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A new species and new records of *Downeshelea* Wirth & Grogan in Neotropical Mexico (Diptera: Ceratopogonidae)

HERÓN HUERTA[1], MARIA LUIZA FELIPPE-BAUER[2] & GUSTAVO R. SPINELLI[3]

[1]*Lab. Entomología, InDRE, Carpio 470, Col. Santo Tomas, México D.F. 11340, Mexico. E-mail: cerato_2000@yahoo.com*
[2]*Laboratório de Diptera, Instituto Oswaldo Cruz-Fiocruz, Av. Brasil 4365, 21040-900 Rio de Janeiro, RJ. E-mail: mlfbauer@ioc.fiocruz.br*
[3]*División Entomología, Museo de La Plata, CCT CONICET- La Plata, Paseo del Bosque s/n, 1900 La Plata, Argentina. E-mail: spinelli@fcnym.unlp.edu.ar*

In the revision of the Ceratopogonini of the World, Wirth & Grogan (1988) placed the species of the *Monohelea multilineata* group in the new genus *Downeshelea*, which includes 33 species (Borkent, 2011), most of them known from the New World. Borkent and Spinelli (2000, 2007) listed 18 species from the Neotropical Region and Felippe-Bauer and Silva (2008) subsequently described *D. oliveirai* Felippe-Bauer from northern Brazil. From Mexico, only *D. multilineata* (Lutz) and *D. panamensis* (Lane & Wirth) have been reported.

The study of male specimens of *Downeshelea* from the state of Oaxaca, Veracruz and Quintana Roo revealed the presence of an undescribed species, and the presence of *D. fluminensis* Felippe-Bauer that has been reported for only the type locality, Rio de Janeiro, Brazil. The study of additional material from Belize and Colombia revealed that the new species also is present out of Mexico.

In this paper, we describe and illustrate the new species, comparing it with related species of Neotropical *Downeshelea*, which now includes 20 species for this biogeographical region, of which four inhabit Mexico.

Material and methods

The material was collected by means of CDC and Malaise traps in the mountain area of the state of Oaxaca and Veracruz, Mexico. The type specimens were mounted on microscope slides with Euparal following the technique of Borkent & Spinelli (2007). Measurements are given in millimeters. Specific terms and ratios currently used for the genus are those by Meillon & Wirth (1991).Terms for wing veins follow the system of the Manual of Central American Diptera (Brown *et al.*, 2009). The type material was deposited in the Collection of Arthropods of Medical Importance (CAIM), Mexico City, Mexico, in the Ceratopogonidae Collection of the Instituto Oswaldo Cruz (CCER), Rio de Janeiro, Brazil, in the Museo de La Plata (MLP), La Plata, Argentina, and in the U.S. National Museum of Natural History (USNM), USA. Meristic information is given as range, following by the mean and number of specimens examined. Illustrations were made with the aid of a drawing tube (camera lucida) attached to a compound microscope and drawn in inking perspective.

Downeshelea grogani sp. nov.

Figs. 1–3

Diagnosis. Only species of *Downeshelea* with following combinations of characters: r_3 with only one dark spot extending posteriorly from end of 2nd radial cell to M_1, legs brown with knees yellowish, parameres connected basally by a sclerotized bar, each stem curved laterally, gradually tapering distally to pointed, posterolaterally directed apex, without apical, subapical or mid processes or lobes.

Male. Head (Fig. 1A). Brown, eyes bare, moderately separated. Antenna pale, except base of flagellomere 1, distal portion of flagellomere 10, flagellomeres 11–13 pale brown; flagellomeres 2–8 somewhat barrel-shaped; flagellomeres 11–13 elongate, lengths of flagellomeres 10–13 as in Fig. 1C; antennal ratio 0.92–0.97 (0.94, n=4); palpus (Fig. 1B)

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brown, segment 3 with broad, deep sensory pit at midlength, opening by small pore, 4–5 scattered setae; palpal ratio 2.0–3.1 (2.5, n=9).

