Alephia bifida, a new species of moth flies from Central America (Diptera: Psychodidae: Psychodinae)

Michal TKOČ1,2,4), Jan JEŽEK1) & François LE PONT3)

1) National Museum, Department of Entomology, Cirkusová 1740, CZ-193 00 Praha 9 – Horní Počernice, Czech Republic; e-mails: michaltkoc@gmail.com, jan.jezek@o2active.cz
2) Charles University in Prague, Faculty of Science, Department of Zoology, Viničná 7, CZ-128 44 Praha 2, Czech Republic,
3) Boulevard Aristide Briand 95, Montreuil Sous Bois, F-93100, France; e-mail: pancho75013@aol.com
4) Corresponding author

Abstract. A new species of moth flies, Alephia bifida sp. nov., is described and figured based on males, females and eggs. The type specimens were collected in central Nicaragua, Cerro Musún Mt. This new species is characterized by unique morphology of the wing, basiphallus, distiphallus and gonostyli. The genus Alephia Enderlein, 1937 is one of the most diverse genera of Neotropical Psychodinae (54 known species including the one described here), but it is so well characterized morphologically that no generic synonyms have been proposed.

Key words. Diptera, Psychodidae, Psychodinae, Maruiniini, Alephia, taxonomy, new species, Cerro Musún Mt., Nicaragua, Neotropical Region

Introduction

The moth fly genus Alephia Enderlein, 1937 is one of the most diverse genera of Neotropical Psychodinae. A list of the world species of the genus Alephia (JEZEK et al. 2011) includes 52 known species. OMAD & ROSSI (2012) added one new species from Argentina. Including herein described Alephia bifida sp. nov. from Nicaragua, there are currently 54 known world species of Alephia. The newly described Alephia bifida sp. nov. represents the second record of the genus for Nicaragua, the first being Alephia eburna (Rapp, 1945) (see QUATE & BROWN 2004). The subfamily Psychodinae is represented by 52 species in Nicaragua so far (DUCKHOUSE 1973, MAES & KILICK-KENDRICK 1990, COLLANTES & MARTINEZ-ORTEGA 1999, QUATE & BROWN 2004). The newly described species was collected in Cerro Musún Mt. in central Nicaragua.
Materials and methods

The material was collected with Centers for Disease Control miniature light traps (CDC-LT), placed 1.5 m above the ground in the forest. The trap was operated in the environs of the research station of Cerro Musún Mt. (Nicaragua, Matagalpa, Rio Blanco, 12°57′18.0″N, 85°13′48.0″W, 620 m a.s.l.). Cerro Musún Natural Reserve (La Reserva Natural del Musún, 12°58′48″N, 85°14′27.6″W), in the east of Matagalpa Department, is an isolated mountain (peak altitude 1438 m a.s.l.), southeast of the northern mountains of Nicaragua. Located in the middle of a cattle ranching landscape, the protected area is very important as a conservation site for local biodiversity. For more information about natural conditions of the collecting site please see Anonymous (2003).

Captured moth flies were preserved in 70% ethanol in the field, and mounted on classic flat slides or slides with one shallow central depression with Canada balsam in the laboratory in Prague, Czech Republic. The type specimens are deposited in the collection of the National Museum, Praha, Czech Republic (NMPC). Slides were numbered following the procedure used in Diptera collection of NMPC (see TKOČ et al. 2014) with two separate number series (Inv. No. – Inventory Slide Number of the family Psychodidae; Cat. No. – Catalogue Number of Slide). The latter series is used for numbering of the type material included in the NMPC Diptera collection.

The microphotographs were taken with a Nikon ECLIPSE TS-100F microscope equipped with digital camera DS-Fi2. Drawings and photographs were edited in CorelDRAW X6 and Corel PHOTO-PAINT X6 graphic software.

Wing indices are based on distances between the following points: A = tip of R5, B = radial fork, C = medial fork, D = tip of CuA2; the distances are indicated by both extreme points. Maximum wing length (approximately) equal to the distance from a line connecting the bases of basal costal node to neala and the wing apex. Fore, middle and hind leg ratios are indicated by P1, P2 and P3, respectively.

Taxonomy

Maruinini Enderlein, 1937

Alepia Enderlein, 1937

Alepia bifida sp. nov.

(Figs 1–27)

Type locality. Nicaragua, Matagalpa Department, Río Blanco, Cerro Musún, 620 m a.s.l., 12°57′18″N, 85°13′48″W.


