



Hurleyella, a new genus of Nearctic Dolichopodidae (Diptera)

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Abstract

The new micro-dolichopodid genus *Hurleyella* and two new species, *H. cumberlandensis* and *H. brooksi* are described from the Nearctic. *Hurleyella* resembles the subfamily Medeterinae in having the legs bare of major setae, a depressed posterior mesonotum, and concave dorsal postcranium, but the complex male genitalia is unlike the relatively simple structure of traditional Medeterinae (e.g., *Medetera*, *Thrypyicus*, *Corindia*, etc.). Until the relationship of *Hurleyella* to other genera can be determined, and the limits of dolichopodid subfamilies refined, it should be considered as *incertae sedis*.

Key words: long-legged flies, Medeterinae, micro-dolichopodid, *Enlinia*, *Harmstonia*, *Microcyrtura*, *Microchrysotus*, *Micromedetera*

Introduction

In June of 2008, the senior author (JBR) collected a new genus of minute Dolichopodidae in the Appalachian Mountains of southwest Virginia. This fly belongs to the group informally referred to as ‘micro-dolichopodids’, an interesting and notable element of the dolichopodid fauna of the Nearctic and especially the Neotropics (Robinson 1969; Yang *et al.* 2007; Bickel 2009). These species are about 1 mm long, or less, and belong to several relatively unrelated genera. Most speciose of the micro-dolichopodid genera are the seemingly related *Enlinia* Aldrich (79 described spp.) and *Harmstonia* Robinson (18 described spp.) (Yang *et al.* 2007), both of which are represented in the Nearctic, but have radiated extensively in the Neotropics (see Robinson 1969). Only a small fraction of the total *Enlinia* and *Harmstonia* species have been described and *Enlinia* may well prove to have more species than any other dolichopodid genus in tropical America. The remaining American micro-dolichopodid genera are known only from the Neotropics: *Microcyrtura* Robinson (4 spp.) and *Microchrysotus* Robinson (2 spp.) (Robinson 1964b), and *Micromedetera* Robinson (3 spp.) (Robinson 1975). Because of their small size and elusive habits (e.g., *Enlinia* hover very closely to the substrata), micro-dolichopodids are difficult to collect and have been largely overlooked. For example, *Micromedetera* (3 spp.) is known from both sexes and three countries (Dominica, Jamaica, and Panama), but from a total of only four specimens (Robinson 1975). Undoubtedly, more species of *Micromedetera* await discovery, something that is true for the micro-Dolichopodidae in general.

This paper describes *Hurleyella cumberlandensis*, the new genus and species of micro-Dolichopodidae collected in Virginia. Specimens of a second species of *Hurleyella* from Texas were provided to us by the dipterist Scott Brooks (CNC) after he reviewed an earlier version of this paper. ESEM images of the genus are provided, as are illustrations of the male genitalia. In some aspects, *Hurleyella* fits in the subfamily Medeterinae, but its minute size, pollinose face, distinctly haired eyes and complex genitalia are not congruent with the traditional concept of that subfamily. The systematic position of *Hurleyella* and its potential relationship to other micro-dolichopodid genera are discussed.

Material and methods

Structural terminology follows McAlpine (1981), except for genitalia which follow Cumming et al. (1995) and Sinclair & Cumming (2006). The postabdomen on intact specimens is rotated approximately 180° and lateroflexed to the right, but in descriptions “dorsal” and “ventral” refer to the true morphological positions (e.g., “up” on genitalia of intact specimens is ventral). Legs are designated by roman numerals (e.g., Leg III = the metathoracic leg). Genitalia were cleared using KOH and mounted in glycerin for examination and illustration; two whole specimens of *H. cumberlandensis* were cleared and then permanently slide mounted, whereas the abdomen of a *H. brooksi* specimen was removed, cleared and then transferred to a microvial and attached to the corresponding specimen. SEM images were taken at the SEM lab at the United States National Museum of Natural History in Washington, D.C. with a Philips XL30 ESEM Scope that allowed imaging without metallic coating. Density of pollen is characterized as in Runyon & Hurley (2003), Runyon (2008), and Hurley & Runyon (2009).

