

***Flatopsis medleri* sp. n. – a new flatid species from Madagascar (Hemiptera: Fulgoromorpha: Flatidae)**

Dariusz ŚWIERCZEWSKI and Adam STROIŃSKI

Received: 20 April 2011

Accepted: 4 May 2011

ŚWIERCZEWSKI D., STROIŃSKI A. 2011. *Flatopsis medleri* – a new flatid species from Madagascar (Hemiptera: Fulgoromorpha: Flatidae). *Acta zoologica cracoviensia*, **54B**(1-2): 23-30.

Abstract. A new planthopper species of the family Flatidae *Flatopsis medleri* sp. n. from Madagascar is described and illustrated.

Key words: Entomology, taxonomy, Hemiptera, Fulgoromorpha, Flatidae, *Flatopsis*, new species, Madagascar.

Dariusz ŚWIERCZEWSKI, Jan Długosz University, Department of Zoology and Animal Ecology, Al. Armii Krajowej 13/15, 42-201 Częstochowa.

E-mail: dswier@ajd.czest.pl

Adam STROIŃSKI, Museum and Institute of Zoology PAS, Wilcza 64, 00-679 Warsaw, Poland.

E-mail: adam@miiz.waw.pl

I. INTRODUCTION

The genus *Flatopsis* was established by MELICHAR (1902) for two species: *Phyllyphanta nivea* SIGNORET, 1860 and *Flatopsis guttifera* MELICHAR, 1902, which can be both easily distinguished by the presence of characteristic tegmina coloration in the latter. Moreover, *Flatopsis nivea* comprises two colour variations named *Flatopsis nivea nigropunctata* (STÅL, 1866) and *Flatopsis nivea basipunctata* (SCHMIDT, 1906). The paper describes here a new species belonging to the genus *Flatopsis* from the southeastern part of Madagascar.

II. MATERIAL AND METHODS

Measurements and abbreviations. The following measurements were made and abbreviations used in this study:

Total length – measured (in dorsal view) from the apex of head (protrusion) to the apex of tegmina;

C/E – width of frons between eyes/length of frons in mid line;
 D/E – maximum width of frons/length of frons in mid line;
 G/H – length of mesonotum in mid line/width of mesonotum between lateral angles;
 I/J – length of tegmen measured from the base to the apical margin in median portion/width of tegmen measured from the apex of clavus to the anterior margin.

Vein nomenclature after interpretation proposed by SZWEDO & ŻYŁA (2009).

Preparations and illustration. The abdomens of the specimens examined were cut and boiled in 10% KOH with a few drops of chlorazol black for dyeing the ectodermic genital ducts based on the method introduced by CARAYON (1969) and BOURGOIN (1993). Dissections and cleaning of genital structures were performed in distilled water. Final observations and drawings were done in glycerine using a camera lucida attached to a light microscope. The photos were taken using microscope Leica MZ 16, with digital camera IC 3D; images were produced using the software Synoptics Automontage®. The nomenclature of the male genitalia follows BOURGOIN (1988) and BOURGOIN & HUANG (1990), and for the female genitalia BOURGOIN (1993).

Material. The studied material comes from the collection of the California Academy of Sciences in San Francisco, USA (Dr N. PENNY, curator).

III. TAXONOMY

Flatopsis medleri sp. n.

Figs 1-22

Diagnosis. *Flatopsis medleri* SWI. et STR., sp. n. differs from *Flatopsis guttifera* MEL. by the colour pattern of tegmina (dark brown costal area in *F. guttifera*; dark brown spots concentrated in the apical part of tegmen in *F. guttifera* and more diffused in *F. medleri*) and by the male genital block structure (posterior arm of aedeagus almost straight with 2 teeth in *F. guttifera* and strongly curved with 3-5 teeth in *F. medleri*).

Etymology. The species was named to honour Dr John T. MEDLER (1914-2006), an outstanding researcher of the world fauna of Flatidae.

Description. Body slender. Total length: 9.8-12.1 mm (♂♂ 9.8-10.4 mm, ♀♀ 10.5-12.1 mm).

Head. Head conical, with compound eyes (in dorsal view) narrower than thorax (Fig. 1).

Vertex transverse, distinctly wider than long in midline, medially in a half covered by pronotum; anterior margin concave, lateral margins almost straight and parallel, posterior margin deeply arcuate; disc of vertex convex, without carinae.