Thorax. Scutum brown; humeral pits, prescutellar depression paler. Scutellum with median brown band, lateral portions paler; postscutellum, pleura brown. Wing (Fig. 2) hyaline without macrotrichia; two distinctive black spots, one on r-m extending over medial fork, other in r_3 at level of apex of 2nd radial cell extending to M_1, three distinctive grayish areas: first near apex of M_1, second sigmoid-shaped near apex of M_2 extending to wing margin in m_2, third over CuA_1 and CuA_2 extending into cua_1 and anal cell; 2nd radial cell 2.5x longer than 1st; wing length 1.03–1.25 (1.11, n=10) mm; breadth 0.33–0.40 (0.36, n=10) mm; costal ratio 0.71–0.75 (0.74, n=10). Halter stem pale; knob brown. Legs brown, hind leg darker (Fig. 1D); femora with apical, tibiae with basal narrow pale bands; knees yellowish; hind tibia with short apical spur, tibial comb with 6 spines; lengths of trochanters, femora, tibiae of fore-, mid-, hind legs: 105-460-430, 94-530-470, 100-575-520 µm (n=10). Tarsi pale with scattered setae; palisade setae in single row on hind tarsomere 1 (Fig. 1D); fore-, hind tarsomere 1 with one basal, one apical spine; mid tarsomere 1 with 2 basal, 2 apical, 1-4 other ventral spines; apical spines of tarsomeres 2-4 of fore-, mid-, hind legs: 1-1-1 (rarely 2-2-2), 2-2-2, 1-1-1, basal spines absent; fore-, mid-, hind tarsal ratios 2.1, 2.4, 2.0 (n=10).

Abdomen. Dark brown. Terminalia (Fig. 3A): tergite 9 rounded distally, basal arch concave; sternite 9 concave anteriorly, spiculate except on basal portion, posterior margin with moderately convex mesal extension bearing 2–4 setae in one row. Gonocoxite moderately stout, nearly 2.3x longer than basal width; gonostylus slightly curved, about 0.75 length of gonocoxite, proximal ½ pilose, with delicate setae on apex and ventral portion; apex pointed. Parameres (Fig. 3C) 1.1x longer than aedeagus, connected basally by slightly sclerotized bar, each with basal arm trilobed, heavily sclerotized, mid portion of stem curved laterally, gradually tapering distally to pointed, posterolaterally directed apex. Aedeagus (Fig. 3B) triangular, basal arch broad, concave, extending 0.26 of total length, basal arms slender, sclerotized; mid portion with 2 ventrolateral horn-like, strongly sclerotized processes; distal portion excavated mesally, with ventral, sclerotized process, dorsal expansion membranous.

Female**.** Unknown.

Distribution. Mexico (Veracruz, Oaxaca, Quintana Roo), Belize and Colombia.

Type material. Holotype male. MEXICO, Oaxaca, Municipio San Juan Guichicovi, Localidad El Zacatal, 27–28-VII.2009, CDC light trap, B. Salceda S., A. Rodríguez & J. Ordoñez cols. (CAIM). Nine paratypes, as follows: 1 male, same data as holotype (CAIM); 2 males, Veracruz, Fortin, Fortin de las Flores, VI.1964, F.S. Blanton col. (1, CCER; 1, USNM); 1 male, Quintana Roo, Puerto de Morelos, VI.1961 (USNM); 4 males, BELIZE, Toledo, Punta Gorda, 1.5 min. W, 31.VII.1968, W. L. Haase, black light. (2, MLP; 1, CCER, 1 USNM); 1 male, COLOMBIA, Rio Raposo, 1. VII.1964, V. H. Lee, light trap (USNM).

Etymology. The species is named after our colleague and good friend, Dr. William L. Grogan Jr., in recognition of his superb contributions on the systematics of World Ceratopogonidae.