Material from this work is housed in the following institutions: CNC = Canadian National Collection, Ottawa; DEBU = University of Guelph Insect Collection, Guelph, ON, Canada; MTEC = Montana Entomology Collection, Montana State University, Bozeman; USNM = National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Genus *Hurleyella* Runyon & Robinson, gen. nov.

Type species: *Hurleyella cumberlandensis* new species. Habitus (Fig. 1).

Diagnosis. The combination of the following character states will diagnose *Hurleyella* in the Nearctic. Minute size, body length approximately 1.0 mm. Vertex of head not excavate. Antennal scape without dorsal setae; pedicel without medioapical thumb-like projection. Eyes with short hairs between facets. Wing with costa continuous to tip of unbranched vein M; vein R_{2+3} short, fusing with costa about half way between termination of R_1 and R_{4+5} ; veins R_{4+5} and M_1 converging near wing apex, then nearly parallel at apex; crossvein dm-cu shorter than last part of CuA_1 . Proepisternum with at most a few, small hairs. Femora without preapical setae.

In Nearctic keys (Robinson 1964a; Robinson & Vockeroth 1981), *Hurleyella* runs to *Xanthochlorus* Loew, but is easily distinguished by its minute size, dark body color, apical arista, and short wing vein R_{2+3} .

In the Neotropics, *Hurleyella* is only likely to be confused with *Microcyrtura*, *Microchrysotus*, or *Micromedetera*, which also have the short wing vein R_{2+3} . *Microcyrtura* is distinguished from *Hurleyella* by the nearly straight preabdomen bearing a sharply reflexed genital capsule in the male and by the very long arista; *Microchrysotus* has ornamented palpi and fore tarsi and a banded wing. The wing venation and curved abdomen of *Hurleyella* are very much like *Micromedetera*, but the hypopygium of *Hurleyella* is symmetrical and lacks the distinct projections asymmetrically from one side found in *Micromedetera*. On the basis of its wing venation, *Hurleyella* keys in the Manual of Central American Diptera (Bickel 2009) to *Micromedetera* with which it is considered to be most closely related.

Description. Male: *Head:* face pollinose, with dorsal half broadly triangular, ventral half narrowed with sides nearly parallel to slightly broadened at palpus; frontoclypeal suture distinct (Fig. 2A). Dorsal postcranium strongly concave (Fig. 1). Eyes (Figs. 2A, C) with short hairs between facets; ommatidia enlarged near face. Vertical setae not on elevation or tubercle; ocellar tubercle not prominent; postocellar setae very short, hair-like; postocular setae very short, sparse (Fig. 2A). Ventral postcranial hairs (beard) and gena absent. Palpus (Fig. 2A) small, not ornamented. Proboscis sclerotized, shining, not or slightly enlarged. Labellum with 6 sclerotized pseudotracheae, but not geminately so. Antenna (Figs. 2A, B) short, scape without dorsal setae; pedicel with apical ring of setulae; arista apical, about as long as height of face.

Thorax: scutum with posterior third distinctly flattened. 4 or 5 dorsocentral setae; acrostichal setae absent; 1 notopleural seta; 1 scutellar seta per side, no additional hairs; 1 humeral seta.

Legs: not ornamented, without major setae. Coxa II without lateral seta. Coxa III with minute lateral hair. Femora without preapical setae.

Wing (Fig. 3): vein R_{2+3} short, fusing with costa about half way between termination of R_1 and R_{4+5} . Basal section of M_1 curving posteriorly to crossvein dm-cu, remainder nearly straight, directed slightly anteriorly. Vein R_{4+5} curving toward, then nearly parallel to M_1 just before wing apex. Vein M without evident *bosse alaire*, the slight flexion and wing indentation typically on vein M distal to crossvein dm-cu that is present in many dolichopodids. Vein A_1 absent. Calypter without evident setae.

