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LEMBAKARIA GEN. NOV. – A NEW GENUS OF SELIZINI FROM MADAGASCAR SPINY FOREST ECOREGION (HEMIPTERA: FULGOROMOPRHA: FLATIDAE)

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Abstract.— A new genus of flatid planthoppers (Hemiptera: Fulgoromorpha: Flatidae), *Lembakaria* **gen. nov.**, is described for *Lembakaria saintemariae* **sp. nov.** (type species) and *Lembakaria mikeae* **sp. nov.** from the island of Madagascar. Habitus, male and female external and internal genital structures of the new species are illustrated. *Lembakaria* is probably endemic to Madagascar where it is known to date, only from a southern part of the island and is confined to the vegetation of Spiny Forest Ecoregion.

Key words.— planthoppers, Fulgoroidea, Madagascar, taxonomy, morphology

INTRODUCTION

Madagascar has been designed as one of eight the most important global biodiversity hotspots due to its high number of island endemic species (Myers *et al*. 2000, Ganzhorn *et al*. 2001). Interestingly, 90% of them are associated with different types of forests (Dufils 2003), although this type of vegetation covered only 16% of the territory of Madagascar in 2005. Deforestation is attaining alarming proportions and is recognized as a major environmental problem, accelerating particularly in the southwest of the country (Blanc-Pamard 2009).

Flatidae constitutes the fifth largest family within planthoppers (Fulgoromorpha, Hemiptera) with 1439 species (10.5% of the Fulgoromorpha species) and 294 genera (12.2% of the Fulgoromorpha genera) covering two subfamilies: Flatinae Spinola, 1839 and Flatoidinae Melichar, 1901 (Bourgoin 2019). These phytophagous insects are found on all continents but are especially common and abundant in the tropics (O'Brien 2002), but with a latitudinal profile of specific richness largely shifted in the Northern Hemisphere (Bourgoin 2019). The Flatidae fauna of Madagascar includes, in total, 21 genera with 51 species of Flatinae and 11 genera with 37 species of Flatoidinae. In this paper, we describe an additional new genus of Flatidae including two new species occurring in the area of Spiny Forest Ecoregion in southern Madagascar.

MATERIAL AND METHODS

Material. The material studied comes from the collection of the California Academy of Sciences in San Francisco, USA (Dr N. Penny). Depositories of material are abbreviated as follows:

CAS – California Academy of Sciences, Department of Entomology, San Francisco (USA);
MIZ – Museum and Institute of Zoology PAS, Warszawa (Poland).

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Label information of all specimens examined is in square brackets and provided verbatim with each line separated by a slash (/).

Preparations and illustration. The abdomens of the specimens examined were removed and cleared for 30 minutes in warm (50°C) 10% KOH solution with a few drops of chlorazol black (CAS No. 1937–37–7) for dying the ectodermic structures 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 glycerol using a camera lucida attached to a light microscope. Photos were taken using a stereomicroscope Leica MZ 16 with digital camera IC 3D; final images were produced using Helicon Focus and Adobe Photoshop software. The SEM photographs of uncoated specimens were taken in the Laboratory of Scanning Microscopy, Museum and Institute of Zoology, Polish Academy of Sciences (Warsaw), using a scanning electron microscope HITACHI S-3400N under low vacuum conditions.

Measurements and abbreviations. Measurements were made with an ocular micrometer. The following measurements, ratios and their abbreviations were used in this study:

Total
length – length of specimen from head apex to tegmina apex (in dorsal view),
A/B – width of vertex / length of vertex at midline,
C/E – width of frons at upper margin / length of frons at midline,
D/E – maximum width of frons / length of frons at midline,
F/B – length of pronotum at midline / length of vertex at midline,
G/F – length of mesonotum / length of pronotum at midline,
G/B+F – length of mesonotum / cumulative length of vertex and pronotum at midline,
G/H – length of mesonotum at midline / width of mesonotum between lateral angles,
I/J – length of tegmen from the base to the posterior margin / width of tegmen at the widest part.

