

The Western Hemisphere Species of the Predaceous Midge Genus *Echinohelea*, with Descriptions of Six New Species (Diptera: Ceratopogonidae)

Willis W. Wirth

Systematic Entomology Laboratory, USDA,
and Florida State Collection of Arthropods,
1204 NW 94th St., Gainesville, Florida 21606, U.S.A.

Abstract.

There are four previously described species of the genus *Echinohelea* Kieffer in the Western Hemisphere. The following species are described as NEW SPECIES: *aitkeni* from Brazil, *blantoni* and *panamensis* from Panama, *jamaicensis* from Jamaica, and *leei* and *neotropica* from Colombia. *Echinoideshelea* NEW SUBGENUS is described with *E. aitkeni* n. sp. as type-species. The hitherto unknown pupal stage of the genus is described for *E. lanei* Wirth, which was reared from a pond margin in New York, U.S.A. Diagnoses are presented for the genus *Echinohelea* and the subgenus *Echinoideshelea*, a key is given for the identification of the 11 species, descriptions or diagnoses are given for all species, and diagnostic characters of the male genitalia are illustrated.

Introduction.

The genus *Echinohelea* Macfie is represented by 22 described species, and is pantropical to subtropical in distribution. The genus is distinguished by a number of distinctive apotypic character states, while within the genus species are remarkably uniform in appearance and difficult to distinguish. Excellent discussions and illustrations of taxonomic characters, and taxonomic keys, have been published by Debenham (1970) for the Australasian Region and Clastrier (1984) for the Afrotropical Region. There has been no published cladistic or phylogenetic discussion of the taxonomic position of *Echinohelea*, although the genus has been assigned without comment to the Stilobezziini (Wirth et al. 1974) or more recently, to the Ceratopogonini (Wirth & Grogan 1988, de Meillon & Wirth 1991). Grogan (1975) published a note on the larval habitat of *E. lanei* Wirth in Maryland, U.S.A., and McKeever et al. (1991) presented studies of the male and female mouthparts of the same species, using the scanning electron microscope. The purpose of this paper is to offer a key to distinguish the Western Hemisphere species, describe six additional new species, erect a new subgenus for one unusual species which likely is the sister lineage of all the remaining *Echinohelea*,

describe the hitherto unknown pupal state, and present new distribution records.

Explanation of the taxonomic characters used can be found in the papers cited above, as well as in the general contributions on Ceratopogonidae by Wirth (1952) and Downes and Wirth (1981). Pupal terminology follows that given in Blanton & Wirth (1979). The types of the new species are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Genus *Echinohelea* Macfie

Echinohelea Macfie, 1940: 187. Type-species, *Echinohelea ornatipennis* Macfie, by original designation.

References: Debenham, 1970: 145 (diagnosis; revision Australia and New Guinea species); Clastrier, 1984: 361 (detailed generic diagnosis, figs.; revision Afrotropical species).

Generic Diagnosis. Medium size yellowish to reddish brown midges; wing length 1.3-2.0 mm. Eyes bare, narrowly separated. Female antenna (Fig. 1) long and slender, verticils long; male flagellum (Fig. 9) without plume, last five segments elongate as in female; third segment with numerous sensilla coeloconica. Palpus (Figs. 2,3) 5-seg-

mented; third segment with small, round, shallow, sensory pit. Clypeus and proboscis elongated (Fig. 10). Female mandible with 7-10 coarse, retrorse teeth. Legs (Fig. 6) rather stout, femora and tibiae with scattered, stout, black spines, and in males with additional fine wavy hairlike setae; fourth tarsomeres (Fig. 12) subcylindrical, provided ventrally with two pairs of long, sinuate, filamentous, hyaline sensilla with bulbous tips; claws equal in male, equal or unequal in female (Fig. 8); female claws with distinct inner basal teeth. Wing (Fig. 4) bare, with two elongate radial cells, second much longer than first; costal ratio 0.74-0.80; media short petiolate to barely sessile, the fork arising at or near r-m crossvein. Female abdomen (Fig. 11) with sternite 8 modified, forming a subtriangular genital plate (Figs. 17,18), tergites 8-9 distinct; one spermatheca (Fig. 5), usually subspherical, with short, slender neck and minute hyaline perforations. Male genitalia (Fig. 13) in subgenus *Echinohelea* bulbous; dorsomedian portion of the bulbous gonocoxites fused with basal portion of the greatly reduced and narrowed ninth tergite; gonostyli broadly saber-shaped with blunt tip; parameres (Fig. 14) usually separate. Genitalia of subgenus *Echinoideshelea* (Fig. 15) less strongly modified, gonocoxites long and slender, well separated by a broad, bandlike ninth sternite and long, narrow, ninth tergite; gonostyli long and slender, tapering to sharp-pointed tip.

Immature Stages. Larva unknown. A description of the hitherto unknown pupa is presented below for *Echinohelea lanei* Wirth (Figs. 19-23). Diagnostic features are the smooth integument without prominent tubercles or spines; the smooth, spatuliform respiratory horn with eight terminal spiracular openings; the inconspicuous scalelike abdominal tubercles, each with a central seta and a pair of small sharp spines; and the small, tapering, apicolateral processes on the last abdominal segment.

Biology. Two Afrotropical species were reared from soil rich in organic matter from near very wet rocks, from mud at a pond margin, and from mud in the bottom of a drain. Grogan (1975) reared a single male of *Echinohelea lanei* from under bark of a rotting tulip poplar (*Liriodendron tulipifera*) in Maryland.

Relationships. In the revision of the genera of Ceratopogonini by Wirth and Grogan (1988) the

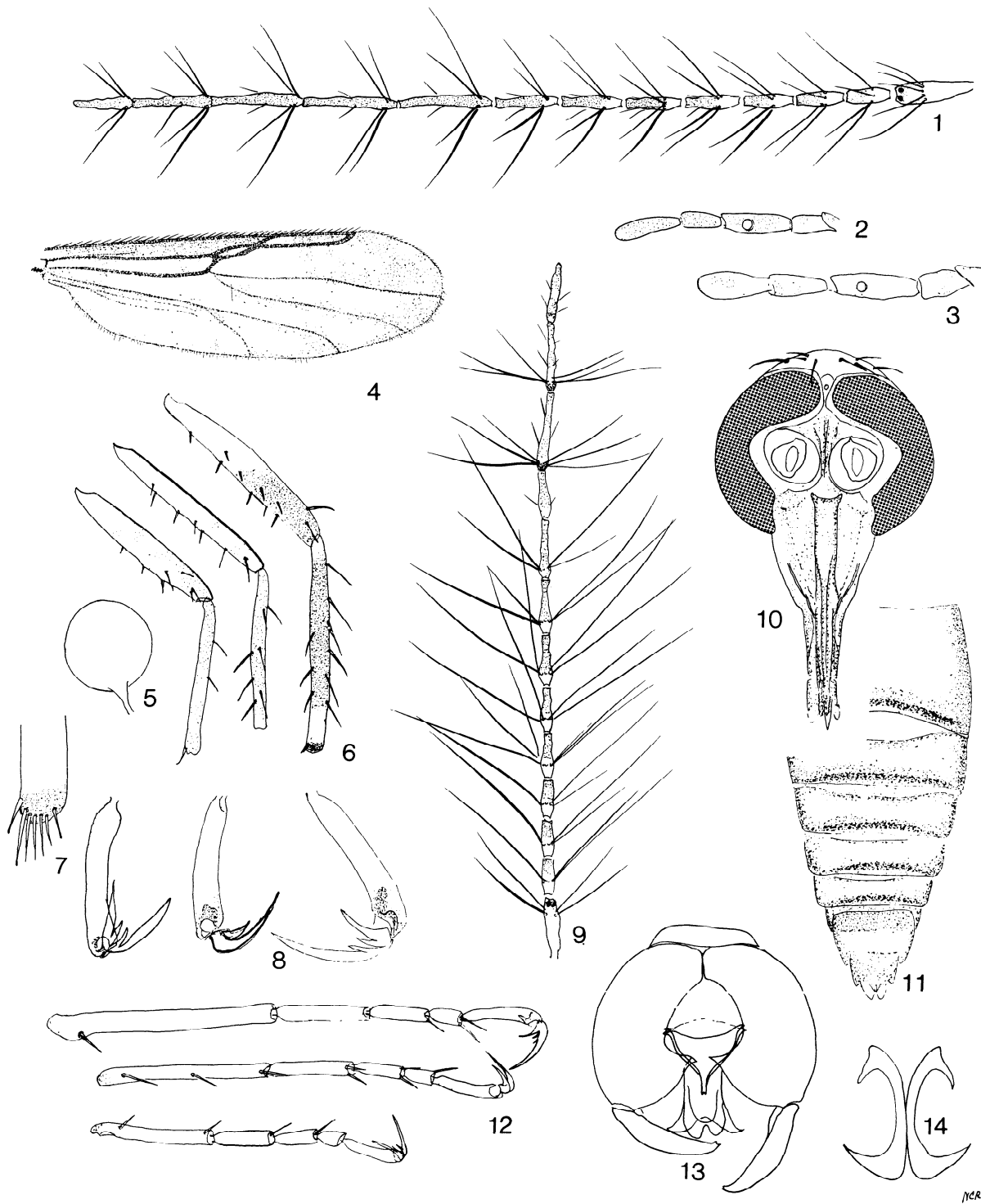
inclusion of a large number of recently described genera afforded an enlarged data base for a re-evaluation of primitive and derived character states in this tribe. These authors decided to combine the genera previously assigned to the tribes Ceratopogonini and Stilobezziini in a single tribe, for which the name Ceratopogonini had priority. They concluded that "because of the failure of a preliminary cladistic study to bring out any consistent synapomorphies or to establish reliable trends or polarity of characters, we are forced to conclude that only a single tribe [Ceratopogonini] is justified."

