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The family Lygistorrhinidae (Diptera: Sciaroidea) in Mexico and the description of two new species

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Abstract

The family Lygistorrhinidae is recorded for the first time in Mexico, based on adult morphological descriptions of two new species of the genus *Lygistorrhina* Skuse: *L. (Probolaeus) alexi* **sp. nov.** and *L. (P.) borkenti* **sp. nov.** A third species belonging to *L.* (*Lygistorrhina*) sp. was found, but it remains undescribed due to scarcity of specimens. The specimens were collected in two natural reserves of the state of Yucatan (Ría Lagartos and Ría Celestún), along the border of the states of Morelos and Mexico (National Park "Lagunas de Zempoala"), and in the state of Hidalgo (near the locality of Tlanchinol).

Keys words: Diptera, Lygistorrhinidae, Mexico, *Lygistorrhina*, *Probolaeus*, new species

Introduction

The family Lygistorrhinidae (Sciaroidea) has a wide distribution in tropical and subtropical regions of the world (Grimaldi & Blagoderov 2001). To date, 13 genera are recognized, 7 extant and 6 known only from fossils. Thirty-two extant species have been described worldwide (Evenhuis 2008), yet many areas remain particularly poorly surveyed or uncollected. Hippa et al. (2005) mentioned the existence of several undescribed taxa from the Oriental region, and many others are known to exist in the Neotropics (D. Grimaldi, pers. comm.).

Lygistorrhina Skuse (1890) is the most diverse of all lygistorrhinid genera with 21 species and is provisionally divided in two subgenera: *Lygistorrhina* s. str., and *Probolaeus* Williston 1896; the status of the second is, however, in doubt (Thompson 1975; Grimaldi & Blagoderov 2001 and Hippa et al. 2005). *Lygistorrhina sanctaecatharinae* Thompson (1975) is a unique species known from the Nearctic region (southeastern U.S.), and seven species are known to occur in the Neotropics (Brazil) and West Indies (St. Vincent and Trinidad) (Thompson 1975, Papavero 1977, Bechev 1999, 2000, Grimaldi & Blagoderov 2001).

In this paper two new species of *Lygistorrhina (Probolaeus)* of Mexico are described and another, *Lygistorrhina* (*Lygistorrhina*) sp., is recorded. Adult specimens were collected with Malaise traps or aerial net in the Special Biosphere Reserves of Ría Lagartos and Ría Celestún in the state of Yucatan, in the National Park "Lagunas de Zempoala", located on the border between the states of Morelos and Mexico, and in Tlanchinol, Hidalgo, Mexico (Fig. 1).

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FIGURE 1. Map of Mexico showing the type localities of *Lygistorrhina (Probolaeus) alexi* **sp. nov.** (black square), *Lygistorrhina (Probolaeus) borkenti* **sp. nov.** (open square) and record of *Lygistorrhina (Lygistorrhina)* sp. (black circle). (without scale).

Material and methods

Some specimens were mounted on microscope slides following the technique recommended by Wirth and Martson (1968), while others were preserved in 70% ethanol or pinned. Explanations of the taxonomic characters used here are found in Grimaldi and Blagoderov (2001) and Hippa et al. (2005). Measurements are given in millimeters. All specimens were deposited in the Insect Collection (IEXA) of Instituto de Ecología, A. C., Xalapa, Veracruz, Mexico, and in the Collection of Arthropods with Medical Importance (CAIM), Mexico City, Distrito Federal, Mexico.

