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Review of the Afrotropical genus *Aphasmaphleps* Grichanov (Diptera: Dolichopodidae)

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ABSTRACT

The Afrotropical genus *Aphasmaphleps* Grichanov is reviewed. The type-species, *A. bandia* Grichanov, is redescribed based on material from Botswana and Tanzania, and three new species are described from Madagascar: *A. bickeli* sp. n., *A. paulyi* sp. n. and *A. stuckenbergi* sp. n. Females of the genus are reported for the first time, and hypopygial and oviscapt morphologies are described and illustrated in detail. A key to all named species of *Aphasmaphleps* is provided, and the systematic position of the genus among the diaphorines is briefly discussed.

KEY WORDS: Diptera, Dolichopodidae, Diaphorinae, *Aphasmaphleps*, Afrotropical Region, Botswana, Madagascar, Tanzania, review, new species, identification key, male secondary sexual characters.

INTRODUCTION

Diaphorinae Schiner, 1864 is one of the most diverse subfamilies of Dolichopodidae, nevertheless its boundaries are not precisely defined. Yang *et al.* (2006) assigned 18 genera to the Diaphorinae, with about 830 described species, but their circumscription remains heterogeneous and some genera were also referred to other subfamilies, such as Rhaphiinae Bigot, 1852 and Sympycninae Aldrich, 1905 (e.g., Foote *et al.* 1965; Dyte & Smith 1980; Ulrich 1981). Actually the Rhaphiinae were sometimes regarded as close to the Diaphorinae (Robinson 1970; Bickel 1999), and the "*Argyra* group of genera" (Negrobov 1986) is remarkable in having disputable position between both subfamilies. Ulrich (1981) restricted the concept of Diaphorinae, transferring the *Argyra* group of genera—*Argyra* Macquart, *Keirosoma* Van Duzee, *Pseudargyra* Van Duzee and *Somillus* Brèthes—to the Rhaphiinae, while Negrobov (1986) placed them in his newly erected tribe Argyrini Negrobov, 1986 (within Diaphorinae), later including *Falbouria* Dyte in that tribe (Maslova & Negrobov 1996). Following Negrobov's tribal classification (Negrobov 1986, 1991; Maslova & Negrobov 1996), Grichanov (1998*a*, *b*, *c*) transferred the genera *Urodolichus* Lamb (Grichanov 1998*a*), *Dactylonotus* Parent (Grichanov 1998*b*) and *Acropsilus* Mik (Grichanov 1998*c*) to the Argyrini, but later (Grichanov & Mostovski 2009) recognized that *Acropsilus*, *Dactylonotus*, *Somillus* and *Urodolichus* together would deserve a separate tribe or even subfamily.

The Afrotropical Diaphorinae (*sensu* Yang *et al.* 2006) currently counts 66 described species distributed in ten genera, viz. *Achradocera* Becker, *Aphasmaphleps* Grichanov, *Argyra*, *Chrysotus* Meigen, *Cryptophleps* Lichtwardt, *Dactylonotus*, *Diaphorus* Meigen, *Nurteria* Dyte & Smith, *Shamshevia* Grichanov, and *Trigonocera* Becker (Yang *et al.* 2006; Grichanov 2006, 2010, 2011, 2012*a*; Grichanov & Mostovski 2009). Nevertheless the Afrotropical species of *Achradocera* probably belong elsewhere, and hence the genus is restricted to the Neotropics with secondary Polynesian introduction (Bickel 2000).

The genus *Nurteria* possesses several features of Sympycninae (Grichanov 2010) and was probably correctly referred to that subfamily by Ulrich (1981).

We here review the formerly monotypic Afrotropical genus *Aphasmaphleps*. The type species, *A. bandia*, is redescribed and three new species are described from Madagascar. New data have allowed revising the systematic position of *Aphasmaphleps* among the diaphorine genera.

MATERIAL AND METHODS

The morphological nomenclature follows mainly Cumming and Wood (2009). The body length was measured from the insertion of the antenna to the apex of the hypopygium in males and to posterior margin of the fifth tergite in females. The wing length was measured from the wing base to its apex, and the width was measured at the widest point of the wing, both measurements given as ranges. Measurements for antennomeres and podomeres are representative ratios, given in the following order: scape, pedicel, postpedicel, 1st stylomere, 2nd stylomere; and trochanter+femur, tibia, tarsomeres 1, 2, 3, 4, 5. CuAx proportion is calculated as a ratio of the discal medial-cubital crossvein length to the length of the distal section of the cubital vein.