When Macfie (1940) erected the genus *Echinohelea*, he compared it with the genus *Serromyia*, to which he remarked it had a superficial resemblance. Wirth et al. (1974) placed the genus in the tribe Stilobezziini without giving any special reasons or comments. Wirth and Grogan (1988), without comment, placed *Echinohelea* in their consolidated tribe Ceratopogonini. During the present study I became impressed by several characters of *Echinohelea*, not stressed previously, that tend to confirm the assignment of the genus to the Ceratopogonini, and possibly to relate it to certain other genera.

1. Sensilla coeloconica present only on the third antennal segment. This arrangement is characteristic, with rare exceptions, in all genera of Ceratopogonini. In the Culicoidini sensilla coeloconica are also usually present on some or all of the distal flagellar segments. These sensilla are not present in the remaining tribes of Ceratopogoninae.

2. Medial fork (at base of veins M1 and M2) located at or near r-m crossvein. In most Ceratopogonini the media has a short to long petiole, but in a significant number of genera the base of M2 arises at or near the crossvein, or is evanescent.

3. Tarsomeres 3 and 4 provided ventrally with several long, filamentous, sinuate sensilla with enlarged tips. These sensilla were first noted by de Meillon (1960) for *E. harbelensis* de Meillon, figured by Tokunaga (1963) for *E. hardyi* Tokunaga, and by Clastrier (1984) for *E. pastoriana* Clastrier. They were discussed briefly by Clastrier. These hyaline sensilla are characteristic of the majority of the genera of Ceratopogonini, usually confined to a pair near the tip of the fourth tarsomere. They vary in development from short, curved sensilla in *Brachypogon* to abruptly bent, whiplike structures in *Kolenhelea* and several other genera. Such sensilla are poorly developed in the Culicoidini and



Figures 1-14. *Echinohelea lanei*: 1, 3-8, 10-12, female; 2, 9, 13-14, male: 1, 9, antenna; 2, 3, palpus; 4, wing; 5, spermatheca; 6, femora and tibiae of (left to right) fore, mid and hind legs; 7, hind tibial comb; 8, 5th tarsomeres and claws of (left to right) fore, mid and hind legs; 10, head, anterior view; 11, abdomen, dorsal view; 12, hind, mid, and fore tarsi (top to bottom); 13, genitalia, parameres omitted; 14, parameres.

the remaining tribes and subfamilies of Ceratopogonidae. Clastrier (1975) pointed out that these hyaline tarsal sensilla are present in relatively unmodified form on the tarsomeres in *Leptocnops* and in several other families of Diptera Nematocera.

4. Ninth tergite of male genitalia. Debenham (1970) characterized the condition as "Displaced distally, narrow and elongate, bearing a pair of apicolateral triangular lobes." In the subgenus *Echinohelea* s. str. the bulbous gonocoxites are fused at their bases entirely isolating the tergite and sternite distally. In *Echinoideshelea* the gonocoxites are not fused at the base, but separate the ninth sternite completely from the tergite. Marked bulbous enlargement of the gonocoxites and compression of the ninth tergite is found in several genera of Ceratopogonini. Along with this, the mesal side of the tergite distally bears a rounded membranous area bearing the cerci, bordered by an incomplete, heavily sclerotized margin laterally and distally. A similar configuration is present in the male genitalia of a number of genera in the tribe Ceratopogonini, including *Bothahelea*, *Brachypogon*, *Ceratohelea*, *Ceratopogon*, *Fanthamia* and *Kolenhelea*.

Key to the Western Hemisphere Species of *Echinohelea*.

- | | | |
|--------|---|---------------------------------|
| 1. | Wing hyaline to pale brownish with two small, infuscated spots, one over r-m crossvein, the other behind tip of second radial cell..... | 2 |
| — | Wing without distinct spots, infuscation general or diffuse over anterior portion..... | 4 |
| 2. | Infuscated wing spots distinct..... | 3 |
| — | Infuscated wing spots indistinct, apparent only as areas of darker infuscation..... | <i>panamensis</i> n. sp. (part) |
| 3. | Wing with distal dark spot touching tip of vein R4+5; hind leg with distal third of femur dark brown; male parameres fused in midportion, clavate but not hooked at tip; distal lobe of aedeagus with a pair of long subapical, lateral, retrorse hooks; wing length 2.0 mm (Mexico to Guyana)..... | <i>ornatipennis</i> Macfie |
| — | Wing with distal dark spot not touching tip of vein R4+5; hind femur yellow to tip; male parameres with very large distal hook; distal lobe of aedeagus with small subapical ventrolateral points; wing length 1.66 mm (Panama)..... | <i>blantoni</i> n. sp. |
| 4(1). | Males..... | 5 |
| — | Females..... | 10 |
| 5. | Genitalia elongate, about twice as long as broad; basistyle about 4 times as long as broad (Fig. 15)..... | <i>aitkeni</i> n. sp. |
| — | Genitalia globular, about as broad as long; basistyle about twice as long as broad (Fig. 13)..... | 6 |
| 6. | Paramere long and slender, straight in midportion, the tip abruptly bent laterad and tapering to a point (Fig. 31)..... | <i>leei</i> n. sp. |
| — | Paramere more or less arcuate, length variable, the apex variously expanded or lengthened (Figs. 25, 29, 32, 33, 38)..... | 7 |
| 7. | Paramere with ventrolateral distal lobe or expansion short, not longer than basal breadth of expanded or bent portion (Figs. 27, 37)..... | 8 |
| — | Paramere with ventrolateral distal lobe long and usually slender, length of bent portion more than 1.5 times its basal breadth; distal lobe of aedeagus various (Figs. 29, 33)..... | 9 |
| 8. | Distal lobe of aedeagus pointed apically with subapical lateral points (Fig. 36); paramere expanded at apex of stem at base of gradually bent tip (Fig. 37)..... | <i>richardsi</i> Macfie |
| — | Distal lobe of aedeagus pointed apically, without subapical lateral points (Fig. 26); paramere slender and straight, the tip abruptly bent anterolaterally (Fig. 27)..... | <i>jamaicensis</i> n. sp. |
| 9. | Wing with two areas of slightly deeper infuscation, one over r-m crossvein, other over tip of second radial cell; distal lobe of paramere (Fig. 33) not broader than stem; aedeagus (Fig. 32) with strong angular sclerotization on shoulders, distal lobe with sharp lateral subapical points (Panama)..... | <i>panamensis</i> n. sp. (part) |
| — | Wing uniformly infuscated along anterior margin; paramere (Fig. 29) with apex expanded, flaring lateral portion broader at base than thickness of stem of paramere; aedeagus (Fig. 28) without strong angular sclerotization on shoulders, distal lobe without lateral points or hooks (Massachusetts to Panama)..... | <i>lanei</i> Wirth |
| 10(4). | Tarsal claws subequal on each leg; wing 1.8 mm long (Guyana)..... | 11 |
| — | Tarsal claws unequal on mid and hind legs ... | 12 |
| 11. | Large species, wing length 1.8 mm..... | <i>smartli</i> Macfie |
| — | Smaller species, wing length less than 1.30 mm..... | <i>jamaicensis</i> n. sp. |

12. Wing uniformly infuscated along anterior margin 13
 — Wing with two areas of deeper infuscation, one over r-m crossvein, other at end of second radial cell *panamensis* n. sp. (part)
13. Claws unequal on all legs; hind tibia yellowish (occasionally somewhat brownish proximally), narrow tip dark *macfie* Lane
 — Claws equal on fore leg, unequal on mid and hind legs; hind tibia dark brown on proximal 3/4, with pale subapical band 14
14. Costa short, costal ratio 0.74; female genital plate (Fig. 17) attenuated posteriorly, with concave lateral margins *aitkeni* n. sp.
 — Costa long, costal ratio 0.77-0.80; female genital plate trapezoidal with straight or convex lateral margins (Fig. 18) 15
15. Small species, wing length 1.15-1.22 mm; hind femur without distal infuscation; mid femur with 5-6 spines, hind tibia with 5-9 spines; genital plate longer than basal breadth *richardsi* Macfie
 — Larger species, with length 1.3-1.8 mm; hind femur dusky on distal third; mid femur with 7-11 spines, hind tibia with 4-5 spines; genital plate as long as basal breadth *lanei* Wirth

Subgenus *Echinoideshelea* Wirth,
 new subgenus.
 (Figs. 17, 17)

Type-species: *Echinohelea (Echinoideshelea) aitkeni* Wirth, by present designation.

