

## Nota científica

### New details of the male terminalia of *Diathoneura longipennis* (Malloch, 1926) (Diptera, Drosophilidae)

### Nuevos aportes a la terminalia masculina de *Diathoneura longipennis* (Malloch, 1926) (Diptera, Drosophilidae)

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**ABSTRACT.** - The male terminalia of a non-type *Diathoneura longipennis* (Malloch 1926) specimen, collected in Peru, were dissected and analyzed. The aedeagus and associated sclerites were found to have been fixed at a late stage of protrusion, resulting in a different morphology, when compared to the two previous publications, which were fixed at earlier stages. Consequently, additional details of certain anatomical parts were observed and a better understanding of the aedeagus protruding process was attained. *Diathoneura longipennis* has been previously identified in San Mateo, Alajuela, Costa Rica (type locality) and Panama, and this specimen represents the first record of this species in South America.

**KEYWORDS:** aedeagus protrusion; habitus; new record; Peru; photomicrographs.

**RESUMEN.** - En esta contribución se describe la terminalia masculina de *Diathoneura longipennis* (Malloch 1926) sobre la base de un espécimen colectado en Perú, el cual fue disecado y analizado. Se encontró que el edeago y escleritos asociados se han fijado en una etapa tardía de la protuberancia, lo que resulta en una morfología diferente a lo publicado anteriormente, que dichas estructuras se fijaron en etapas tempranas. Se describe en detalle ciertas partes anatómicas lográndose una mejor comprensión del proceso de la protuberancia del edeago. La especie *Diathoneura longipennis* ha sido identificada previamente en San Mateo, Alajuela, Costa Rica (localidad tipo) y Panamá, el espécimen aquí analizado representa el primer registro en América del Sur.

**PALABRAS CLAVES:** fotomicrografías; *habitus*; nuevo récord; Perú; protuberancia del edeago.

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## INTRODUCTION

While analyzing a series of undetermined specimens of *Stegana* Meigen, on loan from the United States National Museum (USNM), a Peruvian specimen of *Diathoneura longipennis* (Malloch 1926) was identified. Due to its dark color and hanging of the wings, it could have been easily mistaken as a *Stegana* specimen. After dissecting the specimen,

it was determined that the aedeagus and associated sclerites were fixed at a late protruded stage. This is in contrast to the holotype from Costa Rica, which was fixed in the rest position, as described and illustrated by Vilela and Bächli (1990). As a consequence, morphological differences can be observed, which can sometimes reveal unique structural details and/or changes, that may not have been visible, otherwise. However, such

a discrepancy can potentially complicate the interpretation of some of the internal terminalia sclerite details, since these rely heavily on the stage of protrusion, at the time when the specimen was killed, dried and fixed.

Chemicals can also influence the protrusion stage. For example employing sulphuric ether, as a killing agent, sometimes induces a rapid change in the morphology of the male terminalia from the rest position to a late protrusion stage. In the present study, the relevant details are described, towards the goal of providing a better understanding of *D. longipennis* terminalia sclerite articulation.

## MATERIAL AND METHODS

A single *Diathoneura longipennis* male collected

at Parque Nacional del Manú, in Peru, which is redescribed below, was analyzed.

Label data attached to the specimen was cited in full with a slash indicating a line change and a double slash, a label change. Our own notes and interpretations are included in brackets.

Refer to Vilela and Bächli (2000) and Bächli et al. (2004) for terminalia preparations, terminology, and additional references, and to Bächli and Vilela (2019) and Vilela and Bächli (2019) for photomicrograph procedures.

## RESULTS

*Diathoneura longipennis* (Malloch 1926)

*Clastopterymyia longipennis* Malloch 1926: 34.

