

## A New Species of *Diathoneura* (Diptera: Drosophilidae) from Costa Rica with a Striking Sexual Dimorphism

TAM C. NGUYEN

(2003)

Division of Invertebrate Zoology, American Museum of Natural History,  
Central Park West at 79th Street, New York, New York 10024-5192

ABSTRACT: *Diathoneura mephistocephala* (Diptera: Drosophilidae), collected from Costa Rica, is described and figured. This is the first recorded drosophilid possessing genal processes, which is probably restricted to males as in other Diptera that possess the trait.

Among the most colorful and diverse Drosophilidae in the Neotropics is the genus *Diathoneura* Duda (1925), of which there are about 32 described species. The undisputed sister group to *Diathoneura* is the Neotropical genus *Cladochaeta* Coquillett (Grimaldi, 1990; Grimaldi and Nguyen, 1999). Biologically, the two genera appear extremely disparate, which may be a consequence of scant information on their life histories. Where known, the larvae of *Diathoneura* live in flowers (Pipkin *et al.*, 1966, wherein they are called by the old generic name, *Clastopteromyia*). *Cladochaeta* has recently been monographed (Grimaldi and Nguyen, 1999), and all larvae, save one, are parasites of spittlebugs (Auchenorrhyncha: Cercopidae). The exception is *Cladochaeta psychotria* Grimaldi and Nguyen, found breeding in flowers of *Psychotria* (Rubiaceae) in Costa Rica. In that monograph 105 new species of *Cladochaeta* were described. Thirteen species were named previously, and significant numbers of species remain. When eventually monographed, *Diathoneura* may be found to have similar diversity. Until that time, I take this opportunity to describe a most exotic species in the genus.

It is my pleasure and honor to dedicate this work to Dr. Jerome Rozen, a respected colleague and friend.

### Materials and Methods

This new species is described from two specimens sorted from a Malaise trap sample taken in Costa Rica. Both specimens were critically point dried and mounted on points. Digital photographs of the head and habitus were taken with a Nikon D1x camera, using the Infinity Lens System and the MicOptics ML1000 Illumination System. Scanning electron micrographs (SEM) were taken of both specimens with a Hitachi S4700 Field Emission SEM. The specimens were not coated for SEM. Both specimens are deposited in the American Museum of Natural History.

### Systematics

#### *Diathoneura mephistocephala* Nguyen, new species

Figs. 1–9

DIAGNOSIS: Readily recognizable by an unusual pair of processes (genal appendages) arising from the genae; wings brown with broad, central hyaline band; abdomen dark brown with pale yellow band on tergites IV–V (Fig. 1).

DESCRIPTION: **Male.** Body lengths: 2.96 mm and 2.52 mm, width of head (from margins of eyes): 1.35 mm and 1.10 mm. Head and vertex brownish. Pedicel and flagellomere I dark yellow. Arista with 5 dorsal branches and 3 ventral branches; branches of apical fork less than 0.5 length of dorsal branches. Anterior reclinate and proclinate orbital setae about equal in length; posterior reclinate orbital setae about 3.5× length of anterior reclinate orbital se-

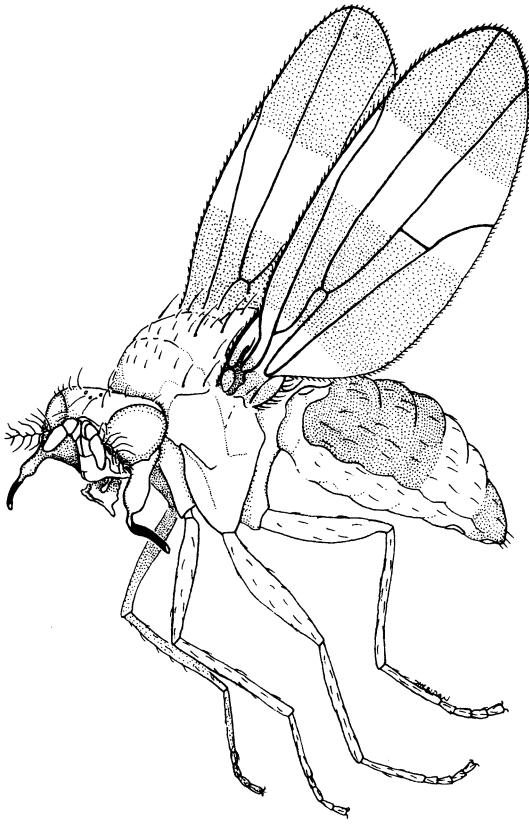


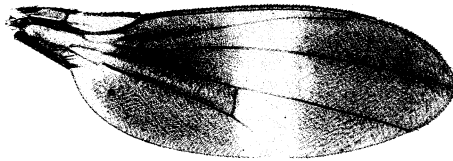
Fig. 1. Habitus of *Diathoneura mephistocephala*.

tae. Postocellar setae short and convergent. Outer and inner vertical setae about equal in length to posterior reclinate orbital setae. Eyes bare. Face pale yellow and flat. Palps yellow; proboscis light cream colored. Genae yellow with pair of appendages projecting laterally and forward (Fig. 2). Genal appendages with basal portion brownish and broad; medial portion constricted and pale yellow; apical portion narrow, flattened and black with white tip.