Subgeneric Diagnosis. Closely resembling *Echinohelea* s. str. except as follows: Small species, wing length 0.74 mm (compared with 1.2-2.0 mm in *Echinohelea* s. str.). Costa short, costal ratio 0.74 (compare 0.79-0.80). Wing narrow and bladelikey with reduced anal angle. Antenna short with indistinct verticils, antennal ratio 1.17 (compare 0.78-1.13). Palpus with indistinct sensory pit. Clypeus short (compare short to long). Legs short and stout, especially hind pair; strong spines reduced on femora and tibiae of female, except hind tibia; strong and numerous and extremely variable in length and number on legs of male. Tarsal claws as in *Echinohelea* s. str., unequal on mid and hind legs of female. Genital plate (Fig. 17) of female of diagnostic shape, broad anteriorly and rather abruptly

narrowed caudad, forming a distinctly narrowed posterior half.

Male Genitalia: Diagnostic; relatively elongate with elongate gonocoxites and long, slender, slightly hooklike gonostyli. Ninth tergite long and slender, distally as in *Echinohelea* s. str. but fused proximally with bases of gonocoxites; ninth sternite a broad, arcuate, transverse sclerite with distinct anterior and lateral margins, but indistinct caudad, the posterolateral angles articulating with basal arms of aedeagus. Aedeagus nearly as in *Echinohelea* s. str., basal arms broad and strongly sclerotized, forming a nearly semicircular band; distal process in form of two slender, contiguous rods with bluntly pointed tips bent slightly ventrolaterad. Parameres (Fig. 16) as in *Echinohelea* s. str.

Discussion. Cladistically, the subgenus *Echinoideshelea* likely forms the sister group to all the remaining *Echinohelea*. The elongate gonocoxites and gonostyli differ markedly from those of typical *Echinohelea*, more closely resembling the plesiotypic condition found in many other genera of Ceratopogonini. The narrow ninth tergite and well-developed ninth sternite are intermediate in condition between typical *Echinohelea* and other Ceratopogonini. Females exhibit characters quite similar to those of typical *Echinohelea*, and the male aedeagus and parameres of *Echinoideshelea* are also unmodified.

Echinohelea (Echinoideshelea) aitkeni ·
 Wirth, new species
 (Figs. 15-17)

Description. Allotype Female. Wing length 0.92 mm, breadth 0.33 mm; costal ratio 0.74. A small, pale brown, poorly marked species with short costa, smoky gray-brown wing, and reduced leg spines; legs dusky yellow, hind tibia brown with subapical pale ring; halter deeply infuscated; abdomen pale brown, caudal margins of segments dark brown..

Antenna unusually short, with inconspicuous verticils; lengths of flagellar segments 72-32-32-36-36-40-47-47-80-80-82-80-80 microns; antennal ratio 1.17. Palpus with lengths of segments 14-28-47-32-43 microns, sensory pit indistinct. Clypeus short. Mandible with nine coarse teeth. Legs short and stout; spines relatively weak except on hind tibia: femur 5, tibia 0 on fore leg; femur 6, tibia 3 on mid

leg; and femur 7, tibia 4-5 on hind leg. Tarsal claws equal on fore leg, unequal on mid and hind legs; measuring 90 microns and 36 microns on hind leg. Wing smoky gray brown, slightly darker anteriorly, veins darker brown. Genital plate (Fig. 17) with characteristic shape: broad anteriorly with anterior margin concave, forming two low, more strongly sclerotized, anterolateral lobes, lateral margins concave; posterior portion narrowed, with distinct caudomedian notch at gonopore. Spermatheca short ovoid, tapering to slender neck, measuring 119 microns including neck x 83 microns.

Holotype Male. Wing length 0.93 mm, breadth 0.27 mm; costal ratio 0.76. Similar to female with usual sexual differences. Antenna with verticils long but very fine. Legs unusually stout, especially hind pair; hind femur brown on distal 1/2, hind tibia dark brown with narrow subapical pale ring; spines on hind tibia especially strong and numerous.

Antenna with lengths of flagellar segments 57-32-32-32-36-36-43-47-65-47-80-75-80 microns; antennal ratio 1.08. Palpus with lengths of segments 28-14-43-28-14 microns. Legs with strong black spines as follows: femur 5-9, tibia 2-6 on fore leg; femur 7, tibia 6-7 on mid leg; and femur 4-8, tibia 10-17 on hind leg; the number and size of leg spines extremely variable. Genitalia (Figs. 15-16) as described in diagnosis of subgenus.

Distribution. Brazil.

Types. Holotype male, allotype female, Brazil, Pará, Belem, APEG Forest, terra firma, ii. 1970, T. H. G. Aitken, light trap. Paratypes, 6 males, 6 females, same data as types.

Etymology. This species is named in honor of Thomas H. G. Aitken of the Yale University School of Public Health Arbovirus Laboratory, New Haven, Connecticut, in appreciation of his interest in the collection and study over an extended period of time of the biting midges of the lower Rio Amazon.

Discussion. The female of *Echinohelea aitkeni* is practically indistinguishable from that of *E.*

richardsi, differing principally in the shape of the genital plate, and in its longer distal antennal segments. The wings are very similar, but the costal ratio is greater in *E. richardsi* (costal ratio 0.80).

Echinohelea blantoni Wirth, new species
(Figs. 24-25)

Description. Female Allotype. Wing length 1.66 mm, breadth 0.50 mm; costal ratio 0.79. Color orange-yellow, thorax brownish; hind tibia dark brown except narrow subapical ring yellow. Wing grayish hyaline, more or less brownish infuscated, especially along anterior margin and over the veins; two fairly prominent brownish spots, one centering on r-m crossvein, the other lying just behind tip of vein R4+5 but not touching the vein.