Description. Male. Eyes separated (Fig. 11), frontal suture largely U-shaped with central triangular ligament with concave sides. Eye bridge formed by three facet rows, the number of facets in the apices (not pointed as in female) is more reduced. Number of antennomeres 16.
Figs 1–6. *Alepyia bifida* sp. nov., male and female. 1 – head, frontal view, female; 2 – cibarium, epipharynx and labial lobes, dorsolateral view, male; 3 – wing, male; 4 – subgenital plate, dorso-subventral view, female; 5 – cerci, dorsal view, female; 6 – egg, with detail of sculpture.
Figs 7–10. *Alepia bifida* sp. nov., female. 7–8 – last abdominal segments and genitalia (7 – dorsal view, 8 – lateral view); 9–10 – genital chamber and subgenital plate in detail (9 – lateral view, 10 – caudal view).
Scape 2.4 times as long as pedicel, cylindrical, narrower basally, pedicel almost globular, pressed in longitudinal axis (Fig. 12). Flagellomeres bowl shaped, apical ones missing. Length ratio of maxillary palpomeres 1.0 : 1.9 : 2.2 : 2.2, palpomere 4 not annulate (Fig. 15). Terminal lobes of labium, cibarium and epipharynx as in Figs 2 and 16. Thoracic sclerites as in Fig. 19. Wings sharply pointed, maculated, spots on veins as well as wing membrane very dark and conspicuous (Fig. 3), 2.1–2.5 mm long in holotype and male paratypes. Completely strengthened veins: Sc, R₁, CuA₁, CuA₂ strengthened basally. Radial, medial and cubital veins black spotted at the end, as well as radial and medial forks, basal cell and basis of M₃ and CuA₁. Basal costal nodes well visible, Sc uninterrupted, M₁, CuA₁ and CuA₂ not touching at basis of wing. R₅ extends in the apex of the wing. Radial and medial forks complete, cross veins missing. The wing margin reaching CuA₂ is a little distad of medial fork, medial fork conspicuously distad of radial fork. Medial wing angle 222° (BCD). Wing indices: AB : AC : AD = 3.7 : 3.6 : 4.5; BC : CD : BD = 1.0 : 1.0 : 1.9; maximum wing length equal to 2.7 times its maximum width. Halteres clubbed (Fig. 20), with a maximum length equal hardly to 4.1 times its maximum width. Ratios of lengths of femora, tibiae and first tarsomeres: P₁ = 1.8 : 1.7 : 1.0; P₂ = 2.0 : 2.4 : 1.2; P₃ = 2.0 : 2.7 : 1.3; fore claws bent and pointed distad (Fig. 21). Aedeagal complex as in Figs 17, 18, 22, basiphallus almost straight and narrow from lateral view, however, with a U-shaped loop proximally before apex (Figs 18, 22). Basiphallus very widened and pressed distally, S-shaped, with small blunt teeth, backward oriented. Distiphallus prolonged by bent bifid arm, spanner- or bottle-opener shaped (Figs 18, 22), from which one protuberance is blunt in contrast to very pointed hooked tip. Aedeagal complex overlaid basally by a large hyaline bell-shaped tunica (hypandrium), distinctly narrowed in the middle (lateral view), quite bare (Figs 17, 18, 22). Tunica is articulated proximally to basiphallus and protuberances of gonocoxites. Gonocoxites almost cylindrical, only slightly expanded medially, 1.3 times shorter than gonostyli (Figs 17, 18, 23), both parts with setae. Gonostyli hardly S-shaped in dorsal view, sticky, sickle-shaped from lateral view, subapically inconspicuously inflated and tapered to a narrow, blunt tip. Epandrium bare, with an inconspicuous operculum in dorsal view (Fig. 24), well visible from lateral view (Fig. 25). Ventral plate of epandrium reduced to only two sclerotized converging ribs jointed with surstyli (Fig. 24). Hypandrium hyaline, lateral margin of 9th sternite grows together or connected with proximal border of epandrium and proximal protuberance of gonocoxite. Epiproct transversal as a fold, hardly visible, hypoproct shortly tongue-shaped, both parts with microsetae (Fig. 24). Surstyli almost circular basally, gradually tapering caudally (Figs 24, 25), with numerous accessory tenacula in a dark elliptical area near the base of surstyli (Figs 24–27), subapically with one tenaculum (Figs 24, 25).