Frons (Fig. 2) longer than wide, the widest in the line between antennae, proportion C/E = 0.53-0.71, proportion D/E = 0.61-0.74; disc of frons tricarinate – median carina distinctly visible and very short, lateral carinae in the form of elongated horseshoe, reaching the level of antennae and connected with median carina at the top of the head; lateral margins of frons carinate with shallow incision about the level of the compound eye; disc of frons depressed in the central part (below the median carina and between the lateral ones) and between lateral carinae and lateral margins; frons with protrusion in the upper part; apex of protrusion (in lateral view) at about the same level as vertex, extending the anterior

margin of frons; margin of frons (in dorsal view) blunt, area between anterior margin of vertex and the apex of protrusion without carinae (Fig. 1).

Antennal segment II (pedicel) wider at apex, twice longer than wide, with black flagellum; sensory organs located at the top of pedicel, in shallow depression.

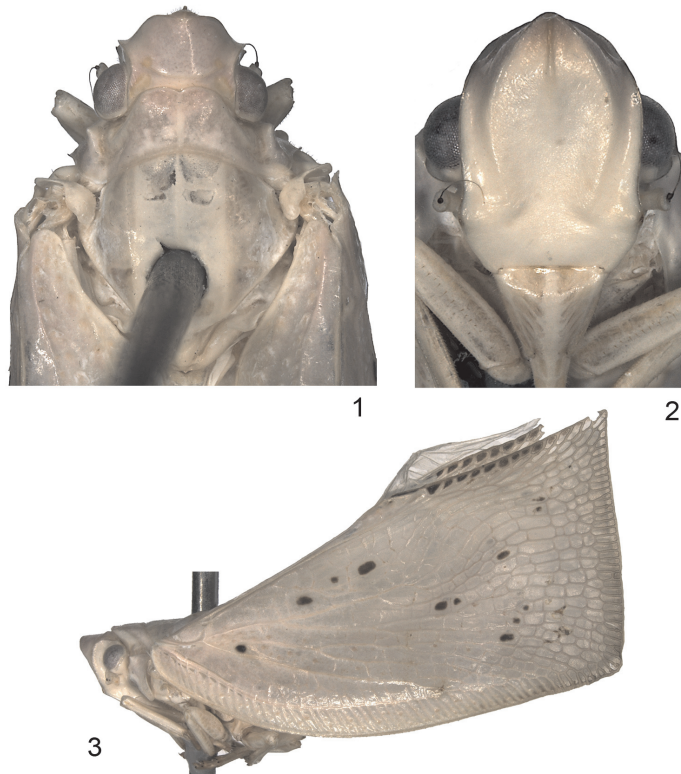
Compound eyes oval with small callus at lower posterior margin, lateral ocelli present.

Frontoclypeal suture almost straight; clypeus without carinae, median portion convex (Fig. 2). Rostrum reaching to the middle point of hind coxae; apical part a bit shorter than the basal one.

Thorax. Pronotum longer in mid line than vertex; anterior and posterior margins in lateral view at the same level; anterior margin in dorsal view distinctly convex with shallow incision in the mid line, partly covering the vertex, posterior margin weakly concave; disc with shallow depression in the median portion, median carina present but weakly visible.

Mesonotum deltoid, proportion G/H = 0.87-1.07; in lateral view at the same level as pronotum; lateral angles placed at 1/3 of the length of mesonotum in mid line; disc of mesonotum flat with three parallel carinae reaching the posterior margin.

Tegmen (Fig. 3) elongately-triangular, membranous, flat, surface smooth without any bulla, proportion I/J = 1.92-2.26; costal margin – basal half arcuate, apical half almost straight; apical angle almost right; apical margin straight; sutural angle acute and slightly



Figs 1-3. *Flatopsis medleri* sp. n. 1 – anterior part of the body, dorsal view; 2 – same, anterior view; 3 – body, lateral view.

produced in relation to apical angle; postclaval sutural margin straight; costal area narrower than costal cell in the midline, about the same width at its length, with dense and numerous transverse veinlets, the end placed a bit after the end of clavus, costal area the same width at its length; costal cell in median portion almost twice wider than costal area, tapering apicad, with sparse net of veinlets; basal cell about twice as long as wide.