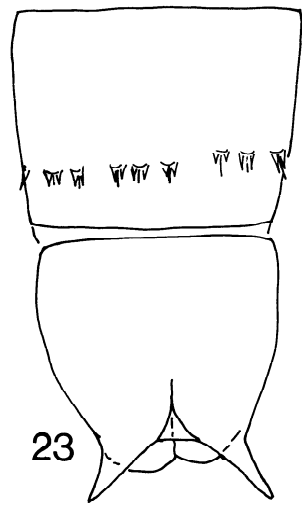
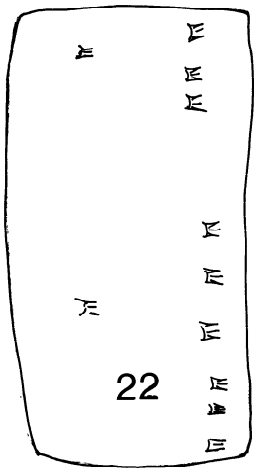
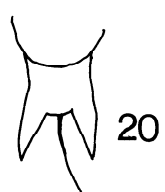
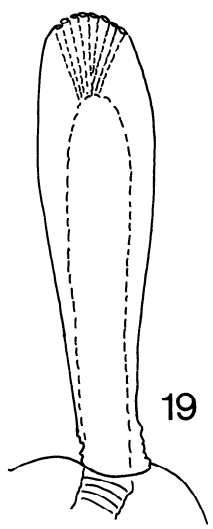
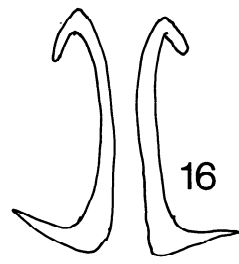
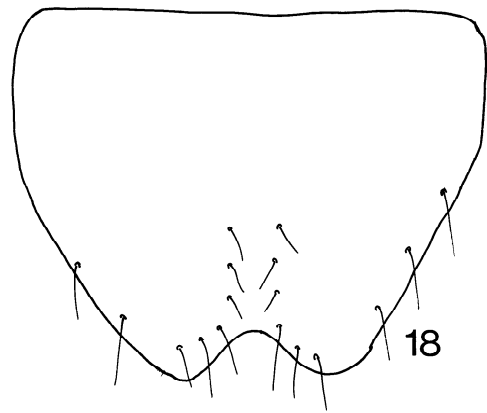
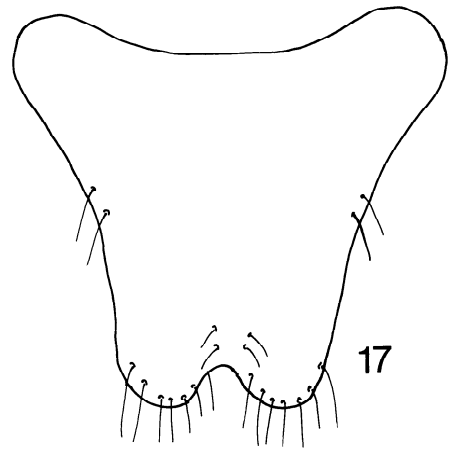
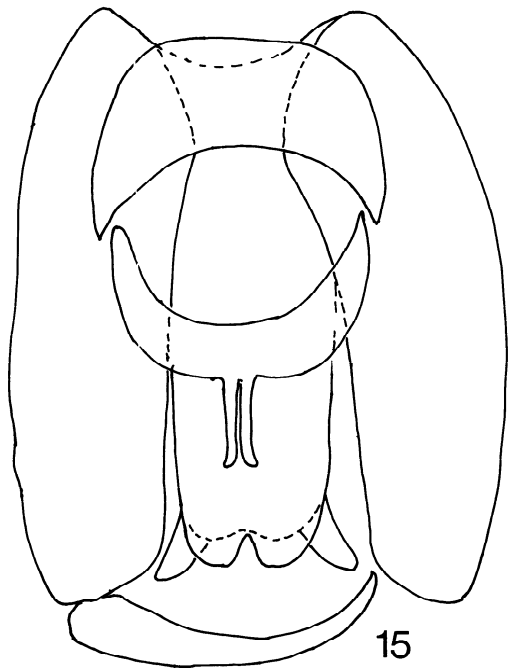
Head: Eyes nearly contiguous on midline. Antenna lost (Ecuador paratype with lengths of flagellar segments 108-72-72-79-90-94-97-108-161-158-154-129-106 microns; antennal ratio 0.98. Palpus with lengths of segments 18-52-90-50-54 microns; third segment slender with a small round sensory pit located at distal fourth. Clypeus long. Mandible with seven teeth.

Thorax: Legs with stout black spines and scattered fine setae. Leg spines as follows: femur 11, tibia 2 on fore leg; femur 12, tibia 10 on mid leg; and femur 15, tibia 16 on hind leg. Hind tarsal ratio 2.2; claws long and equal on all legs. Wing with second radial cell four times as long as first; costal ratio 0.80.

Abdomen: Spermatheca collapsed, in Ecuador paratype large, oval, with short slender neck; 130 x 106 microns, neck 14 microns long.

Male Holotype. Similar to female with usual sexual differences. Head lost. Genitalia with aedeagus (Fig. 24) slender distally, tip cleft, the distal lobes appressed, each with a slightly expanded, rounded tip with small ventrolateral point. Parameres (Fig. 25) separate, each with very slender stem, the long, tapering, pointed, blade-like

Figures 15-23. 15-17, *Echinohelea aitkeni*; 18, *E. ornatipennis*; 19-23, pupa of *E. lanei*: 15, male genitalia, parameres omitted; 16, male parameres; 17, 18, female genital plate; 19, pupal respiratory horn; 20, tubercle of 8th abdominal segment; 21, tubercle of 4th abdominal segment; 22, tubercles of 4th abdominal segment; 23, 8th and 9th abdominal segments.



distal portion abruptly bent ventrolaterad and nearly as long as stem.

Distribution. Colombia, Ecuador, Mexico, Panama.

Types. Holotype male, allotype female, Tocumen, Panama Prov., Panama, i.1953, F. S. Blanton, light trap. Paratypes, 1 male, 3 females, as follows: **COLOMBIA:** Meta, Finca Barbascal, 27-30.ix.1969, V. H. Lee, light trap, 1 female. **ECUADOR:** Napo, 13 km SW Tenat, 28.v.1977., L. J. Pinto, malaise trap, 1 male. **MEXICO:** Oaxaca, Palomares, 5-21.iv.1961, R. & K. Dreisbach, 1 female (pinned). **PANAMA:** Bocas del Toro, Almirante, 28.iv.1953, F.S. Blanton, light trap, 1 male (pinned).

Discussion. The species is named for Professor Franklin S. Blanton, retired from the University of Florida, in recognition of his monumental contribution to our knowledge of the Neotropical biting midges.

Echinohelea blantoni can be confused in the Neotropics with *E. ornatipennis* Macfie which also has 2-spotted wings, but *ornatipennis* has the male aedeagus broad distally with a long pair of lateral retrorse subapical processes, and the parameres are fused at the base of the stem portion and lack the laterally flaring tips.

Echinohelea jamaicensis Wirth,
new species
(Figs. 26-27)

Description. Allotype Female. Wing length 1.30 mm, breadth 0.43 mm; costal ratio 0.77. A dull yellowish brown species, scutum with brownish areas above wing bases; pleuron with two distinct horizontal brown bands; legs pale brown, hind femur dark brown except subapical pale band; wing grayish hyaline, light brown over radial field; halter pale brown; abdomen pale brown, tergites darker distally.

Antenna with lengths of flagellar segments 100-58-58-54-54-58-65-72-100-107- 107-100-100 microns; antennal ratio 1.00. Palpus with lengths of segments 18-29-61-36-58 microns. Clypeus short.

Legs with strong amber colored spines as follows: femur 8-9, tibia 0 on fore leg; femur 4-5, tibia 2-3 on mid leg; and femur 4, tibia 3-4 on hind leg. Tarsal claws subequal, each 83 microns long on hind leg, slender and relatively straight. Genital plate short, length subequal to basal breadth. Spermatheca ovoid, tapering to short slender neck, measuring 97 x 58 microns.

Holotype Male. Wing length 1.25 mm, breadth 0.35 mm; costal ratio 0.76. Similar to female with usual sexual differences. Antenna with lengths of flagellar segments 97-50-50-50-50-50-54-72-65-94-80-72 microns. Legs with stout amber spines as follows: femur 7-8, tibia 0-1 on fore leg; femur 7-8, tibia 1-3 on mid leg; and femur 8-10, tibia 13-14 on hind leg. Genitalia brown, gonostyli dark brown. Aedeagus (Fig. 26) short, total length equal to breadth of basal arch, the basal arms curved, with a pale lateral flange; distal process extremely short, tapering to a point but split distally in two appressed valves. Parameres (Fig. 27) separate; each a relatively short, slender, nearly straight rod with short basal apodeme; tip abruptly bent ventrolaterad in a short retrorse pointed lobe.

Distribution. Jamaica.