Abdomen: cylindrical, gradually but only slightly tapering (Figs. 1, 4A). Hypopygium (Figs. 1, 4–5) bulbous, borne on a broad peduncle formed by abdominal segment 7; abdominal tergite 7 setose; epandrium deeply emarginate dorsally, with basal lobes bearing setae; abdominal sternite 8 with setae; hypopygial foramen left basal; hypandrium fused to base of epandrium, divided into 2 asymmetrical lobes; surstylus large, complex and only partially attached to epandrium, with many lobes, several blade-like setae, and pair of long lateroapical membranous flanges; phallus simple, abruptly arched and projecting ventrally.

Female: Similar to male. Abdominal terminalia with approximately 6 acanthophorite spines.

Etymology: *Hurleyella* is named in honor of the late dipterist Richard Hurley (1934–2008). The Latin diminutive *-ella* denotes the small body size of this genus.

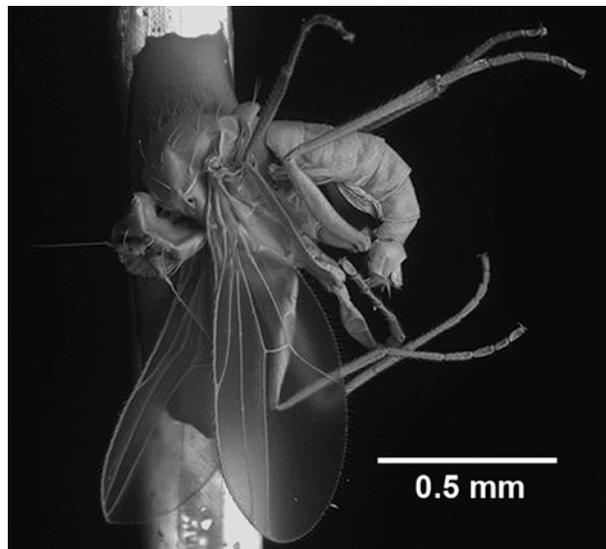


FIGURE 1. *Hurleyella cumberlandensis*, male habitus.

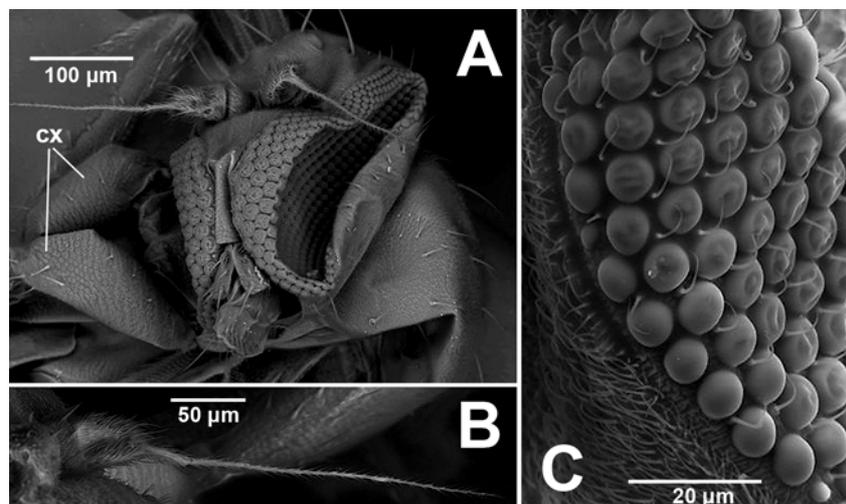


FIGURE 2. *Hurleyella cumberlandensis*, head. **A**. head, front coxae and thorax ca. anterolateral view; **B**. antenna, medial view; **C**. close-up of ommatidia showing hairs between facets. Abbreviation: cx—front coxae.

Remarks: Because only two species are known, the division of generic and specific characters is rather arbitrary, but we have attempted to include the usual characters known to be of value for other dolichopodid genera, or those characters anticipated to be constant in *Hurleyella*.

Key to species of *Hurleyella* Runyon & Robinson

- 1 First flagellomere of antenna distinctly wider than narrowest part of face; males with flange of surstylus relatively narrow, tapering (Figs. 4; 5A, B) (Virginia)..... *cumberlandensis* Runyon & Robinson
- Width of first flagellomere of antenna subequal to narrowest part of face; males with flange of surstylus spatulate (Fig. 5C) (Texas) *brooksi* Runyon & Robinson

Hurleyella cumberlandensis Runyon & Robinson, sp. nov.