Longitudinal stem Sc+R arises as extremely short common stem from basal cell, stem M leaving basal cell with a long stalk. Stem Sc+R diverging into Sc+RA and RP very basad, shortly after leaving basal cell; Sc+RA vein branched into ScRA₁ and RA₂ veins a little before the end of costal area; vein RP branched into RP₁₊₂ and RP₃₊₄ apicad of the M fork; RP₁₊₂ branched near anterior margin of the wing, RP₃₊₄ multiforked; pattern of ultimate apical veins somewhat variable.

Stem M branched in basal part of the wing into M₁₊₂ and M₃₊₄; M₁₊₂ almost straight, forking a little before the fork of M₃₊₄; M₃₊₄ from the first fork strongly diverged, at the level of claval apex; the mediad branches of M₄ vein ending at postclaval margin and posteroapical angle.

CuA fork placed distinctly distad of Sc+R and M forks, branched after the first M fork; CuA₁ arcuate, delimiting huge anterocubital cell, anterocubital cell with net of veinlets.

Tegmina with numerous transverse veinlets forming irregular net, with apical line. Apical cells elongate, 2-3 times longer than wide; tubercles present on clavus between claval veins Pcu and A₁, and between very basal part of stems Sc+R and M.

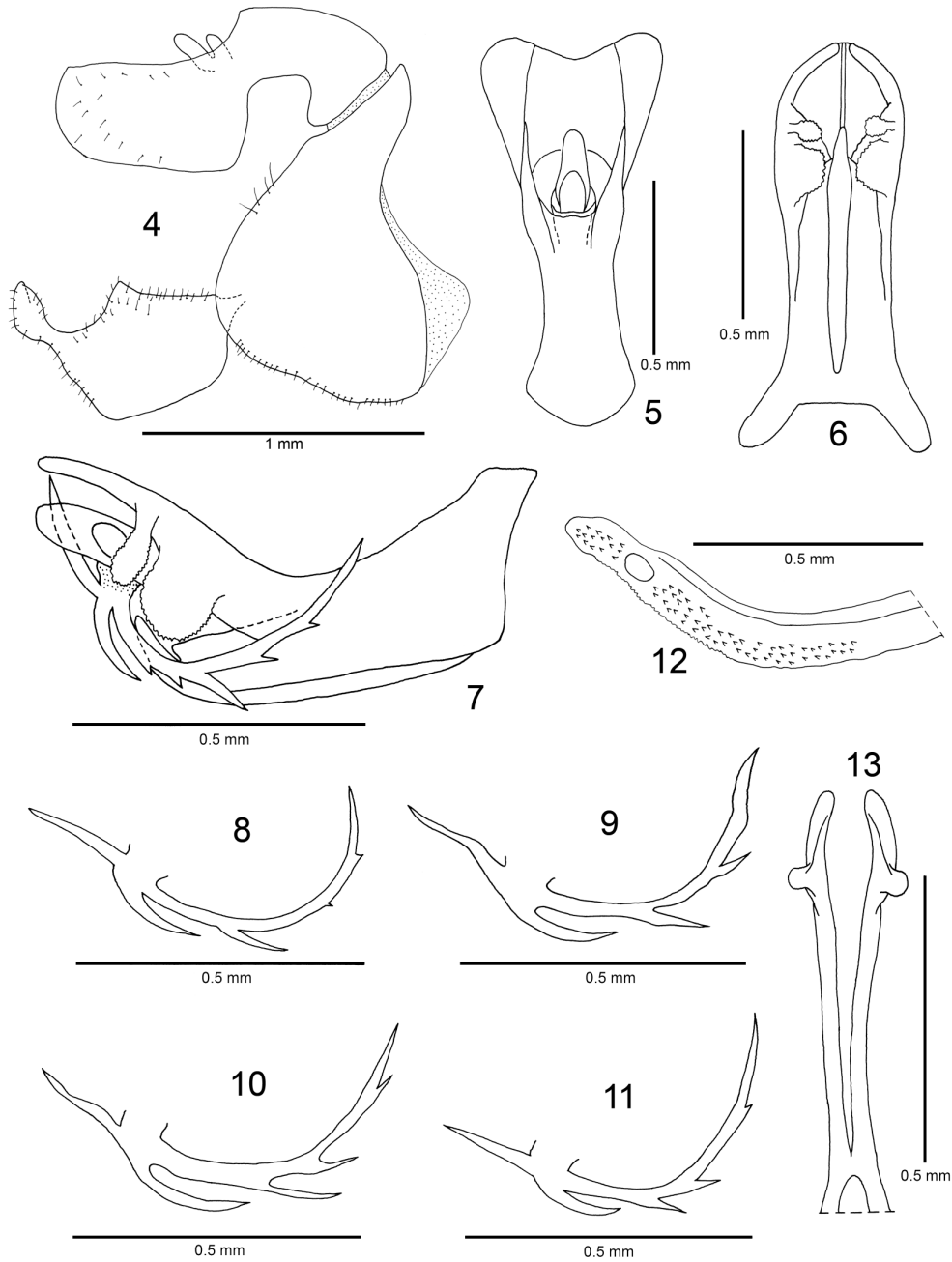
Fore femur about as long as tibia, middle femur little shorter than tibia, hind femur much shorter than tibia; hind tibia with 2 lateral, black topped spines in distal part and arcuate row of apical teeth in formula 2 (longer) + 5 (shorter); basitarsomere as long as cumulative length of second and hind tarsomeres, with row of small, black topped teeth, lateral teeth larger than internal ones.