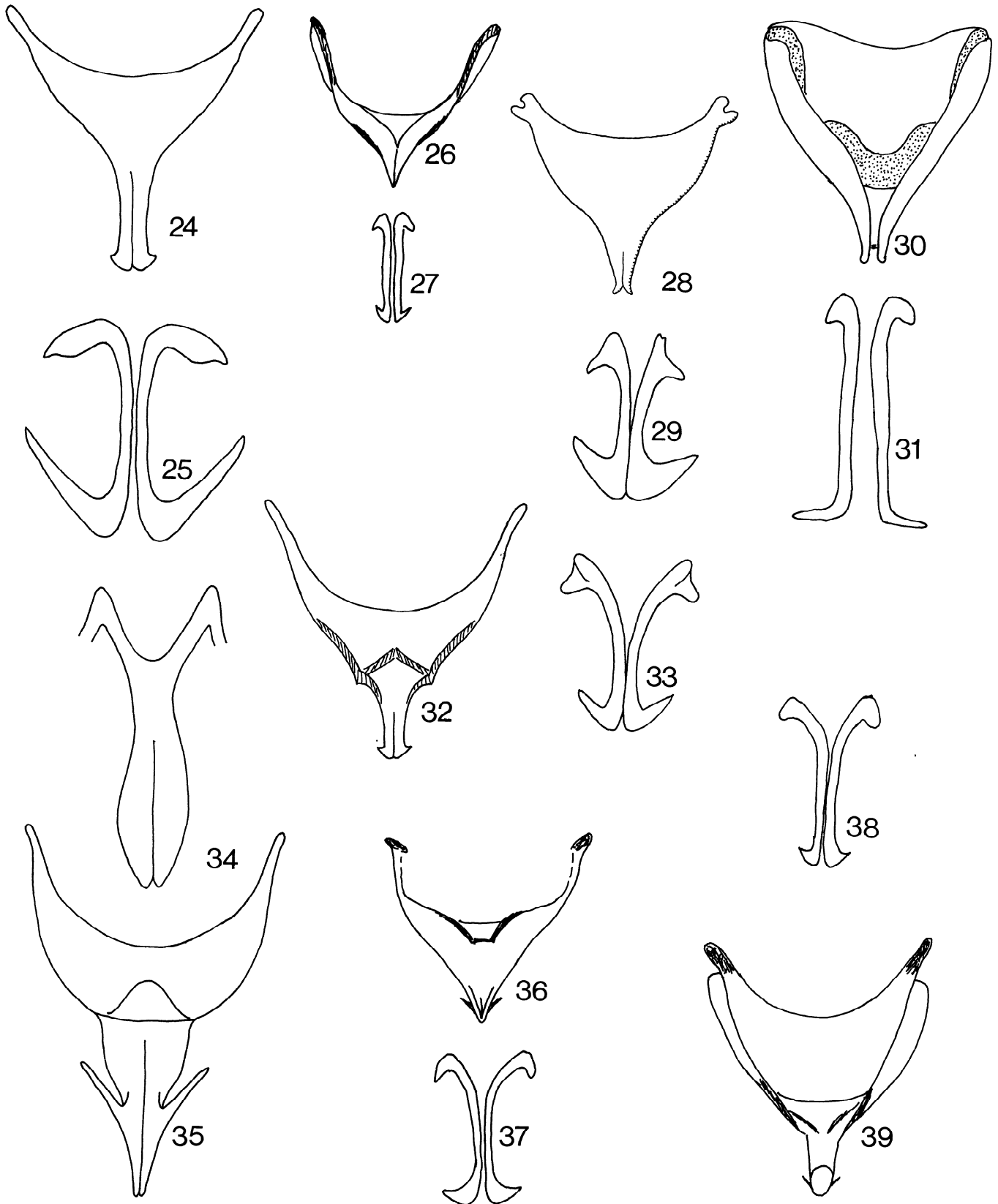
Types. Holotype male, allotype female, Jamaica, Runaway Bay, ii.1969, W. W. Wirth, malaise trap in dry stream bed. Paratypes, 3 males, 2 females (slides), 3 females (pinned), same data as types; 1 female, same but 1-8.iii.1970. Hardwar Gap, Hollywell, 16.vi.1970, E. G. Farnworth, light trap, 1 male. Bath Fountain, St. Thomas, 18.v.1970, E. G. Farnworth, light trap, 1 male.

Discussion. The unmarked wing and equal female claws separate *Echinohelea jamaicensis* from all other Neotropical species except *E. smarti*, which is a larger species with more numerous tibial spines.

Echinohelea lanei Wirth
(Figs. 1-14, 19-23, 28-29)

Echinohelea lanei Wirth, 1951: 319 (male, female; Virginia; fig. male genitalia).

Figures 24-39. *Echinohelea* species, male aedeagus and parameres; 24-25, *E. blantoni*; 26-27, *E. jamaicensis*; 28-29, *E. lanei*; 30-31, *E. leei*; 32-33, *E. panamensis*; 34-35, *E. ornatipennis*; 36-37, *E. richardsi*; 38-39, *E. neotropica*; 24, 26, 28, 30, 32, 35, 36, 39, aedeagus; 25, 27, 29, 31, 33, 34, 37, 38, parameres.



Diagnosis. Female wing length 1.3-1.8 mm, breadth 0.50 mm; costal ratio 0.80. Thorax orange yellow, scutum with two pairs of whitish patches on humeri and in front of wing base; pleuron with two transverse brown bands; legs (Fig. 6) yellow, hind femur dusky on distal third, hind tibia brown with narrow subapical pale ring. Wing (Fig. 4) pale brown, darker on anterior margin; halter dull brown. Abdomen (Fig. 11) dull yellow, lateral and posterior margins of segments dark brown. Female antenna (Fig. 1) with lengths of flagellar segments 100-58-61-61-61-72-72-83-125- 118-118-110-107 microns; antennal ratio 1.03. Palpus (Fig. 3) with lengths of segments 18-36-65-36-65 microns. Clypeus moderately short. Leg spines of female as follows: femur 7-10, tibia 0-1 on fore leg; femur 7-11, tibia 4-10 on mid leg, and femur 5-12, tibia 5-9 on hind leg; in male femur 13-15, tibia 1 on fore leg, femur 11- 14, tibia 3-5 on mid leg, and femur 9-11, tibia 8-10 on hind leg; the vestiture of fine, erect, wavy hairlike setae especially well developed. Female tarsal claws (Fig. 8) equal on fore leg, unequal on mid and hind legs; hind leg with longer claw length 1.07 microns and short claw 36 microns. Female genital plate trapezoidal, length about equal to basal breadth; spermatheca (Fig. 5) subspherical, diameter 80 microns, with an abruptly tapering, well sclerotized neck half as long as diameter of spermatheca. Male genitalia (Fig. 13): Aedeagus (Fig. 28) with distal portion conically attenuated to a pair of very fine contiguous recurved points. Parameres (Fig. 29) each with short, slender midportion; apex abruptly expanded and recurved ventrolaterad in form of a broad, rounded, beaklike blade.

Pupal Exuviae (Figs. 19-23). Length 3.2 mm. Color uniformly creamy white. Integument smooth, without prominent tubercles; microscopic spicules visible only on abdominal segments 8 and 9. Operculum lost. Prothoracic respiratory horn (Fig. 19) 186 microns long, spatula-shaped, length 4.2 x greatest breadth, without scales, spicules or wrinkles, bearing 8 minute spiracular openings in a line at extreme tip. Dorsal thoracic setae minute and difficult to find. Abdominal segments with small, pale, inconspicuous, scale-like tubercles in the usual position; nearly all consist of a low scale bearing a fine median seta and two lateral spinules (Fig. 21). The tubercles are progressively stronger and the lateral spinules stouter on the more posterior segments, especially on segment 8 (Fig. 20). Terminal segment (Fig. 23) with a pair of small,

slender, tapering, bluntly pointed, apicolateral processes.

Note: The structure of the respiratory horn and the trifid abdominal tubercles differ from those of described Ceratopogonini and are similar to those of some genera of Heteromyiini (Elson-Harris & Kettle 1986). The pupal stage is known of such a small fraction of the genera of Ceratopogonini, however, that tribal placement on the basis of these characters would be premature.

Type. Holotype male, Falls Church, Virginia, 8.vii.1950, W. W. Wirth (in Museum of Natural History, Smithsonian Institution, Washington, D.C.).

Distribution. Eastern U.S.A., Brazil, Colombia, Panama, Trinidad.

New Records. BRAZIL: Pará, Belem, ii.ix.1970, T. H. G. Aitken, light trap, APEG Forest, 2 females. Rondonia, 62 km SW Ariquemes, vic. Rancho Grande, 20-25.ix.1992, U. Schmitz, UV light trap, 5 males, 4 females. **COLOMBIA:** Valle, Rio Micay, Casa de Suarez, 24.ix.1965, V. H. Lee, light trap, 1 male, 1 female; Rio Raposo, v.1963, iv-vii.1964, VHL, light trap, 57 males, 20 females. **PANAMA:** Bocas del Toro, Almirante, x-xi.1952, i,iii.1953, F. S. Blanton, light trap, 6 males, 7 females. Canal Zone, Barro Colorado Id., vii.1967, W. W. Wirth, light trap, 1 female; Mojinga Swamp, Fort Sherman, 4.x.1951, FSB, LT, 1 male. **U.S.A.: ALABAMA:** Mobile, Dog River, ix.1968, Blanton & Cannon, light trap, 1 female. **DELAWARE:** Rehoboth, 18.vii.1976, W. W. Wirth, malaise trap, 5 males, 6 females. **FLORIDA:** Alachua Co., Gainesville, Chantilly Acres, v.1967, F. S. Blanton, light trap, 2 females. Gulf Co., Beacon Hill, 3.v.1970, W. W. Wirth, malaise trap, 1 female; St. Joseph St. Park, 1-3.v.1970, WWW, light trap, 1 female; Wewahitchka, vii-ix.1967, Blanton & Boike, light trap, 2 females. Highlands Co., Lake Placid, Archbold Biological Station, 13-19.iv.1970, WWW, light trap, 1 female; Sebring, Highlands Hammock St. Park, 15.iv.1979, WWW, light trap, 7 males, 4 females. Hillsborough Co., Harris Swamp, 13.iv.1967, (? collector), 1 female. Jackson Co., Florida Caverns St. Park, 26.v.1973, WWW, malaise trap, 1 female. Jefferson Co., Monticello, v.ix.1969, W. H. Whitcomb, light trap, 3 females. Liberty Co., Torreya St. Park, v.1971, FSB, light trap, 1 female. Orange Co., Rock Springs, 21.iv.1970,