Description. Male: Body length approximately 1.0 mm; wing approximately 1.0 mm x 0.4 mm. Habitus (Fig. 1).

Head: dark metallic blue-green ground color nearly to wholly concealed with ochre to gray pollen. Face with ventral half very narrow (narrowest width less than width of first flagellomere), with nearly parallel sides; covered with moderately dense to dense gray to gray-ochre pollen; frons covered with dense ochre pollen. Dorsal postcranium with sparse to moderately dense ochre pollen. Vertical setae small, approximately equal to ocellar setae (subequal in length to first flagellomere); postocular setae very short, sparse, white (Fig. 2A). Palpus gray pollinose, small, ovate, with a few black setae (Fig. 2A). Proboscis dark yellow-brown, sclerotized, shining, not enlarged; with short white hairs at apex. Antenna (Figs. 2A, B) wholly black; first flagellomere subtriangular with round apex, a little longer than wide, with rather long hairs; arista apical, about as long as height of face.

Thorax: scutum dark metallic blue-green, covered with dense ochre pollen. Setae of thorax rather short, black; 1 presutural supra-alar seta; 2 postsutural supra-alar setae; 1 postalar seta; proepisternum with 1 small white hair. Pleura metallic blue with sparse to moderately dense gray-brown pollen.

Legs: without major setae. Coxae concolorous with pleura. Coxa I with very sparse, short, white anterior hairs; 1–2 longer white hairs at apex (Fig. 2A). Coxa III with minute, white lateral hair. Femora mostly dark brown; without preapical setae. Tibia I, II, and III dark yellow. Tarsi dark brown from apex of basal tarsomere. Ratios of tibia: tarsomeres for leg I: 9–5–3–2–2–2; for leg II: 12–7–3–2–2–2; for leg III: 12–4–3–2–2–2.

Wing (Fig. 3): hyaline, usually with brownish clouding at very base, especially in costal cell. Vein R_{2+3} short, fusing with costa about midway between termination of R_1 and R_{4+5} , still ending closer to termination of R_1 . Halter knob yellow to yellow-brown; stem brown. Calypter very small, brown, without evident setae.

Abdomen: with very short, rather sparse, stiff black setae (Fig. 4A); dark metallic blue-green covered with moderately dense to dense ochre-brown pollen. Abdominal sternite 8 with setae, rather small and mostly hidden under tergite 7 (Fig. 4B). Hypopygium (Figs. 4–5). Epandrium rather ovate with dorsoapical margin smooth, strongly sclerotized, projecting; with basal, long, narrow epandrial lobe bearing long seta near base and long seta at apex. Hypandrium with 2 broad, asymmetrical lobes that are ventroapically directed. Phallus abruptly arched and pointed ventrally between hypandrial lobes. Cercus roughly oval-shaped, covered with small hairs and several longer setae, especially along margin. Surstylus loosely attached to epandrium (at least ventrally), large, with many lobes, 2 large blade-like setae directed medially; with large, membranous, rugose, tapering, distolateral flange directed dorsomedially.

Female: Similar to male.

Etymology: Specimens were collected in Cumberland Mountains physiographic region of southwestern Virginia.

Holotype: ♂, VIRGINIA: Wise Co., Phillips Creek, 3 mi. SW of Pound, 442 m (1450 ft), N37°06.54' W82°40.25', VI–2–2008, J.B. Runyon (USNM).