Male. Anal tube (in lateral view, Fig. 4) elongate and massive; anterior (basal) part distinctly narrower than the posterior one; lower margin of basal part rectangularly incised, dorsal margin arcuate; apical part in lateral view subrectangular. Anus placed at the half of length. Anal tube (in dorsal view, Fig. 5) chalice-shaped, elongated; anterior margin arcuate, posterior margin shallowly concave.

Pygofer (in lateral view, Fig. 4) higher than wide; upper part distinctly narrower than the lower one, dorsal posterior angle without process; lower posterior margin strongly arcuate.

Genital styles (in lateral view, in direct observation, Fig. 4) longer than wide and bearing distinct capitulum at the end of dorsal margin; ventral margin almost straight, dorsal margin with triangular eminence and distinct concavity near the base of the capitulum; capitulum plate-like, distinctly narrower at the base, tapered apicad.

Phallic complex: Periandrium (in lateral view, Fig. 7) distinctly elongate and narrow; basal and apical part about the same width; dorsal margin in median part concave, ventral margin almost straight; lateral split reaching the half of the length of periandrium; dorsal part longer than ventral one, tapering apicad, with two lateral, ventrally oriented lobes with spiniferous margins: basal lobe distinctly visible, well sclerotized, about as long as wide (rectangular), apical one weakly visible, membranous, club-like; ventral part distinctly shorter than dorsal one with medially placed, elongate and narrow keel.



Figs 4-13. *Flatopsis medleri* sp. n., male. 4 – genital capsule, lateral view; 5 – anal tube, dorsal view; 6 – phallic complex, ventral view; 7 – same, lateral view; 8-11 – latero-ventral process of aedeagus, lateral view; 12 – aedeagus, lateral view; 13 – same, ventral view.

Apical part of upper periandrium (in ventral view, Fig. 6) divided into two narrow and elongate lobes connected by membrane.

Aedeagus s.s. (Figs 12-13): shaft as long as dorsal part of periandrium, weakly arcuate, with bluntly rounded apex, lateral side ornamented; its posterior part near the apex with lateral, well sclerotized, bulb-like, latero-basad appendage; latero-ventral process of aedeagus well sclerotized, with three arms: anterior arm single, almost straight and oriented apicad-dorsad, median and posterior ones curved and oriented dorso-basad: median arm shorter and single, posterior one longer, with 3-5 ventral teeth, as in Figs 8-11.

Female. Pregenital sternite (Fig. 14) with elongate and well developed lateral lobes. Anterior margin in median portion widely and deeply concave, posterior margin arcuate with two laterally placed eminences and incision in the median portion.

Anal tube (in lateral view, Fig. 16) oval; ventral margin strongly arcuate, posterior part bluntly rounded; anus placed little before the half of length; anal tube reaching the posterior margin of the gonoplac.

Anal tube (in dorsal view, Fig. 15) oval; anterior margin weakly concave, posterior margin in median portion with deep, narrow incision; anus placed before the half of length.

Gonoplac unilobate, rectangular (Fig. 17); posterior margin with two rows of well developed teeth – the internal row longer than the external one; membranous part placed under the teeth.

Gonapophysis VIII (in lateral view of the external side, Fig. 18) partly laterally flattened, with sharp apex and well visible 3-4 teeth placed apically; 3 parallel, short, vertical, serrated keels near the lower margin; endogonocoxal process narrow and elongated, tapering apicad.