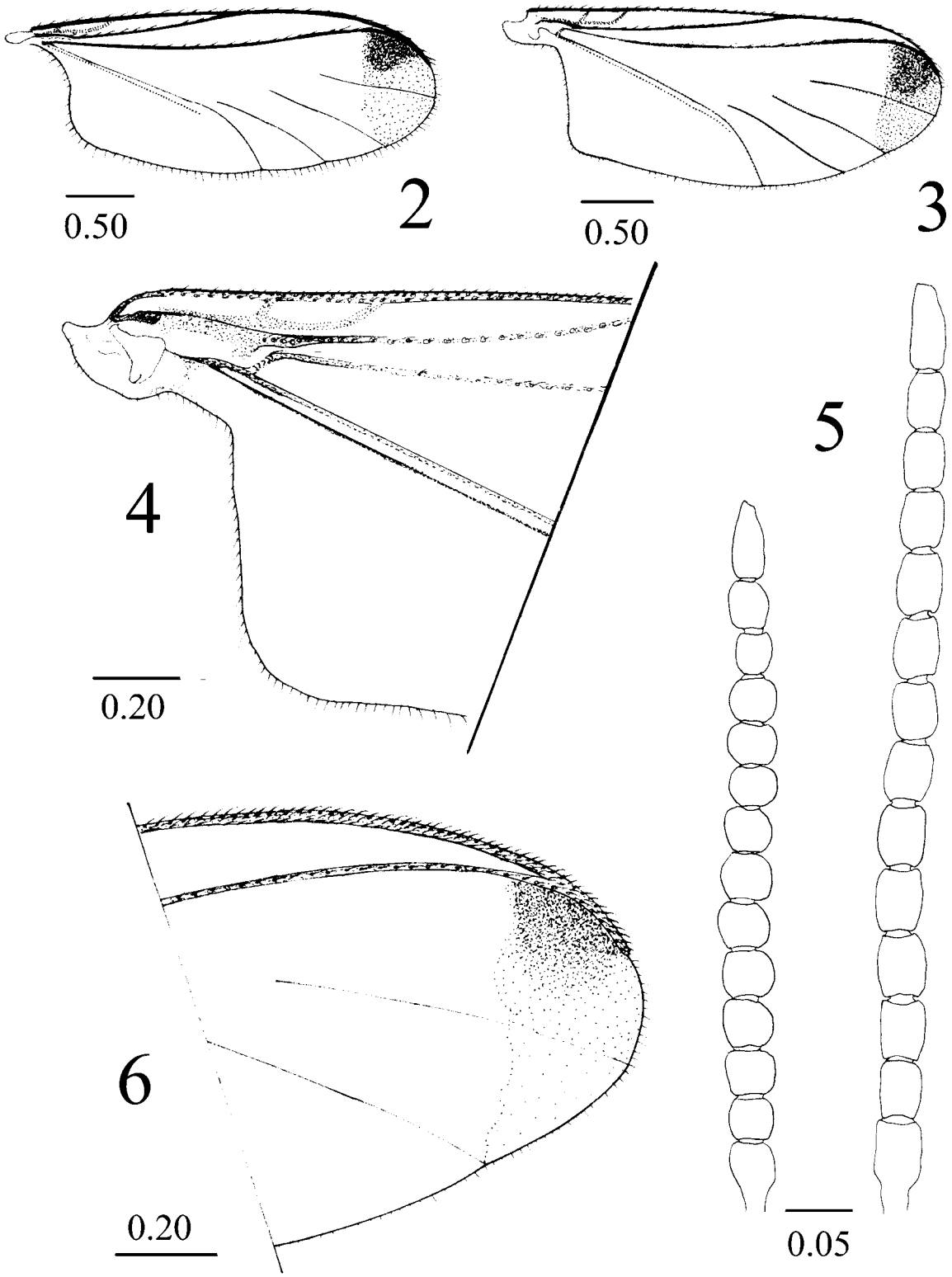
Lygistorrhina (Probolaeus) alexi Huerta & Ibáñez-Bernal sp. nov.

(Figs. 2–12)

