M. 1917. Los alacranes de México. *Boletín de la Dirección de Estudios Biológicos* 2: 265–275.
- Herrera, M. 1921. Los escorpiones de México. *Memorias y Revista de la Sociedad Científica 'Antonio Alzate'* 39: 137–159.
- Hoffmann, C.C. 1931. Monografías para la entomología médica de México. Monografía Num. 2, Los escorpiones de México. Primera parte: Diplocentridae, Chactidae, Vejovidae. *Anales del Instituto de Biología, Universidad Nacional Autónoma de México* 2: 291–408.
- Hoffmann, C.C. 1938. Nuevas consideraciones acerca de los alacranes de México. *Anales del Instituto de Biología Universidad Nacional Autónoma de México* 9: 318–337.
- Instituto Nacional de Estadística, Geografía e Informática (INEGI). 2011. Archivo Histórico de Localidades de México. Internet resource (http://www.inegi.org.mx/geo/contenidos/geoestadistica/consulta_localidades.aspx), accessed March 2011.
- Jarvis A., H.I. Reuter, A. Nelson, and E. Guevara. 2008. Hole-filled seamless SRTM data Ver. 4, International Centre for Tropical Agriculture. Internet resource (<http://srtm.csi.cgiar.org>), accessed September, 2012.
- Karsch, F. 1880. Arachnologische Blätter. X. Scorpionologische Fragmente. *Zeitschrift für die Gesellschaft der Naturwissenschaften* 53: 404–409.
- Kästner, A. 1941. 1. Ordnung der Arachnida: Scorpiones. In T. Krumbach (editor), *Handbuch der Zoologie* 3 (1): 117–240. Berlin: Walter de Gruyter.
- Kraepelin, K. 1894. Revision der Scorpione. II. Scorpionidae und Bothriuridae. Beiheft zum Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten 11: 1–248.
- Kraepelin, K. 1899. Scorpiones und Pedipalpi. In F. Dahl (editor), *Das Tierreich* 8 (Arachnoidea): 1–265. Herausgegeben von der Deutschen Zoologischen Gesellschaft. Berlin: R. Friedländer und Sohn.
- Kovařík, F. 1998. Štíři (Scorpions). Jihlava, Czech Republic: Madagaskar, 175 pp.
- Lamoral, B.H. 1979. The scorpions of Namibia (Arachnida: Scorpionida). *Annals of the Natal Museum* 23: 497–784.
- Laurie, M. 1896a. Notes on the anatomy of some scorpions, and its bearing on the classification of the order. *Annals and Magazine of Natural History* (6) 17: 185–193.
- Laurie, M. 1896b. Further notes on the anatomy and development of scorpions, and their bearing on the classification of the order. *Annals and Magazine of Natural History* 18: 121–133.
- McWest, K.J. 2009. Tarsal spinules and setae of vaejovid scorpions (Scorpiones: Vaejovidae). *Zootaxa* 2001: 1–126.
- Mello-Campos, O. 1924. Os escorpiões brasileiros. *Memórias do Instituto Oswaldo Cruz* 17(2): 237–301.
- Moritz, M., and S.C. Fischer. 1980. Die Typen der Arachniden-Sammlung des Zoologischen Museums Berlin. III. Scorpiones. *Mitteilungen aus dem Zoologischen Museum in Berlin* 2: 309–326.