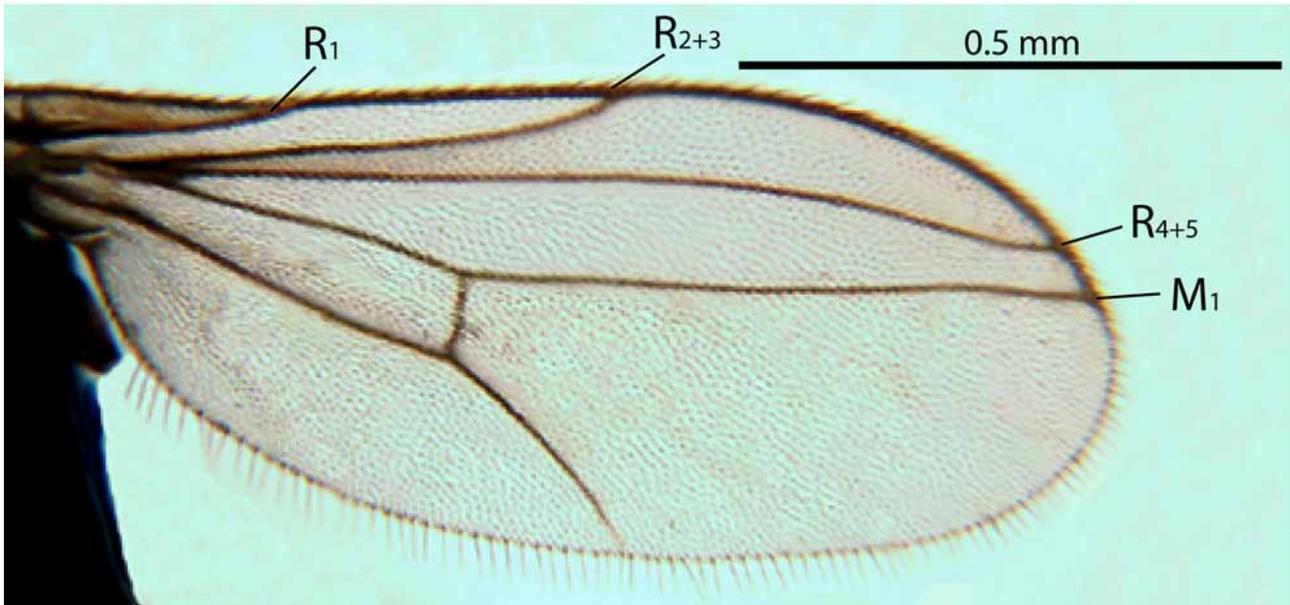


FIGURE 3. *Hurleyella cumberlandensis*, male wing.

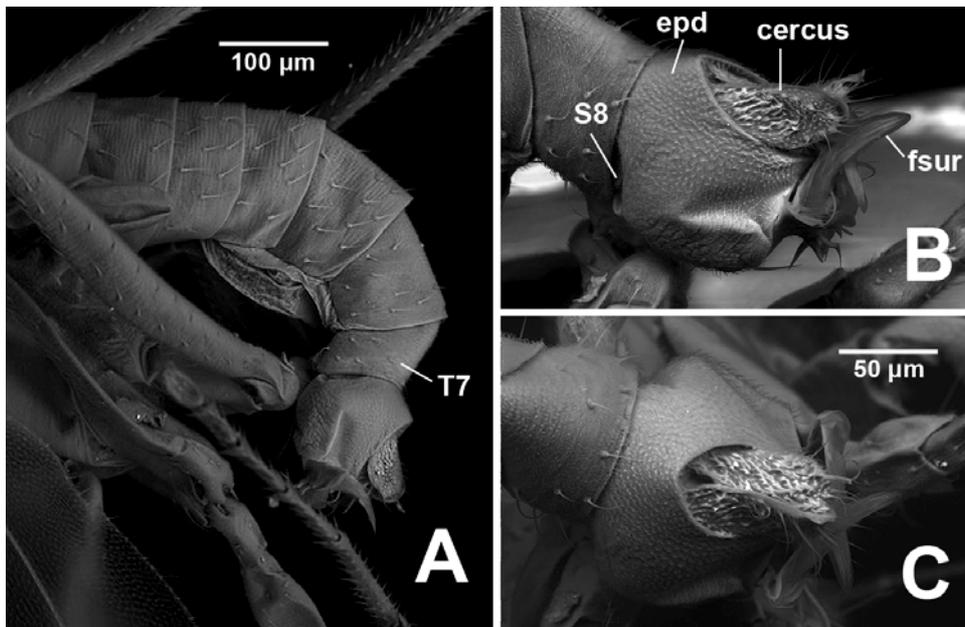


FIGURE 4. *Hurleyella cumberlandensis*. A. abdomen and hypopygium, left lateral view; B. hypopygium, left dorsolateral view; C. hypopygium, dorsal view. Abbreviations: epd - epandrium, fsur - lateroapical flange of surstylus, S8 - abdominal sternite 8, T7 - abdominal tergite 7.