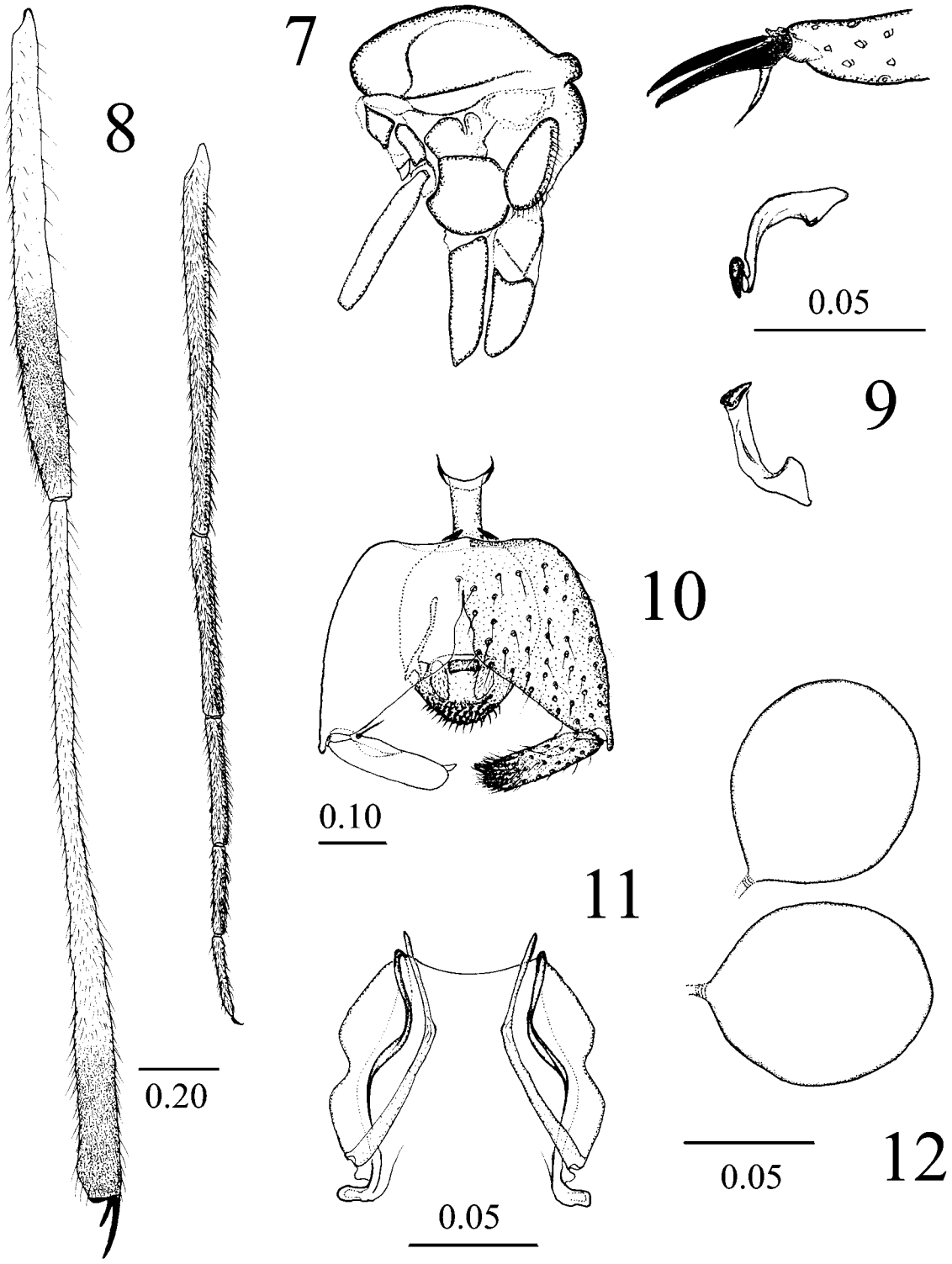
Type material. Holotype male. Labeled: Mexico, Yucatan, Reserva de Ría Lagartos, Km 10 Carretera Ría Lagartos-Las Coloradas, Peten Tucha, (21º35'46" N, 88º08'47" W), 4–5.IV.1997, Malaise trap, IBS, MMCL, HH, MSP cols. (Specimen dissected and mounted on microscopic slide, deposited in CAIM).

Paratypes: 9 males, 1 female; 3 males with same data than holotype (two specimens deposited in IEXA, one in CAIM); 1 female: Mexico, Yucatan, Municipio Tizimin, 1 km al este de la Estación Biológica "El Cuyo", Duna Costera (21º30'45" N, 87º40'33" W), Malaise trap, 4.IV.1997, IBS, MMCL, HH, MSP cols. (deposited in CAIM). 6 males: Mexico, Yucatan, Reserva de Celestún, Rancho Loma Bonita, Km 15, Carretera Celestun-Kinchil, Selva baja (20º50'56" N; 90º15'40" W), 25–26.III.1996, Malaise trap, HH, NCC, PRR cols., 3 specimens in CAIM, and 3 specimens deposited in IEXA. (Two specimens dissected and mounted on microscopic slide, and other specimens preserved in 70% ethanol).

Diagnosis. Abdomen of male with basal pale yellow bands on tergites 1–5, last two segments and genitalia dark brown; antennae pale brown; flagellum length 0.74; fore coxa pale yellow, mid and hind coxae reddish brown; hind femur pale yellow with apical 0.40 reddish brown; wing length 2.5; aedeagal complex membranous with distal portion pointed laterally and medially rounded, parameres with pointed tip.