The following abbreviations are used in this paper: I, II, III: pro-, meso-, metathoracic legs; A_1 – anal vein; C – costal vein; cerc – cercus; CuA – basal part of anterior branch of cubital vein; Cx – coxa; *dm–cu* – discal medial-cubital crossvein; Dsur – dorsal lobe of surstylus; F – femur; lel – lateral epandrial lobe; M – medial vein; MSSC – male secondary sexual character(s); pgon – postgonite; R – radial vein; St – sternite; T – tibia; Tg – tergite; $t_{1–5}$ – tarsomeres 1–5; Vsur – ventral lobe of surstylus. In describing the hypopygium, 'dorsal' and 'ventral' refer to the morphological position prior to the rotation and flexion of the genitaia; as such, the top of the drawing is ventral, and the bottom is dorsal. Characters common to all species are listed in the diagnosis of the genus and are not repeated in species descriptions.

The material used in this study is deposited in the following institutions: Australian Museum, Sydney, Australia (AMS), California Academy of Sciences, San Francisco, US (CAS), Iziko Museums, Cape Town, South Africa (SAMC), National Museum of Natural History, Paris, France (MNHN), Royal Belgian Institute of Natural Sciences, Brussels (ISNB), and Royal Museum for Central Africa, Tervuren, Belgium (MRAC).

TAXONOMY

Genus *Aphasmaphleps* Grichanov, 2010

Aphasmaphleps Grichanov, 2010: 406. Type-species: *Aphasmaphleps bandia* Grichanov, by original designation.

Diagnosis (modified from Grichanov 2010): Small diaphorines, bluish green with copper reflections and little pruinosity.

Male.

Head. Face obliterated by contiguous eyes (MSSC). Antenna sexually dimorphic, longer in male. Antennal scape bare, arista-like stylus dorso-apical, at least twice longer than head height (MSSC).

Thorax. Acrostichals biseriate, 5 pairs of dorsocentral setae; upper part of proepisternum, in front of anterior spiracle, with 1 seta. Scutellum with single pair of setae (lateral setae absent).

Wing. C ending beyond R_{4+5} but not reaching M, M evanescent, and R_{4+5} and M slightly divergent at apex (in *A. bickeli* sp. n. and *A. stuckenbergi* sp. n., C ends in M, M is strong, and R_{4+5} and M are parallel); crossvein *dm–cu* always moved basally (CuAx proportion ≤0.1).

Legs. Fore tarsomeres slightly thickened, with ventral pad of short white hairs, $It_{4–5}$ with longer dorsal setae at apex, It_5 with enlarged pulvilli and claws absent (MSSC); pulvilli and claws of mid and hind legs unmodified.

Abdomen. Covered by short vestiture of black setae; Tg6 pilose. Tg7 and St7 greatly reduced. St8 with short vestiture and 2 conspicuous setae at margin.

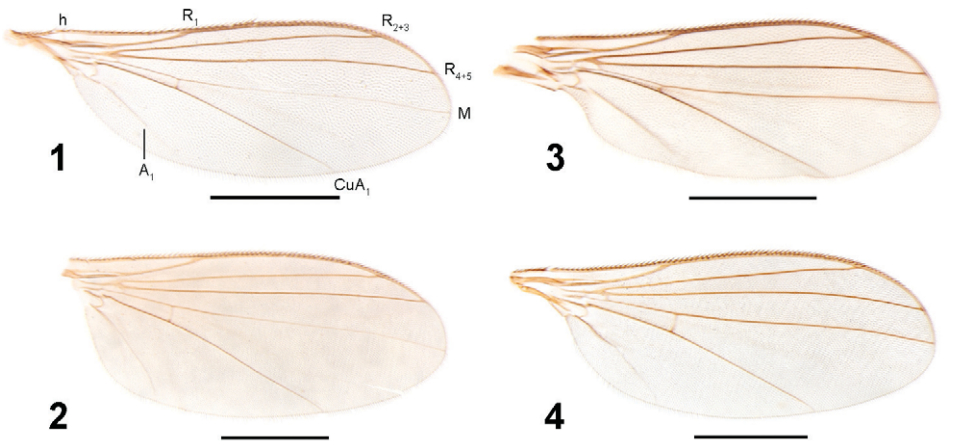
Hypopygium. Epandrium globose, foramen left lateral, near dorsal margin; hypandrium and phallus simple, without ornamentation; lateral epandrial lobe short, with two apical setae and one basiventral seta posteriad; surstylus divided into two lobes; postgonite present; cercus short.

Female.

Similar to male. Antenna shorter. *Oviscapt*: posterior margin of St8 moved ventrally; hemitergites of Tg10 each with 3 or 4 thick spines.

Comments: The availability of additional material of *A. bandia* and discovery of new species allowed revisiting some of the characters, which had been previously regarded by Grichanov (2010) to be of generic value and used to establish his new genus. The wing venation proved to be not always modified as in *A. bandia* and *A. paulyi* sp. n., with evanescent vein M and R_{4+5} and M slightly diverging apically. Additionally, some of the MSSC seem to be synapomorphic to all species in the genus: eyes touching below antennae, antennal stylus elongate (about 0.8× of the body length) and fore tarsomeres modified, including enlarged pulvilli and reduced claws.