Paratypes: 6 ♂, 2 ♀, same data as holotype; 2 ♂, VIRGINIA: Buchanan Co., Hunts Creek, 1 mi. SW of Breaks, 320 m (1050 ft), N37°18.37' W82°17.72', VI-12-2008, J.B. Runyon (USNM, CNC, MTEC). Two male paratypes from Phillips Creek were permanently slide mounted.

Remarks: The specimens at Phillips Creek were collected by sweeping open, dry, sandy soil with some very sparse vegetation at edge of an artificial beach where Phillips Creek flows into North Fork of Pound Lake. Those from Hunts Creek were collected near junction with Garden Creek from open, dry, bare areas of horizontal shale over which the creek flows. The two collection sites are in extreme southwest Virginia, near the Kentucky border, and about 40 km apart.

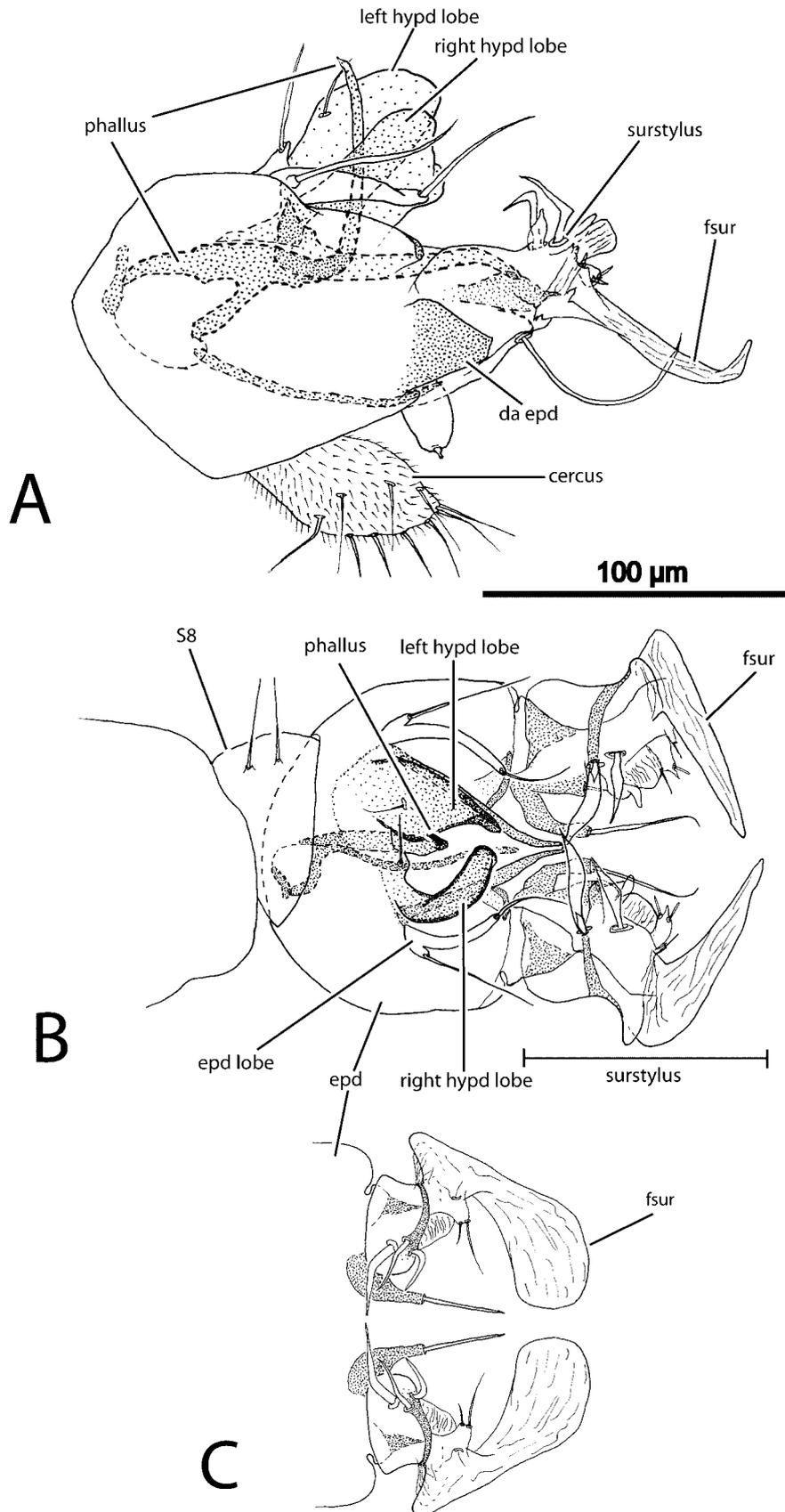


FIGURE 5. *Hurleyella*, genitalia. **A.** *H. cumberlandensis*, hypopygium, right lateral view; **B.** *H. cumberlandensis*, hypopygium, ventral view; **C.** *H. brooksi*, surstylus, ventral view. Abbreviations: da epd—dorsoapical margin of epandrium, epd—epandrium, fsur—lateroapical flange of surstylus, hypd—hypandrial, S8—abdominal sternite 8.

Hurleyella brooksi Runyon & Robinson, sp. nov.

Description: Very similar to *H. cumberlandensis*, showing only the following differences:

Head: face with ventral half not as narrow (narrowest width approximately equal to width of first flagellomere), and more obviously widened toward palpus. Ochre pollen on frons and dorsal postcranium not as dense.

Legs: coxae concolorous with pleura, but more yellowish in some specimens. Ratios of tibia: tarsomeres for leg I: 10–5–3–2–2–2; for leg II: 14–8–4–3–2–2; for leg III: 14–5–4–3–2–2.

Abdomen: epandrial lobe with seta at apex only about one-third as long as seta near base (in *H. cumberlandensis* apical seta at least one-half length of basal seta). Surstylus (Fig. 5C) with 3 large blade-like setae directed medially (*H. cumberlandensis* has 2 large setae - the third seta is very small); the flange of surstylus is very broad and rounded apically (Fig. 5C).

Female: Similar to male.