FIGURES 2–6. *Lygistorrhina (Probolaeus) alexi* **sp. nov.** 2. Female wing; 3. Male wing; 4. Base of wing, male; 5. Antennal flagellum of male (right) and female (left); 6. Detail of wing apex, male. Scales in millimeters.



FIGURES 7–12. *Lygistorrhina (Probolaeus) alexi* **sp. nov.** 7. Thorax of male, lateral view (without scale); 8. Hind leg, male (femur and tibia, left; tarsomeres I–V, right, lateral view); 9. Male tarsal claws of hind leg (top), mid leg in lateral view (center), and mid leg in ventral view (below); 10. Male terminalia in ventral view (Aedeagal complex removed); 11. Aedeagal complex, ventral view; 12. Female spermathecae. Scales in millimeters.

Description. Male. General body coloration reddish brown, length ca. 5.0; head dichoptic, eye facets of equal size and with interfacetal pubescence. Median ocellus present. Proboscis longer than hind femur. Palpus length 1.1, as long as labellum. Antennae (Fig. 5) length 0.88, about 1.5X the head height, with 14 flagellom-

eres, all uniformly pale brown, each flagellomere longer than wide and with distinct reticulation, and scattered seta-like sensilla; flagellum length 0.74, last flagellomere length 0.073.

Thorax (Fig. 7) reddish brown, scutum slightly convex, sparsely covered with short setae; scutellum with 8 setae; mediotergite bare; supra-alar and notopleural setae 6–8; anterior pronotum and episternum setose; anepisternum bare; katepisternum with ventral margin evenly curved; laterotergite lobulate posteroventrally, and with 21–22 setae; metepisternum with membranous aspect, delimited by a sclerotized line. Fore coxa pale yellow, mid and hind coxae reddish brown, length 0.65, 0.52, and 0.41, respectively; all coxae with sparse setae; fore and midleg femora and tibiae pale yellow; hind femur (Fig. 8) pale yellow, apical 0.40 reddish brown, length 1.48; hind tibia pale yellow with apical 0.25 reddish brown, length 2.07; femur/tibia proportion: 0.7; tarsomeres brown, length I–V: 1.16, 0.51, 0.38, 0.29, 0.23; tibial spurs formula 1:1:2; hind tibial spurs subequal, microtrichose, inner spur 1.5X the length of outer spur; tibial setulae in palisade rows; tarsal claws (Fig. 9) of fore and mid legs curved, with diminutive basal projection, sharply curved with strong arched tip; hind claws length 0.04, slightly curved at apex, with sharp tip; empodia present. Wing (Figs. 3, 4, 6) length 2.5, width 1.10; wing membrane densely covered with microtrichia on whole surface; wing infuscate at apex, darker spot situated at the union of R_5 with C, continuing as a faintly infuscation toward vein M_1 and reaching the terminal portion of M_2; Sc joining C, h not oblique; R_1 long and setose, length ca. 0.46X the length of wing; R_5 setose except at base; C ending between apices of R_5 and M_1; Rs absent; only apical third of veins M_1 and M_2 present, length of M_1 0.89, M_2 0.79; CuA_1 and CuA_2 not connected in distal fork, CuA_1 length 0.82; CuA_2 straight but somewhat curved at the level where CuA_1 begins; CuP very close and parallel to stem of CuA_2; anal lobe well developed. Halter white.

Abdomen with basal pale yellow bands on tergites 1–5, more evident on tergites 2–4; last two segments and genitalia dark brown; abdomen length ca. 3.0, length of abdomen in relation to wing length 0.75; sternite 8 rounded at apex. Genitalia (Fig. 10): tergite 9 longer than wide, length 0.24, with the posterior margin rounded and provided with a patch of thickened setae, apodeme long; gonocoxite stout, 1.5X as long as broad; gonostylus with a basolateral apophysis, a basomesal impression, long setae at base, and a tooth and numerous setae at apex, length 0.18. Aedeagal complex membranous, length 0.11, width 0.10, distal portion pointed laterally, medially rounded (Fig. 11); parameres curved, slender with pointed tip. Cercus setose.