**Female.** Eyes separated (Fig. 1), frontal suture triangular, frons bare, frontoclypeus with insertions of setae arranged in two oval areas touched on the level of antennal bows and divergent near tentorial pits. The minimum distance between eyes corresponds approximately to the diameter of two facets. Eye bridge formed by three facet rows, the number of facets in the pointed apices being more reduced. Vertex rounded, occipital lobe small, with a shallow indentation apically and a sclerotized rim. Scape twice as long as pedicel, cylindrical, gradually narrower basally, pedicel globular (Fig. 13). Flagellomeres spindle-shaped, narrow (Figs 13, 14), apical ones missing. Ascoids simple, paired, needle-shaped (Fig. 14). Terminal lobes of
labium, cibarium and epipharynx as in Fig. 1. Wing shape and maculation similar to male, length 2.4–2.5 mm (allotype and female paratype). Ratios of lengths of femora, tibiae and first tarsomeres: \( P_1 = 2.0 : 1.8 : 1.0; P_2 = 2.2 : 2.6 : 1.3; P_3 = 2.3 : 3.1 : 1.4 \). Genitalia as figured (Figs 4, 5, 7–10). Subgenital plate (Figs 4, 7–9) bilobed, with a shallow concavity caudally, with densely spaced microtrichia and sparsely covered by long setae. Genital chamber (Figs 7–10) with simple structures, without net- or wart-like decoration. Cerci almost triangular and slightly bent, three times longer than its bases (Figs 5, 7, 8), rounded caudally, setose, connected by a wrinkled membrane (Fig. 5).

**Egg.** Three times as long as maximum width, with characteristic wrinkled structures (Figs 6, 7).

**Differential diagnosis.** *Alepia bifida* sp. nov. is morphologically similar to *A. recurva* Bravo, Lago & Castro, 2004 from Brazil. However, wing characters, basiphallus, distiphallus and gonostyli show distinct differences (see the Table 1).

**Etymology.** Named after the shape of the bifurcated distiphallus (Lat. *bifidus, -a, -um* = bifid).

**Biology.** Unknown. Adults were collected by light trap in the forest on the slopes of Cerro Musún Mt.

**Distribution.** Currently recorded only from Nicaragua.

---

Table 1. Comparison of diagnostic characters of males of *Alepia bifida* sp. nov. and *A. recurva* Bravo, Lago & Castro, 2004. For figures of *A. recurva* see Bravo et al. (2004).

<table>
<thead>
<tr>
<th>Character</th>
<th><em>A. bifida</em></th>
<th><em>A. recurva</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Medial wing fork with a pattern (Fig. 3)</td>
<td>without a pattern (Fig. 42)</td>
<td></td>
</tr>
<tr>
<td>strengthened (Fig. 3)</td>
<td>linear (Fig. 42)</td>
<td></td>
</tr>
<tr>
<td>Veins ( R_4, R_5, M_1+2, M_3, CuA_1 )</td>
<td>heavily marmorated (Fig. 3)</td>
<td>clear (Fig. 42)</td>
</tr>
<tr>
<td>basally</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ending of ( R_5 ) with a pattern (Fig. 3)</td>
<td>without a pattern (Fig. 42)</td>
<td></td>
</tr>
<tr>
<td>Blunt teeth of basiphallus oriented</td>
<td>backward (Figs 18, 22)</td>
<td>forward (Fig. 44)</td>
</tr>
<tr>
<td>End of distiphallus prolonged by a bent bifid arm, spanner- or bottle-opener shaped (Figs 18, 22)</td>
<td>cut and furrowed (Fig. 44)</td>
<td></td>
</tr>
<tr>
<td>Gonostyli apically not hooked (Figs 17, 18, 23)</td>
<td>hooked (Figs 43, 44)</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