Discussion. *Downeshelea grogani* most closely resembles the Panamanian species *D. balboa* and the Brazilian species *D. fluminensis* and *D. quasidentica* by the similar wing and legs patterns. It can be distinguished from these species by the sclerotized bar which connects the parameres basally (parameres separate in the other species), by the slight and laterally curved aspect of the parameres (divergent in *D. balboa*; sinuous in *D. quasidentica*; straight in *D. fluminensis*) without a mid process in the stem (stem with mid beak-shaped process in *D. fluminensis*; with triangular lobe in *D. quasidentica*) and apical portion tapering to a pointed apex (curved apex in the other species).

Downeshelea fluminensis Felippe-Bauer & Quintelas, 1993

Downeshelea fluminensis Felippe-Bauer & Quintelas, 1993: 33 (male; Rio de Janeiro, Brazil; figs. antenna, eyes, palpus, mesonotum, wing, legs, male genitalia); Borkent & Spinelli, 2000: 47 (in catalog); Borkent & Spinelli, 2007: 80 (in catalog); Borkent, 2011: 120 (in catalog).

Distribution. Brazil (Rio de Janeiro), Mexico (Oaxaca, Veracruz)

New records. MEXICO, Oaxaca, Municipio San Juan Guichicovi, Localidad El Zacatal, 8.VII.2009, 1 male, trampa CDC, B. Salceda S. & A. Rodríguez cols.; Veracruz, Municipio Alto Lucero, Localidad Arroyo Agrío, LC-19, selva baja, trampa Malaise, 5.IX.2008, 1 male, Personal de la Jurisdicción Sanitaría cols. (CAIM).