The presence of all three new species in one Malaise trap (at Morondava locality) is rather remarkable, and it is likely that many more species are to be described in the future. The new species cannot be subspecies or phenotypes of *A. bandia*, which is not found on Madagascar, due to distinct MSSC on antenna, wing and/or mid tarsus. It is



Figs 1–4. Wings of *Aphasmaphleps* spp., permanent slides: (1, 2) *A. bandia* Grichanov, male (1), female (2); (3, 4) *A. bickeli* sp. n., male (3) female (4). Scale bars = 0.5 mm. See Material and Methods for explanation of abbreviations.

quite probable that we observe an early stage of sympatric speciation in *Aphasmaphleps*; the process is not uncommon on Madagascar and adjacent islands even for dolichopodid flies (e.g., Grichanov 2003). This is also suggested by the very similar hypopygial morphology shown by all species.

Key to species of *Aphasmaphleps* based on male characters

1 Vein M reduced to a faint trace; IIt_1 with anterior and ventral rows of stiff hairs, IIt_2 about half as long as IIt_3; distal stylomere of arista-like stylus about 7× as long as basal stylomere 2
– Vein M distinct; IIt_1 without rows of stiff hairs; IIt_2 about as long as IIt_3; distal stylomere of arista-like stylus about 4× as long as basal stylomere 3
2 Arista-like stylus with apical flag (Fig. 5)..... **paulyi** sp. n.
– Arista-like stylus without apical flag (Grichanov 2010, fig. 3)..... ..... **bandia** Grichanov
3 Arista-like stylus with apical flag (Fig. 7)..... **bickeli** sp. n.
– Arista-like stylus without apical flag (Fig. 6)..... **stuckenbergi** sp. n.

Aphasmaphleps bandia Grichanov, 2010

Figs 1, 2

Aphasmaphleps bandia: Grichanov 2010: 407, figs 1–7.

Diagnosis: Male. Antennal stylus without apical lamella. Distal stylomere of arista-like stylus about 7× as long as basal stylomere. Veins R_{4+5} and M slightly diverging apically, M evanescent. IIt_1 with ventral and anterior rows of stiff hairs, IIt_2 shorter than $IIIt_3$.

Redescription:

Male.

Body length 1.4–1.9 mm. Antenna 1.3–1.4 mm. Wing 1.5–1.6 mm long, 0.5–0.6 mm wide.

Head. Spherical, frons as large as third of head width, bluish green; face obliterated by contiguous eyes with enlarged ventral facets; palpus and proboscis brownish without conspicuous setae (often hidden by eyes); pair of strong and slightly divergent ocellar setae, and pair of short post-ocellar setae posteriad; pair of strong proclinate vertical setae, and pair of paravertical setae; a row of pale simple postocular setae except for the black dorsal ones, occiput flat, ventrally with some sparse pale setae. Antenna: 10, 5, 9, 14, 98; scape and pedicel slightly flattened laterally, brownish yellow, darker dorsally; scape subconical, pedicel shorter than scape and cylindrical, and with apical crown of setae, the dorsalmost longer; postpedicel subtriangular, brown, shortly pilose; stylus long, 2nd stylomere 7× as long as 1st stylomere.

Thorax. Bluish green, with little pruinosity; setae black. Acrostichals short, in 2 irregular rows; 1 pre- and 1 sutural intra-alar setae; 1 pre- and 2 postsutural supra-alar setae; 1 postalar; 2 notopleutals; 1 strong and 2 tiny postpronotal setae; lower surface of proepisternum with 1 or 2 setae; upper part of proepisternum with 1 small seta in front of anterior spiracle.