WWW, malaise trap, 3 males, 3 females. Putnam Co., Lons Lake, v. 1971, FSB, light trap, 1 male, 1 female. **MARYLAND:** Prince Georges Co., Patuxent Res. Center, 14.vi.1976, W. L. Grogan, Jr., malaise trap, 2 males; 11.vii-2.viii.1979, WWW, malaise trap, 7 females; Suitland Bog, 14.vi.1951, W. W. Wirth, 1 female. Worcester Co., Snow Hill, 18-30.vi.1968, W. H. Anderson, light trap, 7 males, 4 females. **MASSACHUSETTS:** Middlesex Co., Bedford, 21.vii.1961, WWW, 1 female; Concord, 17.vii.1961, WWW, marshy pond, 9 males, 16 females. **MICHIGAN:** Ionia Co., 12.vii.1952, R. R. Dreisbach, 2 males. **MISSISSIPPI:** Lafayette Co., University, 1951, W. B. Rives, 2 females. **NEW YORK:** Flanders, 4.vi.1963, H. A. Jamnback, reared from margin Flanders Pond, (larva 9.vi, pupa 19.vi, male 28.vi), 1 male with pupal exuviae. **VIRGINIA:** Alexandria, 29.vi.1952, WWW, 1 male; Dyke Swamp, Alexandria, 6.vii.1952, WWW, 1 male. **WEST VIRGINIA:** Pocahontas Co., Cranberry Glades, 16.vii.1955, WWW, 6 males, 13 females.

Discussion. Females of this species are virtually inseparable from those of *E. richardsi* Macfie; the uniformly infuscated anterior wing margin will separate them from those of *E. panamensis*.

Echinohelea leei Wirth, new species.
(Figs. 30-31)

Description. Male Holotype. Wing length 1.22 mm, breadth 0.36 mm; costal ratio 0.80. A pale yellowish brown species, scutum without distinct markings, pleuron with two dark brown bands; legs dull yellow, hind tibia dark brown with narrow subapical pale ring. Wing grayish hyaline, only slightly darker over radial field; halter dark brown. Abdomen dark brown toward posterior margin of segments.

Antenna with lengths of flagellar segments 78-47-47-51-54-54-65-72-93-72-111- 90-90 microns; antennal ratio 0.98. Palpus with lengths of segments 23-30-54-34-54 microns, fourth segment unusually short. Leg spines as follows: femur 9, tibia 1 on fore leg; femur 9, tibia 3 on mid leg; and femur 12, tibia 6 on hind leg.

Genitalia broader than long, dark brown, gonostyli black. Aedeagus (Fig. 30) with total length subequal to basal breadth; basal arms slender, main body from basal arch to base of distal processes strongly sclerotized, dark brown; ending distally in a pair of short, slender, distal processes

with slightly knobbed tips, slightly exceeding the median, blackish connective. Parameres (Fig. 31) separate, each a slender, nearly straight rod, abruptly bent ventrolateral at 3/4 total length, the distal portion dark brown and forming a right angle with the stem and tapering to a blunt point.

Female. Unknown.

Distribution. Colombia.

Types. Holotype male, Colombia, Valle, Rio Raposo, 4.vi.1964, V. H. Lee, light trap. Paratypes, 31 males, same data but dates vi-viii.1964 and ii-viii.1965.

Etymology. This species is named in honor of its collector, Vernon H. Lee, who supplied the Smithsonian Institution with a monumental collection of Colombian Ceratopogonidae.

Discussion. The shape of the male parameres is diagnostic for *Echinohelea leei*.

Echinohelea macfie Lane

Echinohelea macfie Lane, 1948: 228 (female; Brazil).

Type. Holotype female, Juquia, Est. São Paulo, Brazil, i.1939, J. Lane (in coll. Fac. Hig. Saude Pub. Univ. São Paulo, Brazil).

Distribution. Brazil.

Notes. This species has not been reported since its original description. Details in the original description, if confirmed in the light of new critical characters which may permit the ready recognition of these species: All tarsal claws unequal in the female; hind tibia not infuscated; 6-7 spines on the femur and 0 on the tibia of the fore leg, 8-9 on the femur and 9 on the tibia on the mid leg, and 7-8 on the femur and 7-8 on the tibia of the hind leg. A small species, wing 1.4 mm long from wing base. Male unknown.

Echinohelea neotropica Wirth, new species
(Figs. 38-39)

Description. Allotype Female. Wing length 1.40 mm, breadth 0.43 mm; costal ratio 0.80. A large amber yellow species with dark brown markings;

scutum brown above wing bases and behind humeri; pleuron with two longitudinal dark brown bands; legs amber yellow with strong black spines; hind tibia dark brown except narrow subapical pale ring; wing grayish brown, darker toward anterior margin and along veins; halter brown; abdomen pale brown, with dark lines along posterior and lateral margins of tergites and sternites.

Antenna elongate with strong verticils; lengths of flagellar segments 97-58-58-61-65-72-83-87-119-115-119-108-100 microns; antennal ratio 0.97. Palpus with lengths of segments 18-40-72-36-71 microns, third segment with well-marked sensory pit. Clypeus long. Leg spines as follows: femur 8, tibia 1 on fore leg; femur 6, tibia 4 on mid leg; and femur 6, tibia 8-12 on hind leg. Tarsal claws long and strong, equal on fore leg, unequal on mid and hind legs; measuring 125 microns and 54 microns on hind leg. Genital plate trapezoidal, length equal to basal breadth. Spermatheca subspherical, 87 microns by 72 microns plus tapering neck 24 microns long.

Holotype Male. Wing length 1.36 mm, breadth 0.41 mm; costal ratio 0.79. Similar to female with usual sexual differences. Antenna with lengths of flagellar segments 118-58-62-65-65-72-75-75-100-83-123-107-75 microns; antennal ratio 0.89. Palpus with lengths of segments 18-36-58-36-58 microns. Leg spines as follows: femur 8, tibia 1 on fore leg; femur 13, tibia 2-3 on mid leg; and femur 10, tibia 9 on hind leg. Genitalia slightly longer than broad, dark brown. Aedeagus (Fig. 39) with basal arch forming a semicircle, concave proximad, about 1/3 total length of aedeagus; basal arms with a hyaline outer flange with narrow sclerotization on outer margin; distomedian process long, slender, 1/4 as long as total length of aedeagus; comprising two slender, contiguous, more or less fused valves ending in a pair of minute, sharp, retrorse points. Parameres (Fig. 38) separate, slender, divergent on proximal halves, continuous distally; each apically bent ventrolaterad, caplike, and ending in a sharp ventrolateral point.

Distribution. Brazil, Colombia, Ecuador, Panama.

Types. Holotype male, Colombia, Valle, Rio Raposo, 4.vi.1964, V. H. Lee, light trap. Allotype female, same but vii.1964. Paratypes, 56 males, 25 females, as follows: **BRAZIL:** Amazonas, Rio Solimoes, 31.viii.1961, E. J. Fittkau, at light, 1 female. Pará, Belem, iv.1970, T. H. G. Aitken, light trap in APEG

Forest, 2 males. Est. Rio de Janeiro, Fazenda Penedo, 26.viii.1948, S. J. Oliveira, 1 male. **COLOMBIA:** Antioquia, near Rio Anori, ix.1970, D. G. Young, UV light trap in tropic rain forest, 1 male, 3 females. Choco, Camp Teresita, Rio Truando, xi-xii.1967, DGY, 1 male. Valle, Rio Micay, Casa de Suarez, 24.ix.1965, V. II. Lee, light trap, 1 female; Rio Raposo, iv,vi,xii.1963, i-xii.1964, ii-viii.1965, VHL, light trap, 45 males, 18 females. **ECUADOR:** Napo, 13 km SW Tena, 28.v.1977, L. J. Pinto, malaise trap, 1 female. **PANAMA:** Bocas del Toro Prov., Almirante, 26.x.1952, iii.1953, F. S. Blanton, light trap, 2 males. Canal Zone, Mojinga Swamp, Ft. Sherman, 4.x.1951, 17.vi.1952, FSB, light trap, 2 males, 1 female. Panama Prov., Cerro Campana, 19.ix.1952, FSB, light trap, 2 males (slides), 1 female (pinned).