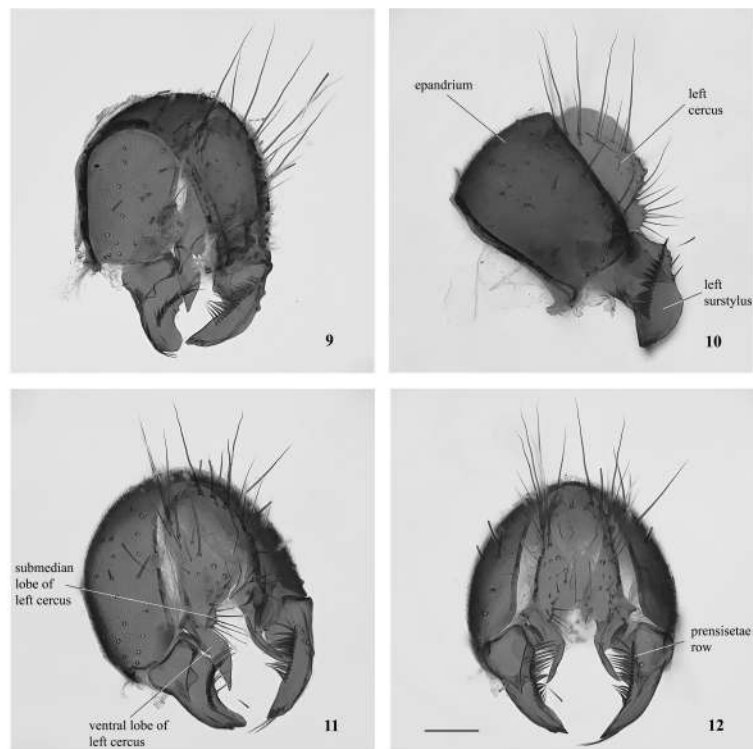
*Diathoneura longipennis* (Malloch 1926); Vilela and Bächli, 1990: 27, 28, 178, 311 (redescription,



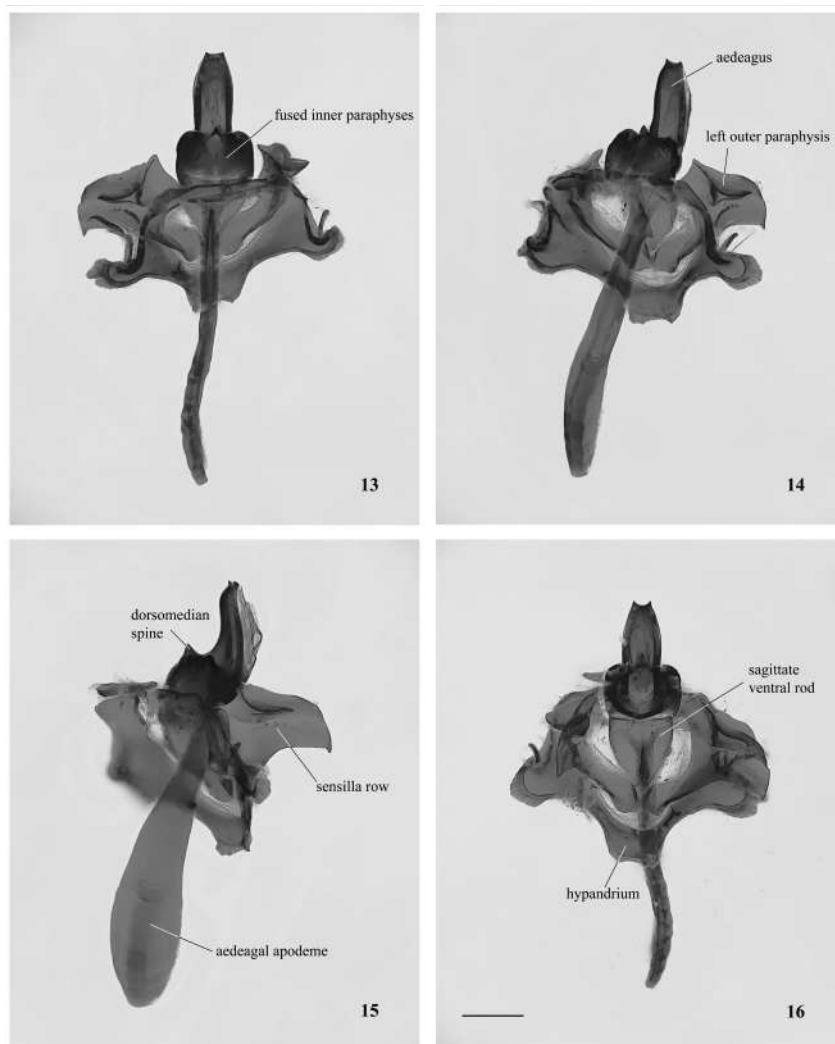
**Figs. 1–4.** *Diathoneura longipennis* (Malloch, 1926), male non-type specimen from Peru, habitus, four views: 1, oblique dorsal, 2, left lateral, 3, head and thorax, dorsal, 4, thorax and abdomen, dorsal. Scale bar = 1 mm.



**Figs. 5–8.** *Diathoneura longipennis* (Malloch, 1926), male non-type specimen from Peru, habitus, four close-ups: 5, left eye and thorax anterior 1/3, lateral view, 6, head, dorsal, 7, head, frontal, 8, head, oblique dorsal. Figs. 5-7 are at the same scale. Scale bars = 1 mm.