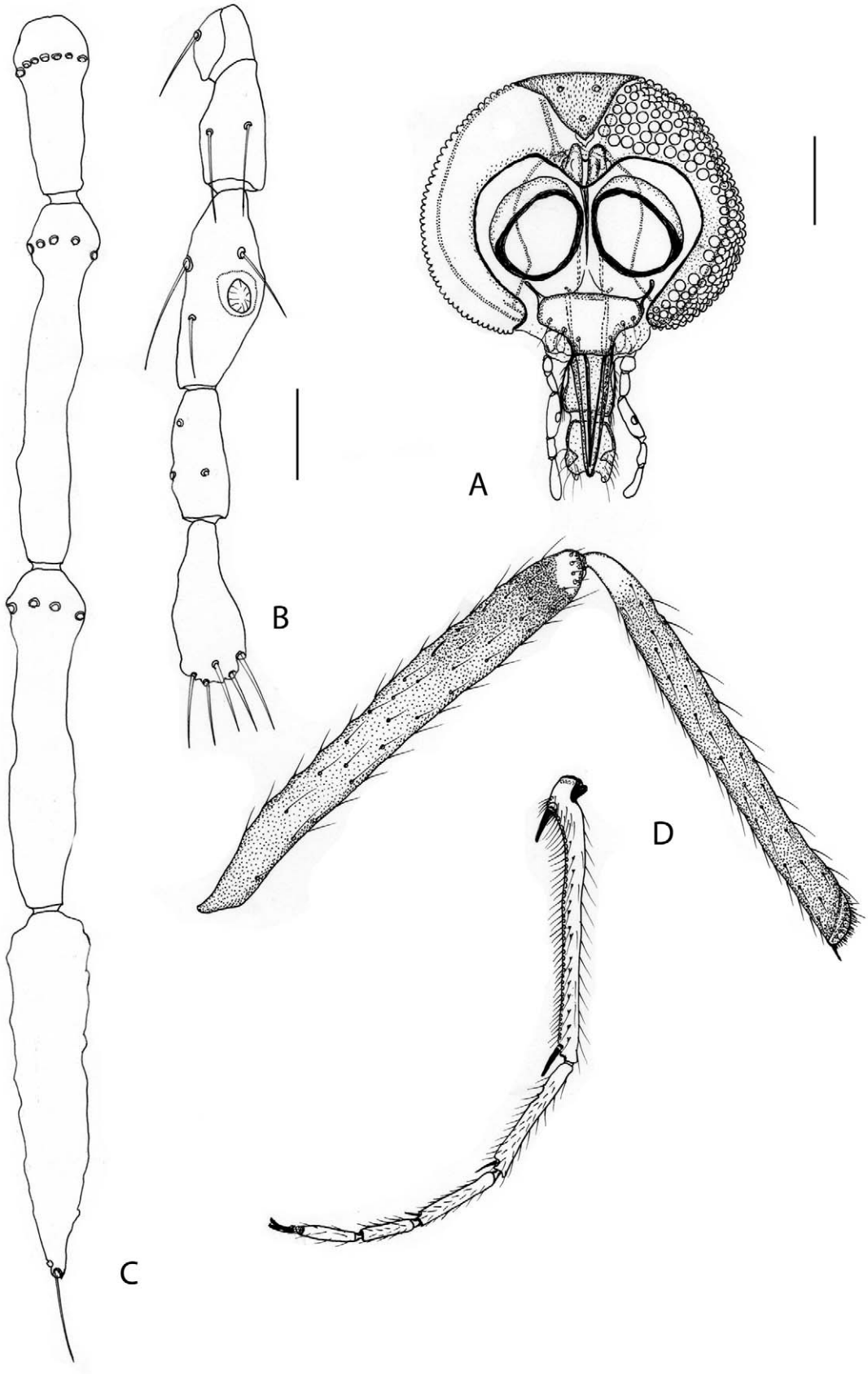

FIGURE 1. *Downeshelea grogani* **sp. nov.** Male. A, head, anterior view; B, palpus, lateral view; C, antennal flagellomeres 10–13, lateral view; D, hind leg (separated), lateral view. Scale bar (A, D, 0.16 mm; B, C, 0.04 mm).