Echinohelea ornatipennis Macfie (Figs. 34-35)

Echinohelea ornatipennis Macfie, 1940: 188 (male, female; Guyana; fig. male genitalia); Wirth, 1956: 249 (Vera Cruz, Mexico).

Diagnosis. Female wing length 2.0 mm, breadth 0.59 mm; costal ratio 0.80. Thorax yellowish brown, mottled with darker brown, with four pale or silvery patches on dorsum. Wing with two small dark brown areas, one over r-m crossvein, the other immediately below tip of vein R4+5, and touching the vein anteriorly. Legs yellowish brown, distal third of hind femur and tip and basal 3/4 of hind tibia dark brown. Antenna with exceptionally strong verticils; lengths of flagellar segments 144-72-79-86-90-97-107-107-144-150-107 microns; antennal ratio 0.95. Palpus with lengths of segments 25-58-107-61-83 microns. Clypeus long. Female claws equal on fore leg, unequal on mid and hind legs. Female with following numbers of spines on the legs: femur 11-12, tibia 1-2 on fore leg; femur 6-7, tibia 6-7 on mid leg; femur 8, tibia 12-14 on hind leg; male with femur 10-13, tibia 1 on fore leg; femur 9, tibia 3 on mid leg; and femur 12-15, tibia 10-13 on hind leg. Spermatheca subspherical, 100 microns in diameter, with short, slender neck. Male genitalia: Distal process of aedeagus (Fig. 35) bearing two large retrorse subapical processes resembling barbs on a fish-hook. Parameres (Fig. 34) fused in midportion, apices separate and slightly expanded, clavate.

Types. Syntypes: Mazaruni, Guyana, 16 and 21.viii.1937, O. W. Richards & J. Smart, 2 males, 1 female (in Natural History Museum, London).

Distribution. Brazil, Guyana, Mexico, Panama, Trinidad.

New Records. **BRAZIL:** Pará, Belem, APEG Forest, ix.1970, T. H. G. Aitken, light trap, 9 females; IPEAN buffalo pasture, THGA, light trap, 1 female. **PANAMA:** Bocas del Toro Prov., Almirante, 28.iv.1953, F. S. Blanton, light trap, 1 female. **TRINIDAD:** Vega de Oropouche, Esperanza Estate, vii.x.1960, THGA, 1 male, 1 female; La Fortune Estate, iii-iv.1960, THGA, 1 male, 1 female.

Discussion. The Vera Cruz, Mexico, record cited by Wirth (1956) is of interest as the male specimen was taken by H. E. Warmke from a flower of *Hevea brasiliensis* in his studies on the pollination of the Para rubber tree; its genitalia are identical with those figured originally by Macfie. This is the only known species of the genus in which the male parameres are fused; they are joined for about half their total length, with the free distal portions lying contiguous, the apices clavate, not greatly expanded nor bent. The Esperanza, Trinidad, female conforms very well to Macfie's description; the Belem, Brazil, females also agree, but are significantly smaller, with wing length only 1.32 mm; males would be necessary to confirm the correctness of the identification.

Echinohelea panamensis Wirth,
new species
(Figs. 32-33)

Description. Female Allotype. Wing length 1.28 mm; breadth 0.40 mm; costal ratio 0.80. Color yellowish brown; mesonotum bright orange yellow, usually darker in two pairs of diagonal bands, one behind humeri and the other above wing base, the latter band more or less continuous with a sublateral pair of darker lines running to ends of scutellum. Abdomen dark brown, bases of tergites dull yellow mesad. Legs dull yellow, hind tibia dark brown except narrow subapical ring pale. Wing brownish infuscated anteriorly in region of the radius and base of the media, becoming gradually lighter and grayish posteriorly and distally; with slightly darker areas over r-m crossvein and at end of costa. Halter moderately infuscated.

Head: Eyes contiguous above. Antenna with lengths of flagellar segments 94-50-54-58-61-66-72-79-129-129-129-100-94 microns; antennal ratio 1.13. Palpal segments with lengths 25-29-58-36-54 microns; third segment with small round sensory pit 2/3 way towards tip. Clypeus short. Mandible with 7 teeth.

Thorax: Legs with strong black spines as follows: femur 8-9, tibia 1 on fore leg; femur 6-7, tibia 4 on mid leg; and femur 4-5, tibia 8-11 on hind leg. Hind tarsal ratio 2.4; claws equal on fore leg, unequal on mid and hind legs. Wing with second radial cell 3.7 times as long as first.

Abdomen: Genital plate 2.5 times as broad as long. Spermatheca subspherical, 87 x 80 microns, not tapering towards entrance of the slender sclerotized neck, which is 29 microns long.

Male Holotype. Similar to female with the usual sexual differences. Antenna with lengths of flagellar segments 98-47-54-54-54-58-58-83-83-100-90-80 microns; antennal ratio 0.94. Legs with stout black spines as follows: femur 8-10, tibia 1 on fore leg; femur 7, tibia 2 on mid leg; femur 8-11, tibia 7-8 on hind leg; legs also with abundant, very long, extremely delicate hairlike setae.

Genitalia: Aedeagus (fig. 32) with high rounded basal arch, a pair of distinctly pointed shoulders sublaterally on outer side of arch near the moderately long distal process; the latter with nearly parallel sides, divided into contiguous lobes, each with a sharp, retrorse, lateral point near apex. Parameres (Fig. 33) separated; each with stem very slender at midportion, apex very slightly expanded and curving ventrolaterad in a sharp-pointed hook.

Distribution. Colombia, Ecuador, Panama.

Types. Holotype male, allotype female, Barro Colorado Islands, Canal Zone, Panama, vii.1967, W. W. Wirth, light trap. Paratypes, 36 males, 24 females, as follows: **COLOMBIA:** Valle, Rio Raposo, iv.1963, V. II. Lee, light trap, 12 males, 11 females. **ECUADOR:** Esmeraldas, La Chiquita, 11 km SE San Lorenzo, J. Cohen, CDC trap, 2 males. **PANAMA:** Canal Zone, same data as types, 14 males, 10 females; Fort Davis, 28.viii.1952, F. S. Blanton, light trap, 1 male; Gamboa, Pipeline Rd., vii.1967, FSB, light trap, 1 male (slide), 2 females (pinned); Federal Preserve Island, 15.vii.1967, FSB, light trap, 1 male; Mojinga Swamp, Fort Sherman, 4.x.1951, 17.vi.1952, FSB, light trap, 6 males, 3 females (slides), 18 males, 18 females (pinned).

Discussion. This species is very similar to *E. lanei* Wirth, but is readily distinguished by the subapical lateral points and sclerotized, angular shoulders on the male aedeagus, the more slender parameres, and fewer spines on the legs.

Echinohelea richardsi Macfie
(Figs. 36-37)

Echinohelea richardsi Macfie, 1940: 189 (female; Guyana); Lane, 1948: 228 (Brazil record).

Female Diagnosis. Wing length 1.15 mm, breadth 0.38 mm; costal ratio 0.80. A small pale brown, poorly marked species; scutum with darker mottling, pleuron with one longitudinal dark brown band; legs stramineous, hind tibia brown with faint subapical pale ring; wing uniformly smoky gray-brown; halter deeply infuscated; abdomen pale brown, caudal margins of segments brown.

Antenna with lengths of flagellar segments 79-43-47-54-54-61-72-72-93-93-97-86-97 microns; antennal ratio 0.97, verticils moderately strong. Palpus very short, lengths of segments 14-22-47-25-47 microns. Clypeus short. Leg spines brown, moderately strong; femur 7, tibia 0 on fore leg; femur 5-6, tibia 3 on mid leg; and femur 6, tibia 4-5 on hind leg. Tarsal claws equal on fore leg, unequal on mid and hind legs; measuring 90 microns and 40 microns on hind leg. Genital plate trapezoidal in outline, slightly longer than anterior breadth. Spermatheca subspherical, tapering abruptly to short sclerotized neck; 80 microns including neck x 65 microns.

Male Diagnosis. Wing length 1.18 mm, breadth 0.38 mm; costal ratio 0.79. Similar to female, with usual sexual differences. Antenna with lengths of flagellar segments 93-54-58-58-61-65-65-75-61-93-82-90 microns; antennal ratio 0.81. Palpus with lengths of segments 18-25-54-32-47 microns. Strong leg spines as follows: femur 8-9, tibia 0-1 on fore leg; femur 7-8, tibia 2-3 on mid leg; and femur 8-10, tibia 5-6 on hind leg. Genitalia as usual in subgenus *Echinohelea*. Aedeagus (Fig. 36) unusually short and broad, basal arch about 1.5 times as broad as total length of aedeagus, poorly sclerotized; distomedian process short and tapering to sharp point. Parameres (Fig. 37) separate; each with slender, slightly arcuate stem, expanding distally to a caplike tip with a sharp lateral point.