Thorax uniformly yellow, slightly lighter laterally. Scutellum brown, lighter apically. Anterior dorsocentral setae about  $0.5 \times$  length of posterior dorsocentral setae. Posterior dorsocentral setae large. Basal and apical scutellar setae about equal to posterior dorsocentral setae. Femora yellow; tibiae and tarsi brownish yellow; forefemur with row of 2 dorso-lateral setae and 2 shorter dorsoventral setae; hind femur without prominent setae. Wing brownish with a broad, transverse, hyaline band through middle (Fig. 3). Costal vein extends to  $M_1$ ;  $R_{2+3}$  very slightly curved near apex.  $CuA_1$  does not reach wing margin; anal veins and anal cells absent.

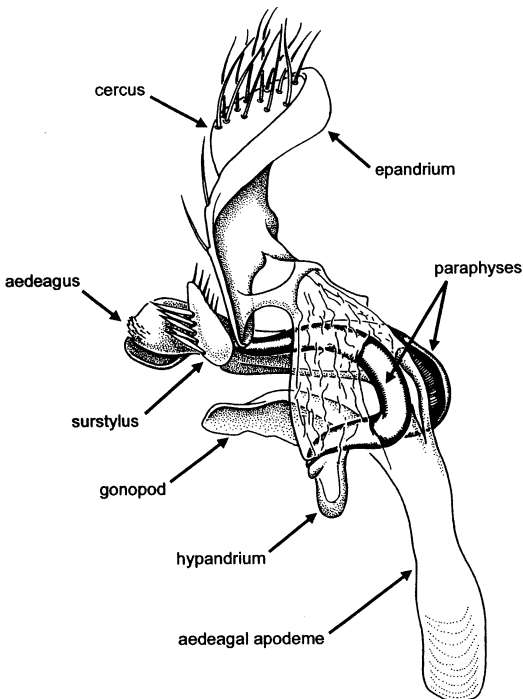
Anterior half of tergite I yellow; posterior half of tergite I and tergites II–III dark brown to black. Tergites IV and anterior half of tergite V light yellow; posterior half of tergite V and tergites VI–VII dark brown to black. Sternites pale yellow.

Genitalia: (Fig. 4) Epandrium narrow at apex and broad at base. Surstylus with 5 stout bristles on outer surface and 6 fine bristles on inner surface; teeth (prensisetae) absent. Apex of aedeagus rounded and serrate. Aedeagal apodeme rod-shaped, slightly longer than aedeagus. Paraphyses U-shaped and moderately sclerotized. Hypandrium reduced and slightly sclerotized.



3

Figs. 2, 3. Photomicrographs of *Diathoneura mephistocephala*: 2, head; 3, wing.

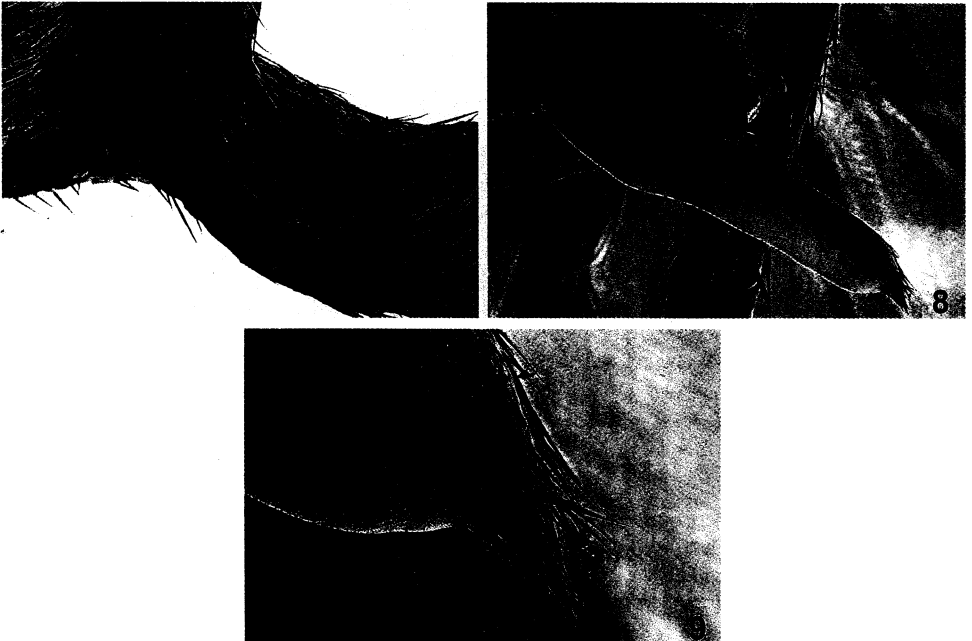


4

Fig. 4. Male genitalia, lateral view.