**Figs. 9–12.** *Diathoneura longipennis* (Malloch, 1926), male non-type specimen from Peru, external male terminalia (epandrium, cerci and surstyli), four views: 9, oblique anterior to 12, posterior. Scale bar = 0.1 mm.



**Figs. 13–16.** *Diathoneura longipennis* (Malloch, 1926), male non-type specimen from Peru, internal male terminalia (hypandrium, inner and outer paraphyses [fused to gonopods], aedeagus and aedeagal apodeme), four views: 13, dorsal to 16, ventral. Scale bar = 0.1 mm.

figures, affiliation); Brake and Bächli, 2008: 33 (affiliation).

**Diagnosis** (modified from Vilela and Bächli, 1990: 27). Thorax dark brown (Figs. 1-3, 5), except scutellum light brown (Figs. 3-4), strongly contrasting with yellow frons (Fig. 6), face (Figs. 7, 8), and legs (Fig. 2). Facial carina absent. Wings uniformly brownish, relatively narrow and long (Fig. 4); veins  $R_{4+5}$  and M divergent. Surstylus well developed, distally projected down and inwards; prensisetae long, sharply pointed (Figs. 11, 12). Aedeagal apodeme relatively large, proximally widely expanded dorsoventrally, ventral rod sagittate (Fig. 16). Outer paraphysis complex,

double-walled, probably fused to gonopods. Aedeagus relatively small, sinuate in profile (Fig. 15), slightly bifid at tip as seen in dorsal and ventral views. Inner paraphyses fused to each other, somewhat embracing aedeagus anteriorly, bearing a conspicuous spine mediolaterally (Figs. 13-15).

#### Material examined

1 ♂, USNM (#127): PERU. Madre de Dios: / Manu, Rio Manu [River Manu], 250m / Pakitza, [headquarters of Parque Nacional del Manu], 12° 7' S, 70° / 58' W, 9-23 Sep 1988 / Amnon Freidberg // USNM ENT / [QR code] / 01372890.

Supplementary description (in addition to Vilela and Bächli 1990)

**Terminalia** ♂ (Figs. 9-16). Epandrium setose and microtrichose except for anterior 1/3, holotype with about 18 (Peruvian with about 25) setae; ventral tip of anterior margin projected antero-wards (Figs. 9-12); devoid of ventral lobe. Cercus dorsally setose, partially microtrichose, attached to epandrium by membranous tissue, bilobed, submedian lobe ear-shaped, short, marginally setose (Figs. 10-12), ventral lobe long, distally twisted, devoid of setae (Figs. 11-12). Surstylus attached to epandrium by membranous tissue, not microtrichose, distally projected downwards and turned inwards, innerly bearing a diagonal row of 13-15 (holotype) or 15-17 (Peruvian) long, slightly sinuate and sharply pointed prensisetae (Fig. 12). Decasternum not recognizable, possibly a small sclerite positioned above the dorsal arch. Hypandrium shorter than epandrium, anteriorly remarkably narrow and slightly concave, medially strongly expanded lateralwards (Fig. 16); dorsal arch spurious, medially membranous; gonopods probably fused to outer paraphysis. Aedeagus not fused to aedeagal apodeme, dorsally sinuate in profile view (Fig. 15), bifid at tip in dorsal (Fig. 13) and ventral (Fig. 16) views, sharply pointed, ventrally membranous, medially wrinkled. Aedeagal apodeme (Figs. 13-16) well developed, almost twice as long as aedeagus, laterally flattened, proximally widely expanded, distally (ventral rod) sagittate (Figs. 14, 16), somewhat resembling an ejaculatory apodeme. Outer paraphysis large and complex, double-walled, distally strongly bifid (Fig. 14), attached by membranous tissue: anteriorly to aedeagal apodeme, aedeagus, and fused inner paraphyses, laterodistally to ventral rod, and ventrodistally to hypandrium; dorsoproximally pointed dorsad, dorsodistally curved and pointed ventrad; ventral margin subapically concave; outer wall of dorsal margin bearing a submedian lobe (Figs. 13, 14), directed lateralwards and somewhat covering a row of about 7 sensilla. The inner wall of the lower branch of the bifid outer paraphysis is probably a modified and fused gonopod that is attached by membranous tissue to distal sharply pointed area of ventral rod and to the medial posterior margin of hypandrium. Inner paraphyses probably fused to each other, modified in a strongly sclerotized sclerite bearing a dorsomedian spine (Figs. 13-15) and resting over anterodorsal region of aedeagus.