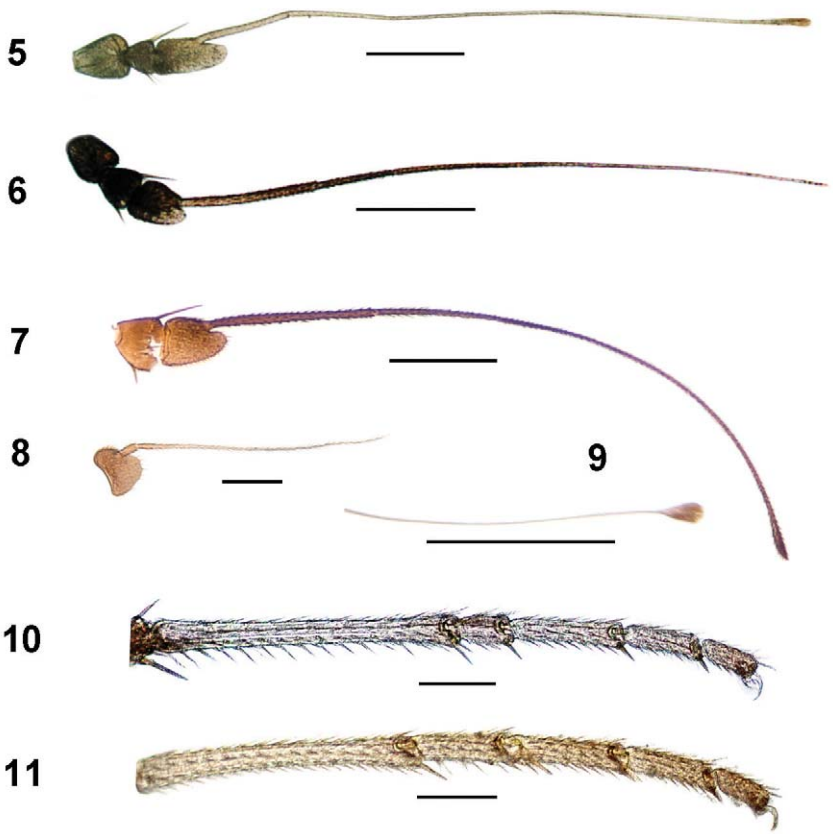
Wing (Fig. 1). Membrane hyaline, veins brown except noted. C ending at wing apex, between R_{4+5} and M; R_1 ending at basal third of wing; R_{2+3} ending at apical fourth of

wing; R_{4+5} ending before wing apex, R_{4+5} and M slightly diverging, M evanescent towards apex, after *dm–cu*, and slightly convex anteriorly; *dm–cu* very short, CuAx proportion 0.04; A_1 present as a fold; anal angle undeveloped. Lower calypter yellow with brownish cilia, haltere yellow.

Legs. I: 1.9, 1.9, 0.5, 0.3, 0.2, 0.2, 0.1. II: 2.3, 2.7, 1.2, 0.2, 0.4, 0.3, 0.2. III: 2.8, 2.9, 0.8, 0.8, 0.5, 0.3, 0.2. Lateral of CxII, base of CxIII and tips of tarsi II and III, light brown, legs otherwise light yellow. Legs devoid of major setae. CxI with 2 or 3 strong white distolateral setae and some smaller white setae on apical edge. CxII with white setae on anterior surface; TII with strong anterodorsal seta on apical ⅓, and 4 apical setae; tarsus II modified (MSSC): IIt_1 with ventral and anterior rows of stiff hairs (MSSC), and with 2 anterior setae at apex, IIt_2 shortened (MSSC). CxIII with white seta at base; TIII with 1 or 2 small dorsal setae at middle, and 4 short apical setae.

Abdomen. Tergites greenish with copper reflection, sternites brownish, St3–4 paler.

Hypopygium (Grichanov 2010, fig. 7). Hypandrium and phallus curved and extending to the level of ventral lobe of surstylus; VSur with some small apical setae and one



Figs 5–11. Antennae and tarsi of *Aphasmaphleps* spp., transmitted light: (5–9) antennae: *A. paulyi* sp. n., male (5); *A. stuckenbergi* sp. n., male (6); *A. bickeli* sp. n., male (7) and female (8); (9) *A.* sp. A, apex of male stylus; (10, 11) male mid tarsus: *A. paulyi* sp. n. (10), *A. stuckenbergi* sp. n. (11). Scale bars = 0.2 mm (5, 6), 0.1 mm (7–11).

more conspicuous dorsal seta near middle; DSur shorter than VSur, with small apical setae and 2 or 3 more conspicuous dorsal setae; postgonite curved and projected beyond level of lateral epandrial lobe.

Female.

Body length 1.4–1.6 mm. Wing 1.5–2.1 mm long, 0.6–0.7 mm wide. Very similar to male, except as noted. Face not obliterated ventrally by contiguous eyes, 0.25 head width; palpus brown. Antenna: 6, 5, 7, 2, 42; postpedicel shorter than in males, trapezoid; stylus shorter than in males, of normal size, bi-articulated at base. *Wing* (Fig. 2). C ending in R_{4+5}, before wing apex; *dm–cu* longer, CuAx proportion 0.1; A_1 stronger, anal angle developed. *Legs*. I: 1.8, 1.6, 0.6, 0.3, 0.2, 0.2, 0.1. II: 2.2, 1.9, 1.0, 0.5, 0.4, 0.3, 0.2. III: 2.5, 2.3, 0.7, 0.6, 0.4, 0.3, 0.2. Coxae with black setae; tarsus I and pulvilli not modified, claws present. *Terminalia*. Similar to those figured for *A. bickeli* sp. n. (cf. Figs 14–16).

Holotype (examined): ♂ SENEGAL: Bandia [14°36'S 17°01'W], 16.vi.1980, B. Sigwalt, Malaise trap (MNHN).