Terminology. The nomenclature of the forewing (tegmen) veins follows the standardized terminology of Bourgoin *et al.* (2015). Antennal structures are named in accordance with Stroiński *et al.* (2011). The terminology of the genitalia follows Bourgoin (1988) and Bourgoin and Huang (1990) for the male, and Bourgoin (1993) for the female.

The distribution map of the species was created using SimpleMappr (https://www.simplemappr.net).

Taxonomy

Class **Insecta** Linnaeus, 1758
Order **Hemiptera** Linnaeus, 1758
Suborder **Fulgoromorpha** Evans, 1946
Superfamily **Fulgoroidea** Latreille, 1810
Family **Flatidae** Spinola, 1839
Subfamily **Flatinae** Spinola, 1839
Tribe **Selizini** Distant, 1906

Lembakaria gen. nov.
(Figs 1–47, 49)

Type species. *Lembakaria saintemariae* sp. nov., here designated.

Etymology. The name of the genus is a combination of the words from the name "Lembalemba Karimbola" – the area (plateau) in southern part of Madagascar covering Cape Sainte Marie – *locus typicus* of the type species. Gender feminine.

Diagnosis. The new genus differs from the genus *Urana* Melichar, 1902, another representative of Madagascan Selizini (Stroiński and Świerczewski 2012), by the following characters: frons without median carina (frons with Y-shaped median carina in *Urana*), mesonotum without gibbosities (mesonotum with four gibbosities in *Urana*), costal margin sinuate before apex, postclaval sutural margin straight (costal margin not sinuate before apex, postclaval sutural margin convex in *Urana*), clavus with slightly elevated base of A_1 vein (clavus with strongly elevated base of A_1 vein in *Urana*).

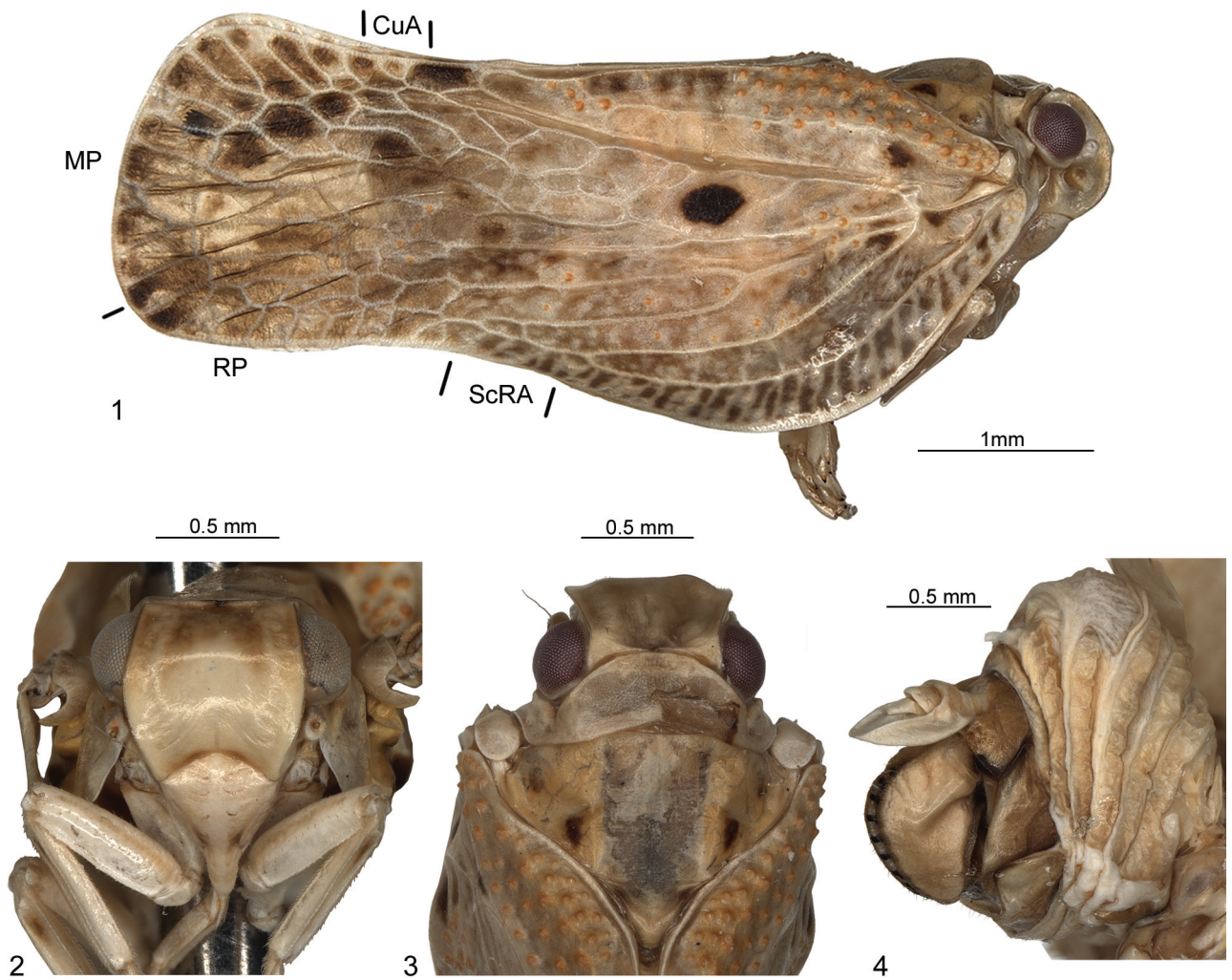
Description. **Head**. Head with compound eyes, in dorsal view, narrower than thorax (Fig. 3). Vertex transverse, in the shape of hourglass, with very narrow median portion, medially slightly overlapped by pronotum; lateral margins carinate and subparallel, anterior margin carinate, arcuate (Figs 3, 5). Frons convex, widest at its lower third in frontal view; lateral margins carinate, arcuate and elevated, without incisions; upper margin almost straight; disc of frons without carinae, laterally with ridges, median portion weakly concave; frontoclypeal suture strongly arcuate (Figs 2, 6, 7).