Etymology: Named in appreciation of the dipterist Scott Brooks, who recognized and sent us the specimens of this species.

Holotype: ♂, TEXAS: Brazos Co., College Station, Lick Creek Park, bottomland forest near creek, malaise trap, 28–30 March 2000, M. Buck (DEBU).

Paratypes: 1 ♂, same data as holotype except 26–28 March 2000; 1 ♂, same data as holotype except 5–9 April 2000; 1 ♀, same data as holotype except “post oak savanna by creek”, 26–28 March 2000 (CNC, DEBU).

Remarks: *Hurleyella brooksi* is very similar to *H. cumberlandensis*, but differs most noticeably in having a wider face and in the form of the surstylus.

Discussion

The systematic position of *Hurleyella* is not clear. It does not fit readily into any described dolichopodid subfamily, but it does superficially resemble and share several characters with the Medeterinae. However, the limits of this subfamily are not well defined (Bickel 2004), and the discovery and placement of a number of genera into it have seemingly diluted the traditional concept of the subfamily. The following character states places *Hurleyella* in the Medeterinae based on Bickel (1986):

1. First flagellomere subrectangular to subovate, with apical arista.
2. Dorsal postcranium concave.
3. Face width subequal in both sexes, and nearly parallel sided ventrally.
4. Posterior mesonotum strongly flattened and slightly depressed.
5. Lateral scutellar setae reduced or absent.
6. Legs of males without strong secondary sexual characters.
7. Femora II and III without anterior preapical seta.
8. Vein M without *bosse alaire*.

The following characters states are distinctive to *Hurleyella*:

1. Vein R_{2+3} short, ending in costa about midway between termination of R_1 and R_{4+5} . The venation of *Hurleyella* is similar to that of *Micromedetera* which has been referred to the Medeterinae (but see discussion below).
2. Surstylus large and complex. Bearing many lobes, several blade-like setae, and long, membranous lateroapical flange.
3. Surstylus loosely attached to epandrium, at least ventrally.
4. Phallus abruptly arching and pointing ventrally.