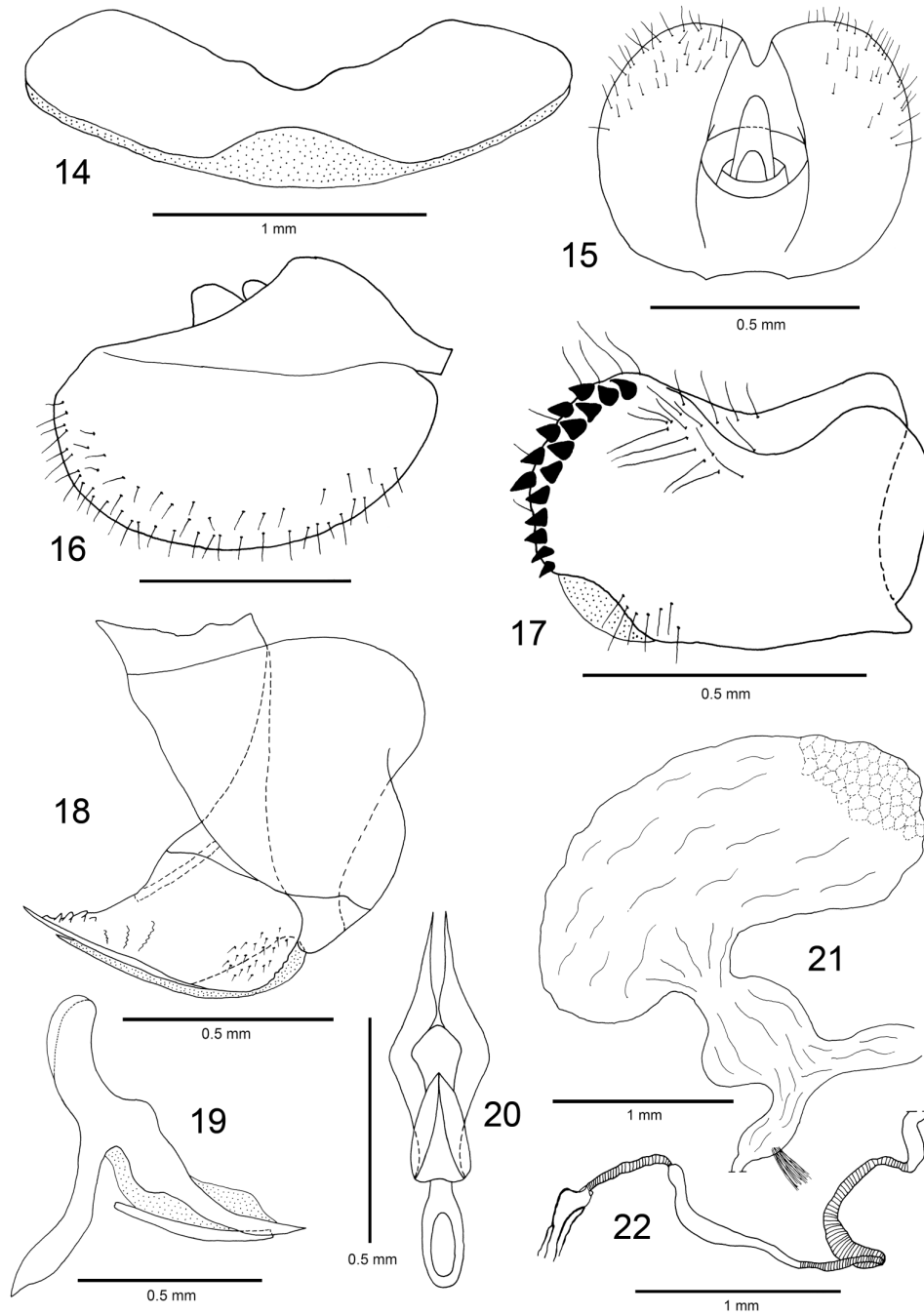
Gonospiculum as in Figs 19-20.

Bursa copulatrix (Fig. 21) of 1 chamber, bean-shaped; cells located only in its upper posterior part, weakly visible and without ornamentation. Spermatheca (Fig. 22) well developed; *ductus receptaculi* ribbed and widened in the distal part; *diverticulum ductus* a bit longer than *ductus receptaculi*, distal part (1/3 of length) ribbed, the rest smooth and widened.