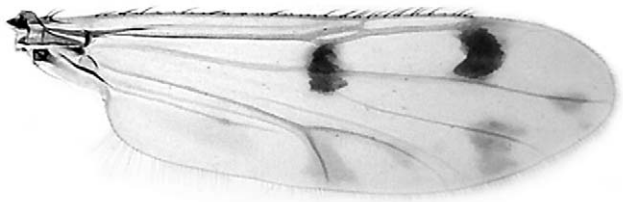

FIGURE 2. Wing of male of *Downeshelea grogani* **sp. nov.**

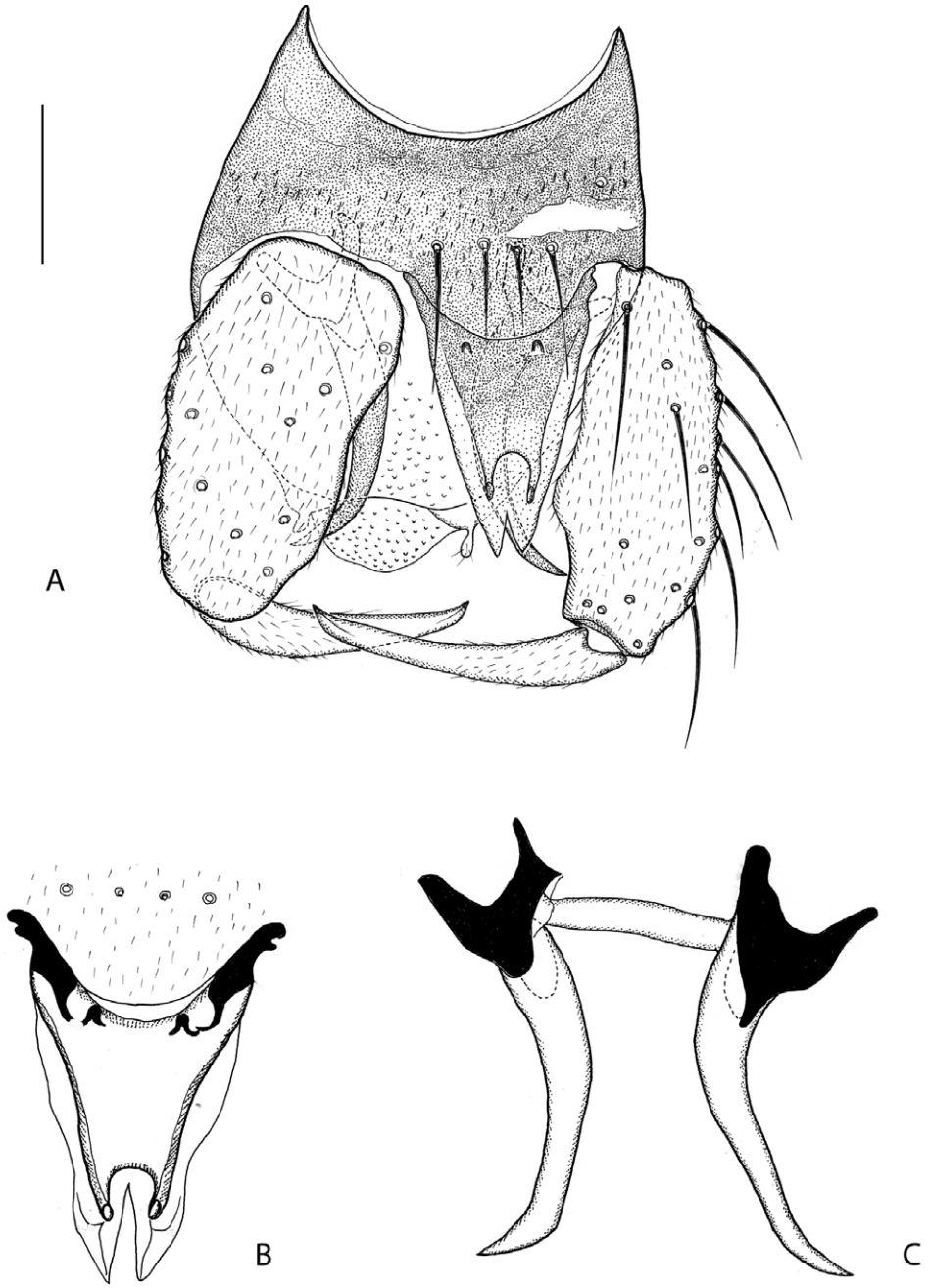

FIGURE 3. *Downeshelea grogani* **sp. nov.** Male. A, terminalia, ventral view; B, aedeagus, ventral view; C, parameres, ventral view. Scale bar: 0.04 mm.

Key to male *Downeshelea* Wirth & Grogan in Mexico

1 Parameres simple, without apical or subapical process (Fig. 3A, C) 2
- Parameres with apical or subapical process..... 3
2(1). Tergite 9 rounded with anterior margin strongly concave; gonostylus moderately elongate with pointed apex; parameres connected at base, each with steam gradually tapering, gradually tapering distad to pointed, posterolaterally directed apex (Fig. 3 A, B).....*D. grogani* Huerta, Felippe-Bauer & Spinelli **sp. nov.**
-. Tergite 9 triangular with anterior margin slightly concave; gonostylus short, stout apically; parameres separated, stems nearly straight and parallel, apical portion greatly divergent, laterally directed ....*D. fluminensis* Felippe-Bauer & Quintelas
3(1). Parameres with long, slender, subapical, straight, needlelike, anteromedial process . *D. panamensis* (Lane & Wirth)
-. Parameres with long, slender, hornlike, curved apically anteromedial process .....*D. multilineata* (Lutz)

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