The genesis of systematic position of *Alepia* was partially discussed by Ježek et al. (2011) and a short recapitulation is given here. Enderlein (1937) included the *Alepia* species group in the subtribe Clytocrina Enderlein, 1937 (i.e. a pericomoid taxon) of the tribe Psychodini Enderlein, 1937 with quite different wing venation in comparison with the genus *Setomima* Enderlein, 1937 placed by him in the subtribe Mormiina Enderlein, 1937 of the tribe Mormiini Enderlein, 1937. The monophyly of the tribe Setomimini Vaillant, 1982 with 15 Neotropical genera sensu Quate & Brown (2004) characterized by internal expanded anterior gonocoxal
apodemes is uncertain. Some genera (7 taxa) of Setomimini resemble Mormiini where R₄ originates in the half of prolonged and unbending R₂+3, in contrast to the situation in the rest of the included 8 genera incl. *Alepia*, characterized by a very short and unconnected R₂+3. DUCKHOUSE (1987) treated *Setomima* and Vaillant’s Setomimini as a part of Maruinini. QUATE (1996, 1999) followed DUCKHOUSE (1987) and included *Alepia* in the tribe Maruinini (placed by Enderlein in the subfamily Phlebotominae). The placement of *Alepia* in the tribe Setomimini was supported by WAGNER & HRIBAR (2004) and WAGNER et al. (2008). However, the wing venation is probably a suitable morphological character for the support of an otherwise polyphyletic group in this case (an application of HENNIG 1968, 1972). Probably more new tribes or subtribes will be established in future for members of Maruinini, especially on the basis of modern phylogenetic methods, including DNA characters.

Acknowledgements

The specimens were collected on the basis of permission from 31.iv.2009 provided by the Entomological Museum (MEL) of Leon, Nicaragua; exportation permit of entomological samples to the National Museum of Natural History, Paris: Autorización especial DGPN / DB-012-2009 was provided by Ministerio del Ambiente y los Recursos Naturales, Dirección específica de biodiversidad, Managua. We are grateful to Dr. Jean-Michel Maes, Director of the Entomological Museum in Leon, for the authorizing us collect in Cerro Musún Natural Reserve in June 2009. We are indebted to Camilo Fuentes for his help during field work, and we thank the team of the Marena Lodge Station, on the Cerro Musún, for their assistance. Our thanks are due to Aleš Bezdek (Czech Academy of Sciences, České Budějovice, Czech Republic), who kindly informed us about updated references in the literature. We express sincere thanks to Martin Fikáček and Petr Kment (both National Museum, Praha, Czech Republic) for their help and for providing other valuable assistance. We would especially like to thank the reviewers, namely Sergio Ibañez-Bernal (INECOL, Veracruz, Mexico) and Guillermo Omad (National University of Patagonia San Juan Bosco, Comodoro Rivadavia, Argentina), who helped by providing constructive comments and for improving the manuscript. The study was supported by the Ministry of Culture of the Czech Republic (DKRVO 2017/14, National Museum, Prague, 00023272) and by the Institutional Research Support grant of the Charles University, Prague (SVV No. 260 434 / 2017).

References


DUCKHOUSE D. A. 1987: A revision of Afrotropical Setomima, elucidation of their genealogical relationships and
81–112.
HENNIG W. 1968: Kritische Bemerkungen über den Bau der Flügelwurzel bei den Dipteren und die Frage nach der
Monophylie der Nematocera. Stuttgarter Beiträge zur Naturkunde aus dem Staatlichen Museum für Naturkunde
HENNIG W. 1972: Insektenfossilien aus der unteren Kreide. IV. Psychodidae (Phlebotominae), mit einer kritischen
Übersicht über das phylogenetische System der Familie und die bisher beschriebenen Fossilien (Diptera). Stutt-
JEŽEK J., LE PONT F., MARTÍNEZ E. & MOLINEDO S. 2011: Three new species of non-biting moth flies (Diptera:
Psychodidae: Psychodinae) from Bolivia, with notes on higher taxa of the subfamily. Acta Entomologica Musei
OMAD G. & ROSSI G. C. 2012: A new species and records of Alepia Enderlein (Diptera, Psychodidae, Psychodinae)
Revista de Biología Tropical 44 (Suppl. 1): 1–81.
QUATE L. W. 1999: Taxonomy of Neotropical Psychodidae (Diptera) 3. Psychodines of Barro Colorado Island and
Contribution in Science: Natural History Museum of Los Angeles 500: 1–117.
TKOČ M., PECHAROVÁ M. & JEŽEK J. 2014: Catalogue of the type specimens of Diptera deposited in the
Department of Entomology, National Museum, Prague, Czech Republic. Moth flies (Psychodidae). Acta Ento-
WAGNER R. & HRIBAR L. J. 2004: Moth flies (Diptera: Psychodidae) from the Florida. Keys with the description
WAGNER R., RICHARDSON B. A. & RICHARDSON M. J. 2008: A new psychodid species from Puerto Rican