Coloration (specimens after the storage in EtOH, Figs 1-3). Head, thorax and abdomen ochraceous, tegmina white or milky-white with pinkish tinge. Postclaval sutural margin cells light brown or brown. Apical cells slightly smoke coloured. Spot pattern slightly variable: 1 spot between Sc+R and RP, at their basal portion; single spot anterior of antero-cubital cell and 2-4 spots at antero-cubital cell; 3-5 spots in bisection line of posteroapical angle, single spot in anterior portion of nodal line.

Type material. Holotype ♂: [MADAGASCAR: Province, Fianarantsoa, 50 km S of Farafangana, Mahabo Mananivo, Ampitavananima Forest 10-15 June 2007] [23°7.79'S, 47°43.02'E, California Acad of Sciences coll: M. IRWIN, F. PARKER, R. HARIN'HALA elev 34 m malaise trap, in low altitude littoral rainforest, MG-35-22], [CASLOT 044599] – (CAS).

Paratypes (9♂♂, 18♀♀): [CASENT 8113285], [10-17 Feb 2007], [MG-35-05] – (1♀, MIZ); [CASENT 8113248], [24 Feb-3 March 2007], [MG-35-07] – (1♂, CAS); [CASENT 8113201], [3-10 March 2007], [MG-35-08] – (1♀, CAS); [CASENT 8113294], [14-21 April 2007], [MG-35-14] – (1♀, CAS); [CASENT 8113198], [17-24 March 2007], [MG-35-10] – (1♀, CAS); [CASENT 8113246], [24-31 March 2007], [MG-35-11] – (1♂,



Figs 14-22. *Flatopsis medleri* sp. n., female. 14 – pregenital sternite, flattened; 15 – anal tube, dorsal view; 16 – same, lateral view; 17 – gonoplac, internal view; 18 – gonapophysis VIII, external view; 19 – gonapophyses IX and gonospiculum bridge, lateral view; 20 – same, dorsal view; 21 – bursa copulatrix, lateral view; 22 – spermatheca.

CAS); [CASENT 8113295], [6-14 May 2007], [MG-35-17] – (1♂, CAS); [CASENT 8113297], [6-14 May 2007], [MG-35-17] – (1♀, CAS); [CASENT 8113268], [14-21 May 2007], [MG-35-18] – (1♀, CAS); [CASENT 8113256], [14-21 May 2007], [MG-35-18] – (1♀, CAS); [CASENT 8113277], [25 May-2 June 2007], [MG-35-20] – (1♂, MIZ); [CASENT 8113278], [25 May-2 June 2007], [MG-35-20] – (1♀, CAS); [CASENT 8113291], [25 May-2 June 2007], [MG-35-20] – (1♀, CAS); [CASENT 8113275], [2-10 June 2007], [MG-35-21] – (1♂, MIZ); [CASENT 8113280], [2-10 June 2007], [MG-35-21] – (1♂, CAS); [CASENT 8113282], [2-10 June 2007], [MG-35-21] – (1♀, CAS); [CASENT 8113287], [2-10 June 2007], [MG-35-21] – (1♀, MIZ); [CASLOT 044591], [1-7 July 2007], [MG-35-24] – (1♀, CAS); [CASLOT 044503], [7-14 July 2007], [MG-35-25] – (1♀, CAS); [CASLOT 044597], [23-27 July 2007], [MG-35-28] – (1♀, CAS); [CASLOT 044597], [23-28 July 2007], [MG-35-28] – (1♀, CAS); [CASLOT 044495], [3-11 Aug 2007], [MG-35-30] – (1♀, CAS); [CASLOT 044496] [27 Aug-6 Sept '07], [MG-35-32] – (2♂♂, CAS); [CASLOT 044508], [20-27 Sept 2007], [MG-35-35] – (1♀, CAS); [CASLOT 044598], [27 Sept-4 Oct '07], [MG-35-36] – (1♂, 1♀, CAS).

Four paratypes (2 males and 2 females) are deposited in the Museum and Institute of Zoology PAS, Warsaw.

Distribution. Madagascar – so far the species is known only from Ampitananima Forest near Mahabo Mananivo, in southeastern part of the island. The habitat of the species is low altitude littoral rainforest.

Acknowledgements. We would like to thank Dr Norman PENNY for the privilege of studying the flatid material from the entomological collection of the California Academy of Sciences in San Francisco (USA) and Dr Jacek SZWEDO (MIIZ PAS) for his valuable comments on the manuscript.

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