- Nenilin, A.B. and V. Fet. 1992. Zoogeographical analysis of the world scorpion fauna (Arachnida: Scorpiones). *Arthropoda Selecta* 1: 3–31. [in Russian; English summary]
- Peters, W. 1861. Ueber eine neue Eintheilung der Skorpione und ueber die von ihm in Mossambique gesammelten Arten von Skorpionen. *Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin* 1861: 507–516.
- Pelaez, D. 1962. *Hoffmanita mexicana* gen. et sp. nov., Cheyletidae parásito de un alacrán del género *Centruroides*. *Anales de la Escuela Nacional de Ciencias Biológicas* 11: 71–78.
- Pocock, R.I. 1893. Contributions to our knowledge of the arthropod fauna of the West Indies. Part I. Scorpiones and Pedipalpi, with a supplementary note upon the freshwater Decapoda of St. Vincent. *Journal of the Linnean Society* 24: 374–409.
- Pocock, R.I. 1898. Descriptions of some new scorpions from Central and South America. *Annals and Magazine of Natural History* (7) 1: 384–394.
- Pocock, R.I. 1902. Arachnida: Scorpiones, Pedipalpi and Solifugae. *Biologia Centrali-Americana*. London: Taylor and Francis, 71 pp.
- Polis, G.A. 1990. Ecology. In G.A. Polis (editor), *The biology of scorpions*: 247–293. Stanford, CA: Stanford University Press.
- Prendini, L. 2000. Phylogeny and classification of the superfamily Scorpionoidea Latreille 1802 (Chelicerata, Scorpiones): an exemplar approach. *Cladistics* 16: 1–78.
- Prendini, L. 2001. Substratum specialization and speciation in southern African scorpions: the Effect Hypothesis revisited. In V. Fet and P.A. Selden (editors.), *Scorpions 2001. In memoriam Gary A. Polis*: 113–118. Burnham Beeches, UK: British Arachnological Society.
- Prendini, L., and W.C. Wheeler. 2005. Scorpion higher phylogeny and classification, taxonomic anarchy, and standards for peer review in online publishing. *Cladistics* 21: 446–494.
- Prendini, L., T.M. Crowe, and W.C. Wheeler. 2003. Systematics and biogeography of the family Scorpionidae (Chelicerata: Scorpiones), with a discussion on phylogenetic methods. *Invertebrate Systematics* 17: 185–259.
- Quijano-Ravell, A., O.F. Francke, J. Ponce-Saavedra, and M. Villaseñor-Ramos. 2012. Caracterización de las madrigueras de *Hadrurus gertschi* Soleglad (Scorpiones, Iuridae) en una localidad de Guerrero, México. *Revista Ibérica de Aracnología* 20: 45–55.
- Rowland, J.M., and J.R. Reddell. 1976. Annotated checklist of the arachnid fauna of Texas (excluding Acarida and Araneida). *Occasional Papers of the Museum, Texas Tech University* 38: 1–25.
- San Martín, P.R. 1963. Una nueva especie de *Bothriurus* (Scorpiones, Bothriuridae) del Uruguay. *Bulletin du Muséum National d'Histoire Naturelle* 35: 400–418.
- Santibáñez-López, C.E., and O.F. Francke. 2008. A new species of *Diplocentrus* (Arachnida: Scorpiones) from Oaxaca, Mexico. *Zootaxa* 1742: 53–60.
- Santibáñez-López, C.E., O.F. Francke, and M. Córdova-Athanasiadis. 2011. The genus *Diplocentrus* Peters (Scorpiones: Diplocentridae) in Morelos, Mexico. *Revista Ibérica de Aracnología* 19: 3–13.
- Sissom, W.D. 1990. Systematics, biogeography and paleontology. In G.A. Polis (editor), *The biology of scorpions*: 64–160. Stanford, CA: Stanford University Press.
- Sissom, W.D. 1991. Studies on the genus *Diplocentrus* in the Valley of Oaxaca, Mexico: a taxonomic conundrum. *Bulletin of the Association of Southeastern Biologists* 33: 156.
- Sissom, W.D. 1994. Systematic studies on *Diplocentrus keyserlingii* and related species from Central Oaxaca, Mexico (Scorpiones, Diplocentridae). *Mitteilungen aus dem Zoologischen Museum in Berlin* 70: 257–266.

- Sissom, W.D., and V. Fet. 2000. Family Diplocentridae Karsch, 1880. In V. Fet, W.D. Sissom, G. Lowe, and M.E. Braunwalder, Catalog of the scorpions of the world (1758–1998): 329–354. New York: New York Entomological Society.
- Sissom, W.D., and J. Jackman. 1997. Order Scorpiones – Scorpions. In J. Jackman (editor), A field guide to spiders and scorpions of Texas: 148–155. Houston: Texas Monthly Field Guide Series, Gulf Publishing Corporation.
- Sissom, W.D., G.A. Polis, and D.D. Watt. 1990. Field and laboratory methods. In G.A. Polis (editor), The biology of scorpions: 445–461. Stanford, CA: Stanford University Press.
- Sissom, W.D., and A.L. Walker. 1992. A new species of *Diplocentrus* from western Mexico. Southwestern Naturalist 37: 126–131.
- Stahnke, H.L. 1970a. *Diplocentrus spitzeri*, a new Arizona species of scorpion. Entomological News 81: 25–32.
- Stahnke, H.L. 1970b. Scorpion nomenclature and mensuration. Entomological News 81: 297–316.
- Stahnke, H.L. 1976. The determination of the type species of *Diplocentrus* (Scorpionida). Journal of the Arizona Academy of Sciences 11 (2): 58–60.
- Stahnke, H.L. 1981. A study of the syntypes of *Diplocentrus keyserlingii* (Diplocentridae). Bulletin of the American Museum of Natural History 170: 34–45.
- Stockwell, S.A. 1988. Six new species of *Diplocentrus* Peters from Central America (Scorpiones, Diplocentridae). Journal of Arachnology 16: 153–175.
- Stockwell, S.A. 1992. Systematic observations on North American Scorpionida with a key and checklist of the families and genera. Journal of Medical Entomology 29 (3): 407–422.
- Stockwell, S.A., and A.S. Baldwin. 2001. A new species of *Diplocentrus* (Scorpiones, Diplocentridae) from Texas. Journal of Arachnology 29: 304–311.
- Teruel, R. 2003. Un nuevo escorpión del género *Diplocentrus* Peters, 1861 (Scorpiones: Diplocentridae) del estado de Guerrero, México. Revista Ibérica de Aracnología 76: 49–53.
- Thorell, T. 1876. On the classification of scorpions. Annals and Magazine of Natural History 4 (17): 1–15.
- Vachon, M. 1952. Étude sur les Scorpions. Alger: Institut Pasteur d'Algérie, 482 pp.
- Vachon, M. 1974. Étude des caractères utilisés pour classer les familles et les genres de scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie, sigles trichobothriaux et types de trichobothriotaxie chez les scorpions. Bulletin du Muséum National d'Histoire Naturelle 3: 857–958.
- Werner, F. 1934. Scorpiones, Pedipalpi. In H.G. Bronns Klassen und Ordnungen des Tierreichs 5, IV, 8 (1–2) (Scorpiones): 1–316. Leipzig: Akademische Verlagsgesellschaft.
- Williams, S.C., and W.E. Savary. 1991. *Uroctonites*, a new genus of scorpion from western North America (Scorpiones: Vaejovidae). Pan-Pacific Entomologist 67: 272–287.

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