Types. Two female syntypes, Mazaruni, Guyana, 21.viii.1937, O. W. Richards & J. Smart (in Natural History Museum, London).

Distribution. Brazil, Colombia, Guyana.

New Records. BRAZIL: Para, Belem, vii.1970, T. H. G. Aitken, sticky trap, 1 male, 10 females. Rondonia, 62 km SW Ariquemes, vic. Rancho Grande, 25.ix.1992, U. Schmitz, UV light trap, 2 females. **COLOMBIA:** Choco, Camp Teresita, Rio Truando, xi-xii, D. G. Young, 1 female. Valle, Rio Raposo, iii.1963, vi-vii.1964, iv.1965, V. H. Lee, light trap, 1 male, 10 females. **ECUADOR:** Napo, 13 km SW Tena, 28.v.1977, L. J. Pinto, malaise trap, 1 female.

Discussion. This species has many similarities to *Echinohelea aitkeni*, but lacks the plesiotypic characters that set *E. aitkeni* apart in the subgenus *Echinoideshelea* from all other *Echinohelea* species. Lane's (1948) record of *E. richardsi* from Brazil was from a specimen captured by Dr. Oliveira at Fazenda Penedo while it was flying in a swarm of *Forcipomyia* midges. Presumably it was a female intending the *Forcipomyia* as prey.

Echinohelea smarti Macfie

Echinohelea smarti Macfie, 1940: 190 (female; Guyana); Lane, 1948: 227 (male; Brazil; fig. genitalia).

Diagnosis (Colombia female). Wing length 1.50 mm, breadth 0.45 mm; costal ratio 0.80. A large (wing length in Guyana holotype 1.8 mm) pale brown species; scutum mottled with dark brown; pleuron with two horizontal dark brown bands; legs yellowish brown, hind tibia dark brown with faint subapical pale ring. Wing brownish infuscated, darker toward anterior margin and along veins, slightly darker areas over r-m crossvein and at tip of costa. Halter brown. Abdomen light brown, darker narrowly along posterior margins of segments.

Antenna with lengths of flagellar segments 118-68-72-75-79-83-90-93-108-111-115-111-115 microns; antennal ratio 0.78. Palpus with lengths of segments 18-36-61-36-65 microns; third segment relatively short. Clypeus short. Legs relatively stout for the genus; strong black spines as follows: femur 8-9, tibia 0-1 on fore leg; femur 5-6, tibia 6 on mid leg; and femur 6-7, tibia 9-14 on hind leg. Palisade setae present on tarsomeres 1-3 on mid and hind legs, especially prominent on hind leg. Tarsal claws

subequal on all legs, strong and moderately curved, 83 microns long on hind legs. Genital plate short and broad, 0.6 as long as basal breadth. Spermatheca subspherical, 92 microns in diameter, with very short, tapering meck.

Types. Two female syntypes, Mazaruni, Guyana, 16.viii.1937 and Kaieteur, 4.ix.1937, O. W. Richards & J. Smart (in Natural History Museum, London).

Distribution. Colombia, Guyana.

New Records. COLOMBIA: Valle, Rio Raposo, 10.vi, 28-vii.1964, v.1965, V. H. Lee, light trap, 6 females.

Discussion. The females are readily separable from all other American species except *E. jamaicensis* n. sp. by the subequal female claws and unspotted wings; *jamaicensis* differs in its smaller size (wing length 1.30 mm) and fewer strong spines on the femora and tibiae. I have been unable to recognize the male of this species in the abundant material examined from Rio Raposo, Colombia. Lane (1948) did not show enough detail in his figure of the male genitalia to allow characterization of the aedeagus and parameres; therefore this species could not be included in the male portion of the foregoing key.

Acknowledgments.

I am greatly indebted to Art Borkent, Salmon Arm, British Columbia, for critical review of the manuscript and constructive comments, especially on the cladistics of *Echinohelea*.

I am grateful to Harold A. Denmark and Richard D. Gaskell of the Florida Department of Agriculture and Consumer Services, Division of Plant Industry, Gainesville, for providing research facilities at the Florida State Collection of Arthropods. I am indebted to Robert V. Peterson of the Systematic Entomology Laboratory, US Department of Agriculture, and to Wayne N. Mathis of the Department of Entomology, Smithsonian Institution, Washington, D.C. for the loan of specimens from the National Museum of Natural History.

Niphan C. Ratanaworabhan kindly provided the illustrations of *Echinohelea lanei* from her PhD dissertation at the University of Florida. Hugo Jamnback provided the author with the previously undescribed pupa of *Echinohelea* from his extensive rearings of New York State Ceratopogonidae.

I sorted especially long series of *Echinohelea* specimens from light trap samples generously provided by Thomas H. G. Aitken from Belem, Brazil, by Franklin S. Blanton from Panama, and by Vernon H. Lee from Rio Raposo, Colombia.

References.

- Blanton, F. S., and Wirth, W. W.** 1979. The sand flies (*Culicoides*) of Florida (Diptera: Ceratopogonidae). *Arthropods of Florida* 10: 1-204.
- Clastrier, J.** 1975. Description de quelques males d'*Holoconops* (Dipt. Ceratopogonidae). *Annales de la Societe Entomologique de France (N.S.)* 11: 587-607.
- Clastrier, J.** 1984. Revision des especes afrotropicales du genre *Echinohelea* (Diptera, Ceratopogonidae) avec description de trois especes nouvelles. *Bulletin du Museum National d'Histoire Naturelle Paris (4 ser.)* 6: 361-376.
- Debenham, M. L.** 1970. Australasian Ceratopogonidae (Diptera, Nematocera). Part XIII: Australian and New Guinea species of *Echinohelea* Macfie. *Proceedings of the Linnæan Society of New South Wales* 94: 145-159.
- Downes, J. A., and Wirth, W. W.** 1981. Ceratopogonidae, pp. 393-421, In: J. F. McAlpine, et al., eds. *Manual of Nearctic Diptera*. Vol. 1. Agriculture Canada Monograph 27, 674 pp.
- Elson-Harris, M. M., and Kettle, D. S.** 1986. The immature stages of some Australian Heteromyiini (Diptera: Ceratopogonidae). *Journal of the Australian Entomological Society* 25: 1-14.
- Grogan, W. L., Jr.** 1975. The larval habitat of *Echinohelea lanei* Wirth (Diptera: Ceratopogonidae). *Mosquito News* 35: 231.
- Lane, J.** 1948. Novos ceratopogonideos do Brasil (Diptera, Ceratopogonidae (Heleidae)). *Arquivos da Faculdade de Higiene e Saude Publica da Universidade de Sao Paulo* 1: 225-239., 4plates.
- Macfie, J. W. S.** 1940. Ceratopogonidae (Diptera) from British Guiana and Trinidad. Part 2. Pro-

- ceedings of the Royal Entomological Society of London (B) 9: 187-195.
- McKeever, S., Hagan, D. V., and Grogan, W. L., Jr.** 1991. Comparative study of mouthparts of ten species of predaceous midges of the tribe Ceratopogonini (Diptera: Ceratopogonidae). *Annals of the Entomological Society of America* 84: 93-106.
- Meillon, B. de.** 1960. New Ceratopogonidae (Diptera: Nematocera) from the Subsaharan region. *Journal of the Entomological Society of Southern Africa* 23: 403- 410.
- Meillon, B. de, and Wirth, W. W.** 1991. The genera and subgenera (excluding *Culicoides*) of the Afrotropical biting midges (Diptera: Ceratopogonidae). *Annals of the Natal Museum* 32: 27-147.
- Tokunaga, M.** 1963. New Guinea biting midges (Diptera: Ceratopogonidae), 3. *Pacific Insects* 5: 211-279.
- Wirth, W. W.** 1951. New species and records of Virginia Heleidae (Diptera). *Proceedings of the Entomological Society of Washington* 53: 313-326.
- Wirth, W. W.** 1952. The Heleidae of California. University of California Publications in Entomology 9: 95-206.
- Wirth, W. W.** 1956. The heleid midges involved in the pollination of rubber trees in America (Diptera, Heleidae). *Proceedings of the Entomological Society of Washington* 58: 241-250.
- Wirth, W. W., and Grogan, W. L., Jr.** 1988. The predaceous midges of the World (Diptera: Ceratopogonidae; tribe Ceratopogonini). *Flora and Fauna Handbook* 4, 160 pp.
- Wirth, W. W., Ratanaworabhan, N. C., and Blanton, F. S.** 1974. Synopsis of the genera of Ceratopogonidae (Diptera). *Annales de Parasitologie humaine et comparee (Paris)* 49: 595-613.