5. Short hairs evident on eyes.
6. Pollen on face obscuring metallic color.

Although *Hurleyella* most closely fits the Medeterinae of the established subfamilies, the structure and complexity of genitalia of *Hurleyella* seem at odds with the classic concept of the subfamily. It is difficult to conceive how the traditional Medeterinae (e.g., *Medetera*, *Thrypticus*) with their quite simple genitalia could form a monophyletic group with *Hurleyella*. There are a number of genera that share typical medeterine characteristics, including legs bare of major setae and a concave dorsal postcranium, but whose placement in the Medeterinae seems uncertain. These genera include *Microcyrtura*, *Microchrysotus*, *Micromedetera*, and perhaps the Asian *Neomedetera* Zhu, Yang & Grootaert, and *Paramedetera* Grootaert & Meuffels. However, it is possible that a complex hypopygial form like that of *Hurleyella* could be derived from (or reduced to) a rather simple “*Medetera*-like” form via relatively few modifications (Bickel, D.J., in litt.). Under this hypothesis, *Hurleyella* would belong to a broadly interpreted Medeterinae. At this point, it is not possible to determine the relationships and systematic placement of these genera. Phylogenetic studies that include all the genera that have been assigned to the Medeterinae and that incorporate both morphology and DNA are needed to define medeterine limits.

Robinson (1975) recognized more than one generic group of micro-dolichopodids, two of them being the *Enlinia-Harmstonia* group and the Neotropical *Microcyrtura-Microchrysotus-Micromedetera* group. *Hurleyella* seems most closely related to the latter group. A subfamily Enliniinae was established for the former group (Robinson 1970b), while a position in the Medeterinae near the European *Cyrturella* Collin was originally suggested by Robinson (1964b) for *Microcyrtura* and *Microchrysotus*. The two groups are not considered closely related to each other or to the Medeterinae at this time. The comparison to *Cyrturella* was spurious, the latter being a true member of the Medeterinae. It is a different Neotropical group including *Dominicomymia* Robinson and *Cryptopygiella* Robinson, with metallic faces and frons, that the junior author (HR) presently considers more properly members of the Medeterinae.

Distinction between the Enliniinae and the *Microcyrtura-Microchrysotus-Micromedetera* group is clear by two characters of the wing. In all Enliniinae, the veins R_{4+5} and M_1 are diverging distally except in the modified wings of some males. In the *Microcyrtura-Microchrysotus-Micromedetera* group, the veins R_{4+5} and M_1 are convergent distally. In the Enliniinae vein R_{2+3} extends over 80% of the length of the wing, while in the *Microcyrtura*, *Microchrysotus*, *Micromedetera*, *Hurleyella* group vein R_{2+3} extends only between 60–75% of the length of the wing. The short R_{2+3} vein is considered one of most distinctive features of the latter group, occurring in almost no other elements of the Dolichopodidae.

The wing vein character tends to distinguish and unify the mostly Neotropical group of genera to which *Hurleyella* belongs. Only a few other examples of a short R_{2+3} vein are recorded for the Dolichopodidae. Such a short vein is illustrated for the male of *Achalculus edwardsae* Van Duzee (1930) now *Australachalcus edwardsae* (Van Duzee) in Pollet (2005), but Pollet shows that the vein character is not present in the female. Males of the Neotropical *Tachytrechus alatus* (Becker) also have a short R_{2+3} vein (Brooks & Cumming 2008). The only other example of such a short vein seems to be in *Achalculus atratus* Van Duzee (1930) of which the female has not been seen or described, but which as described would not be an *Enlinia* as indicated by Robinson (1970b).

The present conclusion is that *Hurleyella* belongs to a distinctive element of the Dolichopodidae containing *Microcyrtura*, *Microchrysotus* and *Micromedetera*, and that in the shape of its preabdomen and wing venation it is closest to *Micromedetera* from which it differs most obviously by its comparatively symmetrical genital capsule. Thus *Hurleyella* seems to be an extension of this largely Neotropical element into the Nearctic realm.

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