**Distribution.** Costa Rica, Panama, Peru (new record).

**Biology.** Unknown.

## DISCUSSION

This specimen, collected in Peru, is the third male *Diathoneura longipennis* recorded in the literature. The previous two reports were the holotype from Costa Rica (Vilela and Bächli 1990), and a non-type specimen from Panama (Wheeler and Takada 1971). The male terminalia of these two specimens were dissected, illustrated and described by Vilela and Bächli 1990:178 and Wheeler and Takada 1971:239. Herein, similar procedures were used in the analysis of the terminalia of the Peruvian species (Figs. 9-16).

The white crystal-like structures, mainly found around the borders of the compound eyes (Figs. 1, 5-8), are most likely Naphthalene deposits from the vapors of mothballs used as a repellent by museums to prevent pests from damaging their dried insect collections. Upon comparing the male anatomical structures of the three known specimens, it was observed that, upon dying, the terminalia of each specimen was fixed at different stages of aedeagus protrusion, ranging from the rest position (Costa Rica), to partially protruded (Panama), to completely protruded (Peru). As previously illustrated and pointed out (Bächli et al. 2005:36, Bächli and Vilela 2007:242, Vilela and Mori 2014:373 and Vilela and Bächli 2009:194, 2019), the analyses of Drosophilidae male terminalia at different stages of protrusion, especially in species with more complex terminalia, provide important information about sclerite articulation. Additionally, the present study also suggests that drosophilid taxonomists should be cautious when identifying new species, since the observed variations in the morphology of terminalia sclerites could simply be due to protrusion stage at death and subsequent fixation process.

Additionally, the hanging of the wings of the specimen collected in Peru does not seem to be natural and is probably the result of using an inappropriate killing and/or mounting method.

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## BIBLIOGRAPHICAL REFERENCES

Bächli G and Vilela CR. 2007. Photomicrographs of the male terminalia of Scandinavian Drosophilidae (Diptera). *Mitteilungen der schweizerischen Entomologischen Gesellschaft* 80: 231-246. <http://dx.doi.org/10.5169/seals-402949>

Bächli G and Vilela CR. 2019 (in press). On the identity of *Paracacoxenus kaszabi* Okada, with the formal description of a new species of *Paracacoxenus* (Diptera, Drosophilidae). *Studia Dipterologica*.

Bächli G, Vilela CR and McEvey SF. 2005. Nine new species of Afrotropical Leucophenga (Diptera: Drosophilidae). *Mitteilungen der schweizerischen Entomologischen Gesellschaft* 78: 23-57. <http://dx.doi.org/10.5169/seals-402883>

Bächli G, Vilela CR, Escher AS and Saura A. 2004. The Drosophilidae (Diptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica*, v. 39, Leiden, Brill 362 p.

Brake I and Bächli G. 2008. Drosophilidae (Diptera). *World Catalogue of Insects*, v.7, Stenstrup, Apollo Books 412 p.

Malloch JR. 1926. New genera and species of acalyptate flies in the United States National Museum. *Proceedings of the United States National Museum* 68: 1-35, 2 plates.

Vilela CR and Bächli G. 1990. Taxonomic studies on Neotropical species of seven genera of Drosophilidae (Diptera). *Mitteilungen der schweizerischen Entomologischen Gesellschaft* 63(supplement): 1-332. <http://dx.doi.org/10.5169/seals-402424>

Vilela CR and Bächli G. 2000. Morphological and ecological notes on the two species of *Drosophila* belonging to the subgenus *Siphlodora* Patterson & Mainland, 1944 (Diptera, Drosophilidae). *Mitteilungen der schweizerischen Entomologischen Gesellschaft* 73(1-2): 23-47. <http://dx.doi.org/10.5169/seals-402770>

Vilela CR and Bächli G. 2009. Redescriptions of three South American species of *Rhinoleucophenga* described by Oswald Duda (Diptera, Drosophilidae). *Mitteilungen der schweizerischen Entomologischen Gesellschaft* 82(3-4): 181-196. <http://doi.org/10.5169/seals-402987>

Vilela CR and Bächli G (2019). On the identities of *Rhinoleucophenga pallida* Hendel and *Rhinoleucophenga obesa* (Loew) (Diptera, Drosophilidae), with description of a new sibling species from Brazil. *Revista Brasileira de Entomologia* 63(2): 149-182. <https://doi.org/10.1016/j.rbe.2019.01.001>.

Vilela CR and Mori L. 2014. The invasive spotted-wing *Drosophila* (Diptera, Drosophilidae) has been found in the city of São Paulo (Brazil). *Revista Brasileira de Entomologia* 58(4): 371-375. <http://dx.doi.org/10.1590/S0085-56262014000400004>

Wheeler MR and Takada H. 1971. Male Genitalia of Some Representative Genera of American Drosophilidae. *University of Texas Publications* 7103: 225-240.