Female. Similar to male, but differs as follows: Body length ca. 3.0; flagellum length 0.59 (Fig. 5); wing length 2.43; width 0.92 (Fig. 2); abdomen dark brown; sphermathecae (Fig. 12) oval, slightly different in size, the larger one length 0.070, width 0.058, the smaller length 0.068, width 0.058.

Comments. In the Americas the known species with wing infuscations are *Lygistorrhina cerqueirai* Lane 1958 from Brazil, *Lygistorrhina* sp. of Grimaldi and Blagoderov (2001) from Costa Rica, and now *L. alexi* and *L. borkenti* from Mexico. All of these species have similar characteristic of the wing maculation, however, in the original description of *L. urichi* Edwards 1912, and *L. brasiliensis* Edwards 1932, it is mentioned that the wing presents a dark cloud at the tip or it is very faintly indicated. Thompson (1975), Grimaldi & Blagoderov (2001), and Hippa et al. (2005), indicated these species without a dark spot.

Lygistorrhina alexi **sp. nov.** differs from previously described species by the following characteristics: abdomen with basal pale bands on tergites 1–5 and the last two segments and genitalia dark brown; hind femur with apical 0.40 reddish brown, and male with the paramere slender and pointed apex, although for many species this characteristic they are not described. The wing of the Costa Rican species mentioned by Grimaldi & Blagoderov (2001) is smaller than in *L. alexi* and does not have an aggregation of thickened setae at the apex of male tergite 9. The differences between *L. alexi* and *L. borkenti* are the wing infuscation at apex, color of the hind femur, abdominal segment coloration, and aedeagus morphology. Another similar species is *L. urichi*, but it has the antennae black, thorax uniformly shining black, fore coxa with the base fuscous and the apex yellowish, halter yellow, and abdomen with apical pale yellow bands.

Distribution. This species is known only from the Biosphere Special Reserves of Ría Lagartos and Ría Celestún, Yucatan, Mexico. All specimens were collected by means of Malaise traps in a typical Yucatan flo-

ristic association known as Peten (Flores & Espejel 1994), which is a differentiated aggregation of trees, shrubs and herbs growing around sites in which the karstic ceiling falls, leaving bodies of subterranean water exposed known as “Cenotes”.

Etymology. This species is named in memory of our friend and colleague, the late Alejandro Pérez García (Alex, as we called him familiarly) (1968–2005), who began to prepare specimens of Mycetophilidae and Bibionidae in the CAIM collection.

Lygistorrhina (Probolaeus) borkenti Huerta & Ibáñez-Bernal sp. nov.

(Figs. 13–19)

Type material. Holotype male. Labeled: Mexico, Parque Nacional “Lagunas de Zempoala”, límite Morelos, 14.VII.1990, aerial net, Ibáñez-Bernal S., col. (Specimen dissected and mounted on microscopic slide, deposited in CAIM).

Paratypes: 4 males: Same data as holotype (2 specimens deposited in CAIM, 2 specimens deposited in IEXA). (One specimen dissected and mounted on microscopic slide, the other three pinned).