Additional material examined: TANZANIA: 21♂ 2♀ Mkomazi Game Reserve, 3°57.91'S 37°48.09'E, 26–30. xi.1995, open *Combretum* bushland, S. van Noort, yellow pan trap (SAMC); BOTSWANA: 11♂ Serowe [22°23'S 26°42'E], xi.1986, M. De Meyer (MRAC).

Comments: *A. bandia* is similar to *A. paulyi* sp. n. in having a modified wing venation (vein M evanescent and slightly diverging from R_{4+5} apically) and anterior and ventral stiff hairs on IIt_1, but can be separated from the latter by the simple antennal stylus.

Aphasmaphleps bickeli sp. n.

Figs 3, 4, 7, 8, 12–16

Etymology: Named after Daniel Bickel (Sydney, Australia), who has greatly contributed to the taxonomic knowledge of the family.

Diagnosis: Male. Antennal stylus with apical lamella; distal stylomere about 4× as long as basal stylomere. Veins R_{4+5} and M parallel, M strong. Tarsomeres of mid leg unmodified, IIt_1 without rows of stiff hairs; IIt_2 about as long as IIt_3.

Description:

Very similar to *A. bandia*, except for the following features.

Male.

Body length 1.5–1.6 mm. Antenna 1.1–1.3 mm. Wing 1.2–1.5 mm long, 0.5–0.6 mm wide. *Head*. Antenna (Fig. 7): 12, 6, 8, 21, 94; postpedicel basally yellow, stylus with a small apical lamella (MSSC); distal stylomere about 4× as long as basal stylomere.

Thorax. Bluish green, darker.

Wing (Fig. 3). Membrane hyaline, all veins brown. C ending in M, at wing apex; R_{4+5} and M parallel after *dm–cu*, M strong; CuAx proportion 0.04; knob of haltere whitish.

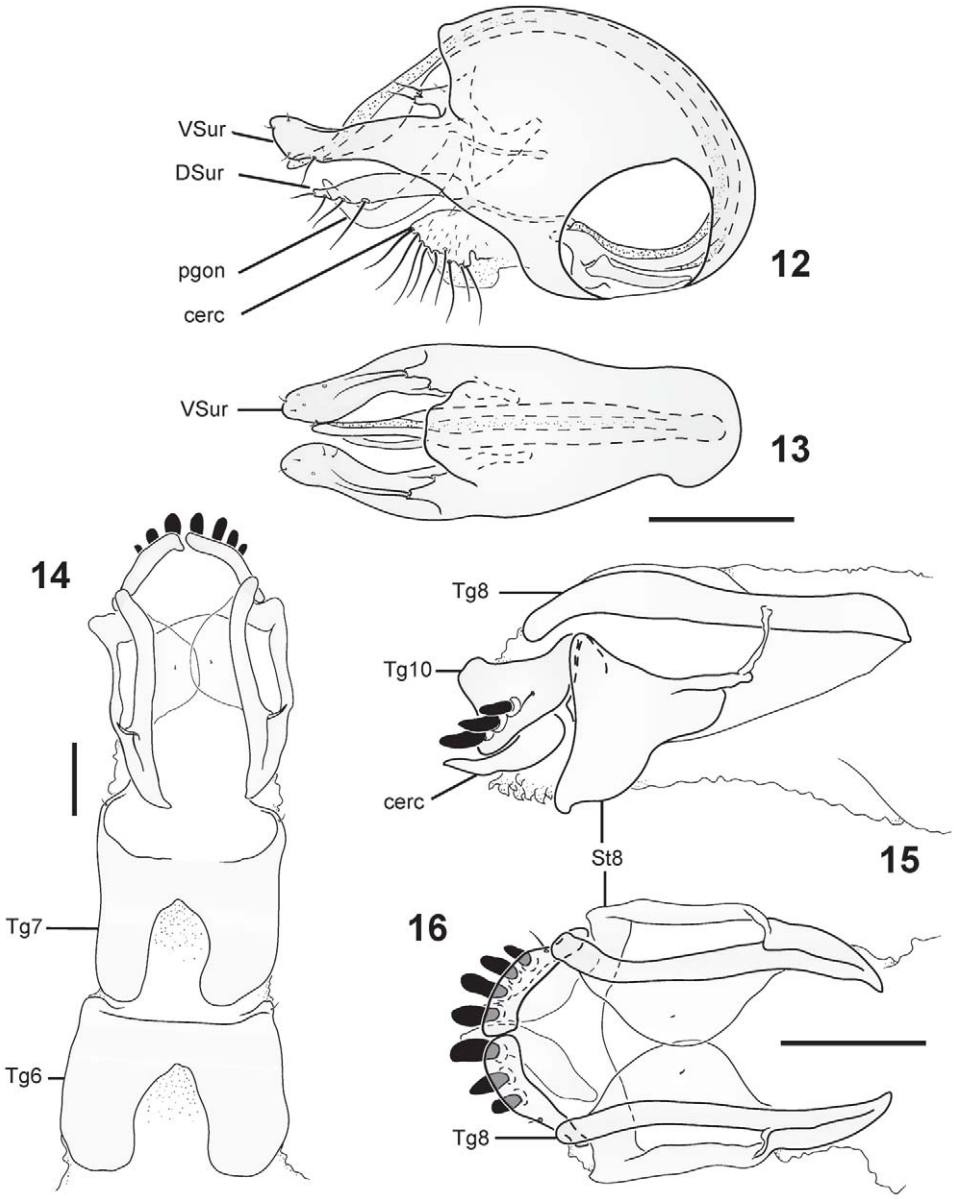
Legs. I: 2.0, 1.9, 0.4, 0.3, 0.1, 0.1, 0.1. II: 2.3, 2.3, 1.1, 0.5, 0.3, 0.3, 0.2. III: 2.5, 2.8, 0.7, 0.8, 0.4, 0.3, 0.2. Tarsus II unmodified: IIt_1 without rows of hairs, IIt_2 slightly longer than IIt_3.