Clypeus smooth, weakly convex, without carinae (Figs 2, 7). Rostrum with apical segment shorter than subapical one, apex reaching between hind coxae (Fig. 2). Compound eyes oval, with narrow callus at posterior margin. Lateral ocelli present (Figs 1, 8, 9). Antenna inserted very close to medio-ventral margin of eye; scapus small, ring-like, without setae; pedicel shorter than diameter of eye but distinctly longer than scapus, bulbous, functional area at the top and on dorsal surface with trichoid sensilla type 1, antennal plate organs

present on apical concavity and basally delimiting lateral margins of dorsal functional surface (Figs 8–9, 17–20).

Thorax. Pronotum shorter than mesonotum at midline, in dorsal view; anterior margin arcuate, reaching the midlength of compound eyes, posterior margin slightly concave; pronotum disc wrinkled, without carinae, with lateral impressions and central pit; postocular eminences conical (Figs 3, 5, 9). Mesonotum with scutellum widely deltoid, wider than long at midline; disc of mesonotum medially with groove and ridges; lateral carinae as low ridges, reaching posterior margin; scutellum flat with acute, elevated apex (Figs 3, 5, 9).

Tegmina longer than wide, subrectangular, with distinct venation and numerous transverse veinlets, without nodal line and with single apical line; costal margin sinuate, costal and sutural angle rounded, postclaval sutural margin straight (Figs 1, 11–16). Costal area short, with dense transverse veinlets, ending before the level of fusion of claval veins. Costal cell about the same width as costal area, tapering apicad. Basal cell much longer than wide. Tegmen with longitudinal veins ScRA and RP arising as short common stem from basal cell at the level of bulla. Vein ScRA with fork distinctly after RP fork, ending on costal margin; vein RP with fork before MP fork, ending on costal margin; vein MP with fork distinctly basad to CuA fork, ending on apical and postclaval margins; CuA bifurcate after the apex of costal area, ending on postclaval margin. Apical cells subrectangular. Veins of apical half of tegmen wrinkled. Clavus in basal half elevated, posterior part concave; A_1 weakly elevated; Pcu and A_1 joined slightly anterior to clavus apex. Sensory and



Figures 1–4. *Lembakaria saintemariae* gen. et sp. nov. (1) Habitus, lateral view; (2) same, frontal view; (3) anterior part of body, dorsal view; (4) abdomen, female, lateral view.

wax gland-plates concentrated on bulla, basal part of clavus and costal area, with a few also scattered on the whole of tegmen (Figs 11–14).