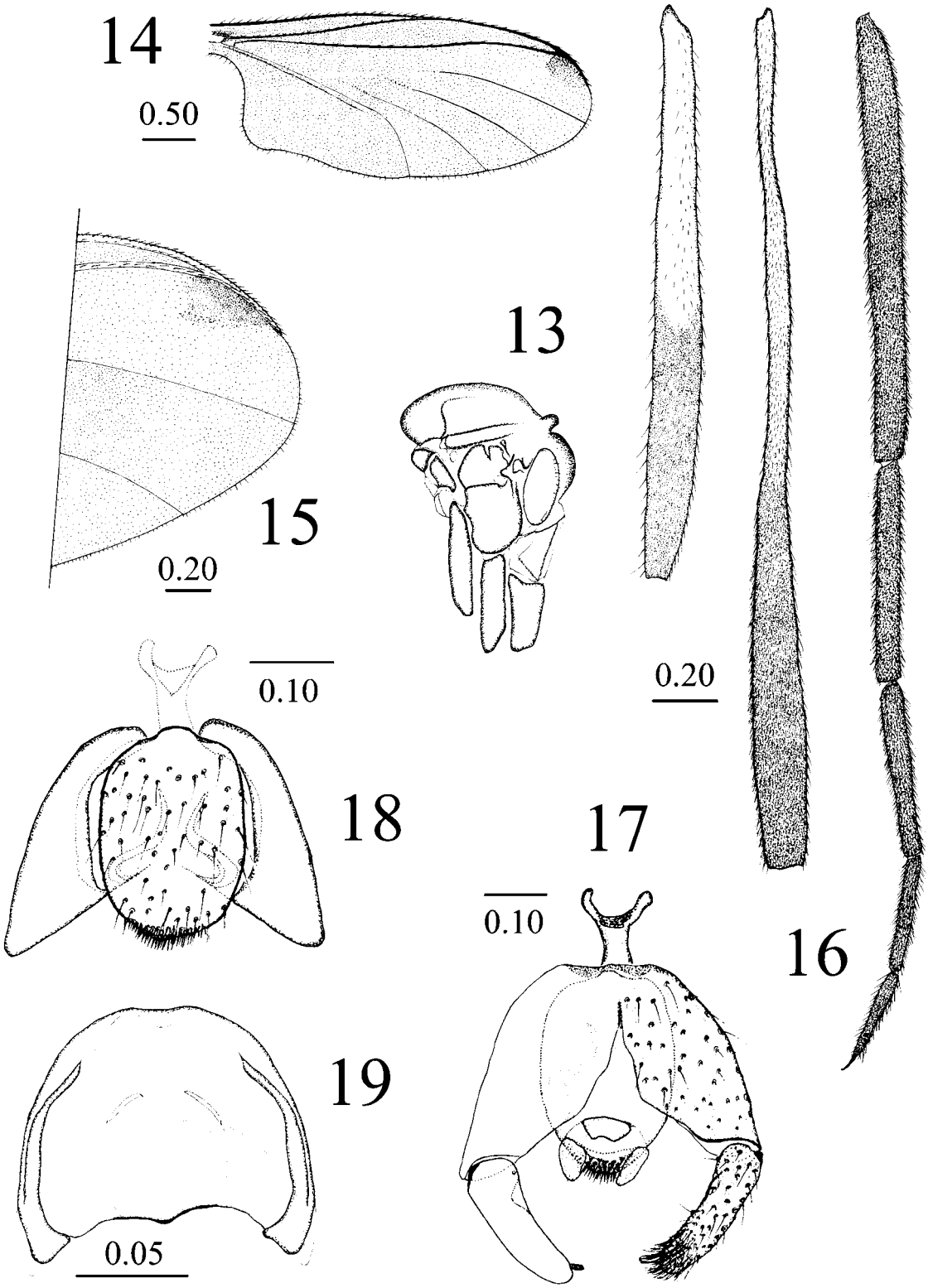
Diagnosis. Abdomen of male with basal pale yellow bands on tergites 2–4, tergites 1 and 5–7 dark brown; antennae dark; flagellum length 1.10; coxae dark; hind femur with basal half pale yellow, apical half dark brown; hind tibia basal half pale yellow, apical half dark brown; wing length 3.84; aedeagal complex membranous and rounded.

Description. Male. General body coloration dark, length ca. 5.0; head dichoptic, eye facets of equal size and with interfacetal pubescence. Median ocellus present. Proboscis longer than hind femur. Palpus length ca. 1.76, as long as labellum. Antennae dark, length 1.2, or 1.3X the head height, with 14 unicolorous flagellomeres, each longer than wide and with distinct reticulations, and scattered seta-like sensilla, flagellum length 1.10; apical flagellomere length 0.13.

Thorax (Fig. 13) dark, scutum slightly convex, sparsely covered with short setae; scutellum with 8 setae; mediotergite bare; supra-alar and notopleural setae 10–12; anterior pronotum and episternum setose; anepisternum bare; katepisternum with ventral margin slightly curved, laterotergite lobe-like posteroventrally with 17 setae; metepisternum with membranous aspect, delimited by a sclerotized line. All coxae dark with sparse setae; length 0.78, 0.64, and 0.50, respectively; fore and midleg femora and tibiae pale yellow, but femora very faint pigmented sub-basally; hind femur (Fig. 16) with basal half pale yellow, apical half dark brown, length 1.8; hind tibia with basal half pale yellow, and apical half dark brown, length 2.72; femur/tibia proportion: 0.6; tarsomeres brown, length I–V: 1.46, 0.69, 0.51, 0.38, 0.25; tibial spurs formula 1:1:2; hind tibial spurs microtrichose, subequal in size, inner spur 1.4X the size of outer; tibial setulae in palisade rows; tarsal claws of fore and mid legs curved, with diminutive projection basally, sharply curved with tip arched; hind tarsal claws length 0.012, slightly curved at apex, with sharp tip; empodia present. Wing (Figs. 14, 15) length 3.84, width 1.48; membrane densely covered with microtrichiae on whole surface, with apical darker spot situated at junction of veins R_5 and C; Sc joining C, h not oblique; R_1 setose, as long as ca. 0.46X the length of wing; R_5 setose except the basal portion; C ending midway between apices of R_5 and M_1; Rs absent; only apical third of veins M_1 and M_2 present; length of M_1 1.4, M_2 1.3; CuA_1 and CuA_2 not connected in distal fork, length of CuA_1 1.2; CuA_2 straight but somewhat curved at the level where CuA_1 begins; CuP very close and parallel to stem of CuA_2; anal lobe well developed. Halter yellow.