Abdomen. Mostly coppery, shining green.

Hypopygium (Figs 12, 13). Hypandrium and phallus slightly constricted at level of emergence of genital capsule.

Female.

Body length 1.5–1.6 mm. Wing 1.4–1.6 mm long, 0.6–0.7 mm wide. Very similar to females of *A. bandia*, except as noted. Antenna (Fig. 8): 5, 6, 7, 3, 45. *Wing* (Fig. 4). CuAx proportion 0.1. *Legs*. I: 1.8, 1.6, 0.7, 0.3, 0.3, 0.2, 0.2. II: 2.3, 2.2, 1.0, 0.5, 0.3, 0.2, 0.2. III: 2.5, 2.6, 0.8, 0.6, 0.4, 0.3, 0.2. Brownish setae on coxae. *Terminalia* (Figs 14–16).



Figs 12–16. *Aphasmaphleps bickeli* sp. n.: (12, 13) hypopygium, left lateral (12), ventral (13); (14–16) oviscapt, dorsal (14, 16), right lateral (15). Scale bars = 0.1 mm. See Material and Methods for explanation of abbreviations.

Anterior margins of Tg6–7 with incision; Tg8 divided into two rod-like sclerites; St8 divided into two sclerites connected mesally at apex, enlarged and moved ventrally; sclerites of Tg8 and St8 connected anteriorly; hemitergites of Tg10 each with 3 or 4 thick spines.

Holotype: ♂ MADAGASCAR: Mahajanga, NP Tsingy de Bemahara, 3.4 km E Bekopaka, Tombeau Vazimba, 19°08'31"S 44°49'41"E, 50 m, 6–10.xi.2001, Fisher *et al*., tropical dry forest (CAS).

Paratypes: 31♂ 20♀ same data as holotype (CAS).

Additional material examined: MADAGASCAR: 21♂ same data as holotype; 21♀ same data as holotype, but 10.6 km 126° ESE Antsalove, 19°42'34"S 44°43'05"E, 150 m, 16–20.xi.2001 (AMS); 2♂ Tul[éar Province], Morondava [19°53'S 44°28'E], 50 km N, 13.xii.1991, A. Pauly, forêt, rivière de salle (ISNB).

Comments: *A. bickeli* sp. n. is similar to *A. stuckenbergi* sp. n., but can be distinguished from the latter by having the antennal stylus with the apical lamella.

Aphasmaphleps paulyi sp. n.

Figs 5, 10

Etymology: The species is named for Alain Pauly (Brussels, Belgium), who collected all known specimens of this species.

Diagnosis: Male. Antennal stylus with apical lamella. Distal stylomere of arista-like stylus about 7× as long as basal stylomere. Veins R_{4+5} and M slightly diverging apically, M evanescent. IIt_1 with ventral and anterior rows of stiff hairs, IIt_2 shorter than $IIIt_3$.

Description:

Very similar to *A. bandia* in all respects including morphology of hypopygium, except for the following features. (All specimens are quite discolourated due to long-term storage in alcohol.)

Male.

Body length 2.0 mm (in alcohol). Antenna 1.5 mm. Wing 1.4 mm long, 0.6 mm wide.

Head. Antenna (Fig. 5): 10, 7, 15, 20, 102; stylus with apical lamella.

Wing. CuAx proportion 0.07.

Legs. It: 1.5, 1.0, 0.6, 0.6, 0.6. IIt: 3.6, 0.7, 1.4, 1.0, 0.7. IIIt: 2.3, 2.0, 1.5, 1.1, 0.9. IIt_1 (Fig. 10) with somewhat weaker ventral and anterior hairs.

Female. Unknown.