Figs. 5, 6. Scanning electron micrograph (SEM) of genital appendage: 5, Appendage of large male; 6, Appendage of small male.



Figs. 7-9. SEM details of genital appendage: 7, Middle constricted area of larger male; 8, Detail of apical portion of genital appendage; 9, Detail of apex of genital appendage.

**Female.** Unknown.

HOLOTYPE MALE: **Costa Rica, San José**, near P.N. Braulio Carrillo, 9.5 km E tunnel, 1000 m. VI/1989, col. Paul Hanson.

PARATYPE: Male, same locality information as holotype.

ETYMOLOGY: From *Mephistopheles* (the Devil in Johann Wolfgang von Goethe's *Faust*) and Greek *kephalē* (head), in reference to the horn-like genal appendages.

## Discussion

The presence of genal processes and other head ornaments in males have been described for various male dipterans. These include "antlered" genae in *Phytalmia* (Tephritidae) and *Giraffomyia* (Platystomatidae); spinose "horns" on the frons of *Stemonocera* (Tephritidae); and eye stalks in such genera as *Plagiocephalus* (Otitidae), *Achias* (Platystomatidae), and *Richardia* (Richardiidae). Although females of *Diathoneura mephistocephala* are unknown, it is virtually certain that the unusual genal appendages are a sexually dimorphic feature. The genal appendage of the larger specimen has three distinct regions: a broad basal portion, a middle constricted area, and a thin, flattened apical portion (Fig. 5). The genal appendage of the smaller specimen is substantially shorter and is uniform in thickness and shape (Fig. 6), and is morphologically similar to the basal portion of the structure in the larger specimen. Scanning electron micrographs show that the basal portion is covered with hairs, which lie flat against the surface and point toward the apex. The constriction of the middle area is due to the sides of the structure being folded toward each other along the midline (Fig. 7). This results in a short but deep groove in that area. The surface of the middle area is rugose and also densely covered with hairs. The apical portion of the genal appendage is mostly smooth and bare except for the dorsal surface, which is densely covered with hairs (Fig. 8). The hairs continue along the length of the apical portion and cover the tip, ending in a small brush of stiff, spiculate bristles (Fig. 9).

## Acknowledgments

I would like to thank David Grimaldi for bringing this new species to my attention, for illustrating the male genitalia, and for his assistance and advice. Paul Hanson provided Malaise-trapped drosophilids to Dave Grimaldi; and Simone Sheridan provided the habitus illustration. I also thank D. Grimaldi, Valerie Giles, and Caroline Chaboo for their comments and reviews of early drafts of the manuscript.

## Literature Cited

- Dodson, G. 1987. Tephritid mating systems, with special reference to antlered flies. *Entomological Society of Queensland News Bulletin* 15(5):59-62.
- Dodson, G. 1989. The horny antics of antlered flies. *Australian Natural History* 22(12):604-611.
- Duda, O. 1925. Die costaricanischen Drosophiliden des Ungarischen National-Museums zu Budapest. *Annales Historico-Naturales Musei Nationalis Hungarici* 22:149-229.
- Grimaldi, D. A. 1990. A phylogenetic, revised classification of genera in the Drosophilidae (Diptera). *Bulletin of the American Museum of Natural History* 197:1-139.
- Grimaldi, D., and G. Fenster. 1989. Evolution of extreme sexual dimorphisms: Structural and behavioral convergence among broad-headed male Drosophilidae (Diptera). *American Museum Novitates* 2939:1-25.
- Grimaldi, D., and T. Nguyen. 1999. Monograph on the spittlebug flies, genus *Cladochaeta* (Diptera: Drosophilidae: Cladochaetini). *Bulletin of the American Museum of Natural History* 241:1-326.
- Moulds, M. S. 1977. Field observations on behavior of a north Queensland species of *Phytalmia* (Diptera: Tephritidae). *Journal of the Australian Entomological Society* 16:347-352.
- Pipkin, S. B., R. L. Rodriguez, and J. Leon. 1966. Plant host specificity among flower-feeding Neotropical *Drosophila* (Diptera: Drosophilidae). *American Naturalist* 100:135-156.