Abdomen with basal pale yellow bands on tergites 2–4, tergites 1 and 5–7 and genitalia dark brown; abdomen length ca. 4.8, length of abdomen in relation to wing 0.85; sternite 8 rounded at apex. Genitalia as in Figs. 17; and 18; tergite 9 length 0.29, longer than wide, with rounded apical margin provided of aggregation of thickened setae, with long apodeme; gonocoxite stout, 1.5X longer than broad; gonostylus with basolateral apophysis, a basomesal impression and a long seta at base and in the middle, with an apical tooth and dense

setae (Fig. 17); length 0.22; aedeagal complex membranous and rounded, with apparent lateral parameres, slightly more sclerotized that the body of the aedeagus; medial portion with hyaline projections; distal portion rounded; length 0.12, width 0.10 (Fig. 19). Cercus setose.



FIGURES 13–19. *Lygistorrhina (Probolaeus) borkenti* **sp. nov.**, male. 13. Thorax, lateral view (without scale); 14. Wing; 15. Detail of wing apex. 16. Hind leg (femur and tibia, left; tarsomeres I–V, right, lateral view). 17. Genitalia in ventral view (Aedeagal complex removed); 18. Tergite 9 and gonocoxite, dorsal view; 19. Aedeagal complex, ventral view. Scales in millimeters.

Female. Unknown.

Comments. A species with apical darker spot of the wing, that is distinguished from all other New World species by the following combination of characters: antennae dark; hind femur with broad patch of dark pigment covering half of the segment; abdomen with basal pale yellow bands on tergites 2–4, tergites 1 and 5–7 dark brown and wing length 3.84. The specific aedeagus characteristics were not adequately described for the eight named New World species. Papp (2005) commented that the male genitalia characteristics are important in taxonomy.

Distribution. *Lygistorrhina borkenti* is known only from the National Park "Lagunas de Zempoala". In this place the altitude varies between 1,250 and 3,450 meters above sea level, and has several types of vegetation, the most representatives being *Pinus*, *Abies* and *Quercus* forests. Specimens were collected with an aerial net at the lake margin.

Etymology. This species is named in honor of Dr. Art Borkent (Research Associate of the Royal British Columbia Museum, American Museum of Natural History and Instituto Nacional de Biodiversidad) for his important contributions to the knowledge of world Ceratopogonidae (Diptera).

Lygistorrhina (Lygistorrhina) sp.

Material studied: 1 female. MEXICO, Hidalgo, Tlanchinol, cloud forest, Km 4 Carretera Tlanchinol-Apantlazol, 29 Sept–2 Oct., 1997, Malaise Trap, Cols. Blackaller J., Salceda B., and Perez A. (20º 59' 849'' N; 98º 37' 538'' W; elevation: 1465 m).

Female. Total length ca. 4.0. Head: antennae dark brown, with 14 unicolorous flagellomeres. Thorax dark brown; coxae dark brown; fore and midleg femora and tibiae pale yellow; hind femur pale yellow at basal 0.33, the rest reddish brown; hind tibia dark brown; tibial spurs formula 1:2:2. Wing without apical dark spot; length ca. 2.5; Sc ending free. Halter white. Abdomen dark brown, without pale yellow bands.

Comments. This female differs by their several characters from the two previously described species. The male was not captured so it is impossible to adequately describe this species. This is the first report of a member of the subgenus *Lygistorrhina* in North America.

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