Holotype: ♂ (in glycerol) MADAGASCAR: Tul[éar Province], Morondava [19°53'S 44°28'E], 50 km N, 13.xii.1991, A. Pauly, forêt, rivière de sale (ISNB).

Paratypes: 3♂ (in alcohol), same data as holotype (ISNB).

Comments: *A. paulyi* sp. n. is similar to *A. bandia*, but can be distinguished from the latter by having the antennal stylus with apical lamella.

Aphasmaphleps stuckenbergi sp. n.

Figs 6, 11

Etymology: The species is named for the late Brian Stuckenberg (1930–2009), the doyen of Afrotropical dipterology.

Diagnosis: Male. Antennal stylus without apical lamella. Distal stylomere of arista-like stylus about 4× longer than basal stylomere. Veins R_{4+5} and M parallel, M strong.

Tarsomeres of mid leg unmodified, IIt_1 without rows of stiff hairs, IIt_2 about as long as IIt_3.

Description:

Very similar to *A. bickeli* in all respects including morphology of hypopygium, except for the following features. (All specimens are quite discolourated due to long-term storage in alcohol.)

Male.

Body length 2.3 mm (in alcohol). Antenna 1.2 mm. Wing 1.6 mm long, 0.6 mm wide.

Head. Antenna (Fig. 6): 9, 6, 11, 21, 82; stylus without apical lamella.

Wing. CuAx proportion 0.05.

Legs. It: 1.5, 1.2, 0.8, 0.9, 0.8. IIt: 3.5, 1.3, 1.5, 1.1, 0.7. IIIt: 2.3, 2.4, 1.5, 1.1, 0.9. IIt_1 (Fig. 11) unmodified. IIt_1 without rows of stiff hairs; IIt_2 about as long as IIt_3.

Female. Unknown.

Holotype: ♂ (in glycerol) MADAGASCAR: Tul[éar Province], Morondava [19°53'S 44°28'E], 50 km N, 13.xii.1991, A. Pauly, forêt, rivière de sale (ISNB).

Paratypes: 24♂ (in alcohol), same data as holotype (ISNB).

Additional material: MADAGASCAR: 4♂ (in alcohol, strongly damaged), same data as holotype; 1♂ (in glycerol, damaged) Fia[narantsoa Province], Ranomafana [National Park, 21°00'S 47°30'E], 19.i.1992, A. Pauly, forêt (ISNB).

Comments: *A. stuckenbergi* sp. n. is similar to *A. bickeli* sp. n., but can be distinguished from the latter by having the antennal stylus without an apical lamella.

Aphasmaphleps sp. A

Fig. 9

Diagnosis: Male. Antennal stylus with enlarged apical lamella, silvery at base. Veins R_{4+5} and M slightly diverging apically, M evanescent. IIt_1 with ventral and anterior rows of stiff hairs, IIt_2 shorter than $IIIt_3$.

Description:

Very similar to *A. paulyi* in all respects including morphology of hypopygium, except for the following features.

Male.

Body length 1.5 mm. Antenna 1.7 mm. Wing 1.4 mm long, 0.6 mm wide.

Head. Antenna (Fig. 9): 6, 3, 7, 12, 87; apical lamellae of stylus larger than in *A. paulyi*, laterally flattened and silvery at base.

Wing. CuAx proportion 0.1.

Legs. I: 1.9, 1.7, 0.4, 0.2, 0.2, 0.2, 0.1. II: 2.1, 2.2, 1.2, 0.3, 0.5, 0.4, 0.2. III: 2.4, 2.9, 0.9, 0.8, 0.5, 0.3, 0.2.

Female. Unknown.

Material examined: MADAGASCAR: 1♂ Mahajanga, NP Tsingy de Bemahara, 3.4 km E Bekopaka, Tombeau Vazimba, 19°08'31"S 44°49'41"E, 6–10.xi.2001, 50 m, Fisher *et al*., tropical dry forest (CAS). Labelled as "Unnamed species A | Capellari & Grichanov 2012".

Comments: Since just a single male specimen with one broken antenna has been found, we prefer to keep it unnamed until more material is available for study.

Aphasmaphleps sp.

Material examined: MADAGASCAR: 6♀ Tul[éar Province], Morondava [19°53'S 44°28'E], 50 km N, 13.xii.1991, A. Pauly, forêt, rivière de salle (ISNB).

Comments: The females were collected together with *A. bickeli* sp. n. and *A. stuckenbergi* sp. n. It is impossible to associate them with either species. Hemitergites each with four thick spines.

DISCUSSION

It is noteworthy that several diaphorine genera—*Aphasmaphleps*, *Asyndetus*, *Cryptophleps*, *Phasmaphleps* and *Shamshevia*—show a modified, at least to some extent, wing venation, while venation characters are mostly conservative in the rest of the subfamily. Indeed, Bickel (1996: 1168) considered *Asyndetus* and *Cryptophleps* as sister taxa based on apomorphic wing characters: "Costa ends at R_{4+5}, well before wing apex" and "vein M with bend or weakening in the distal third of wing, with distal section of M either weakly joined to its base, or distinctly displaced anteriad".

Nevertheless, Bickel (2005) later re-assessed the relationships of both genera in the context of the discovery of *Phasmaphleps*. He regarded *Asyndetus* as being closer related to *Diaphorus*, while *Cryptophleps* and *Phasmaphleps* as belonging to the same lineage of *Chrysotus*, assuming that modifications in wing venation resulted from homoplastic evolution. This interpretation resulted in splitting the Australasian Diaphorinae into two major groups according to his key (Bickel 2005), in which couplet 2 leads to genera with setose or bare upper part of proepisternum. Both *Cryptophleps* and *Phasmaphleps* were keyed as presenting bare upper part of proepisternum, but assessment of this character is sometimes hindered in collapsed or small specimens. Indeed, further examination of specimens of *Phamaphleps pacifica* Bickel, *Cryptophleps cyplus* Bickel, *C. papuanus* Grootaert & Meuffels, *C. yungaburra* Bickel and an undescribed *Cryptophleps* species from Madagascar revealed that all possess a single seta on that sclerite, suggesting that this feature is widespread through these genera. When describing *Aphasmaphleps*, Grichanov (2010) regarded it as close to *Phasmaphleps*, mainly due to similarities in the wing venation. However, with the discovery of *A. bickeli* sp. n. and *A. stuckenbergi* sp. n. (both with a strong vein M), the apomorphic modifications in the wing venation of *A. bandia* and *A. paulyi* sp. n. and in *Phasmaphleps* can be interpreted as independently evolved. Particularly, in *Aphasmaphleps*, a strong vein M can even be secondarily developed, since weakening of M is regarded as a tendency in the Diaphorinae, in which wing venation shows some instability (Bickel 2005), "suggesting a close relationship in terms of developing similar apomorphies" (Bickel 1996: 1168). Accordingly, since characters previously used to infer relationships of these genera are doubtful, the position of *Aphasmaphleps* remains to be investigated.

The pre-abdominal morphology of *Aphasmaphleps* resembles those of *Asyndetus* and *Cryptophleps*, rather than the morphology of *Phasmaphleps*. While in *Phasmaphleps pacifica* (Bickel 2005, fig. 1a) Tg7 and St7 are well developed, segment 7 is strongly reduced and hardly visible in the other three genera. Although Bickel (2005) stated that segment 7 in *Cryptophleps* is developed, its bare Tg6 was probably mistakenly interpreted as Tg7 (e.g., Bickel 2005, figs 2a, 3g). We have examined several *Cryptophleps* species (*C. cyplus*, *C. nova* Bickel, *C. papuanus*, *C. rothii* Couturier, *C. vitiensis* Bickel, *C.*

yungaburra, and an undescribed species from Madagascar) and confirmed that male Tg6 is actually bare in all of them (with reduced segment 7 as well), and this is likely to be a groundplan feature for the entire genus.

Furthermore, the configuration of hypopygial appendices (lateral epandrial lobe, lobes of surstyli and cercus) of *Aphasmaphleps* is more similar to those of *Asyndetus* and *Cryptophleps* (compare with figures in Grootaert & Meuffels 1987; Meuffels & Grootaert 1993; Bickel 1996, 2005; Zhang & Yang 2003; Wang & Yang 2005; Wang *et al.* 2007). The oviscapt morphology seems also to be informative to establish relationship: the connection between both sclerites of St8 is enlarged and moved ventrally (cf. Figs 14–16). This apomorphic condition has been verified in females of *Asyndetus* (*A. decaryi* Parent, *A. infernus* Bickel, *A. interruptus* (Loew), and of one undescribed species from Brazil) and *Cryptophleps* (*C. cyplus*, *C. yungaburra*, and an undescribed species from Madagascar), suggesting a close relationship between these genera and *Aphasmaphleps*.

The position of *Shamshevia* regarding *Aphasmaphleps* is still debatable. *Shamshevia* has previously been regarded close to *Dactylonotus* (Grichanov 2012*a*, *b*), but it shares most of the hypopygial similarities with diaphorine genera with modified wing venation, except *Phasmaphleps*, i.e., *Aphasmphleps*, *Asyndetus* and *Cryptophleps*. With respect to *Aphasmaphleps*, males of both it and *Shamshevia* have setose Tg6, unlike the completely bare Tg6 of *Asyndetus*, *Cryptophleps* and related genera like *Diaphorus*, *Melanostolus* Kowarz and *Ostenia* Hutton. It is possible that *Aphasmaphleps* and *Shamshevia* nest together within the diaphorines with a modified wing venation.

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