Fore and middle femora slightly shorter than tibiae, subrectangular in cross section. Pro- and mesotibia with shallow groove on external side, a bit longer than pro- and mesofemur, respectively; apical tarsomere of both legs longer than cumulative length of second and basal tarsomeres. Metatibia longer than metafemur, triangular in cross section with two lateral spines and apical row of spines – first lateral spine placed subapically, second lateral spine placed a bit after midlength, apical spines with 2 longer (external) + 5 shorter (internal); basitarsomere of metatarsus a bit longer than cumulative length of second and apical tarsomeres, with apical spines lined as semicircle – 2 external spines a bit longer than 6 shorter internal spines; tarsomere with lateral spines and median pad with setae. Metatibiotarsal formula: 2-2+5/8/2.

Male terminalia. Anal tube, in lateral view, elongate, with breaking point just before anus, tapering apicad; anus placed midlength (Fig. 23); in dorsal view, anal tube elongate and ensiform, with rounded apex (Fig. 24). Pygofer, in lateral view, subrectangular with distinctly prolongate bluntly rounded antero-ventral angle; dorsal margin shorter than ventral margin, anterior margin sinuate, posterior margin almost straight (Fig. 23). Genital style ovoid, bearing short, hook-like capitulum with apex oriented anteriad (Fig. 23).

Phallic complex. Periandrium elongate, without any additional processes, about as long as aedeagus; lateral split reaching about three fourth of its length (Figs 26, 30).

Dorsal part of periandrium a bit shorter than ventral part, tapering apicad, bilobate, with deep split distinctly extending midlength; internal margins of both lobes with spiniferous microsculptures (Figs 25, 29). Ventral part of periandrium unilobate, with small triangular keel on ventral side (Figs 26, 30). Aedeagus, in lateral view, long and narrow, apically pointly acute with well-sclerotized, postero-lateral processes oriented basad (Figs 27, 31); in ventral view, with deep median split, reaching almost basal part (Figs 28, 32).

Female terminalia. Pregenital sternite with lateral lobes distinctly separated (Fig. 39). Anal tube, in lateral view, covering gonoplac and reaching its posterior margin (Fig. 33); in dorsal view, elongately oval (Figs 34, 41).

Gonoplac unilobate, triangular, oriented ventrad, covering gonapophysis VIII (Figs 33, 42); posterior margin with one row of stout teeth; single specimens in particular locations having teeth with the same structure but lined less densely (Figs 4, 37–38); teeth of both gonoplacs opposite positioned. Gonapophysis VIII widely triangular, flattened, slightly oblique in respect to longitudinal body axis (Fig. 43); endogonocoxal process as long as gonapophysis, wide, tapering apicad, with spiniferous microsculptures. Gonospiculum as in Figs 44–45. Bursa copulatrix with single pouch, kidney-shaped, cells with weakly sclerotized central areas (Fig. 46). Spermatheca well developed; *ductus receptaculi* shorter than *diverticulum ductus*, both parts smooth (Fig. 47). Tergites of abdomen membranous in median portion (Figs 35–36).

Distribution. Madagascar: Toliara province. Spiny Forest Ecoregion (Figs 48–49).

Lembakaria saintemarieae sp. nov.
(Figs 1–28, 33–47, 49)

Etymology. From the *locus typicus* of the species – Cape Sainte Marie (French: cap Sainte-Marie).

Diagnosis. The species differs from *Lembakaria mikeae* by the following characters: dorsal margin of ventral periandrium without triangular lobe (with triangular lobe in *L. mikeae*); lateral process of aedeagus with apical part not twisted ventrad (with apical part twisted ventrad in *L. mikeae*).

Description. Total length 5.5–6.25 mm.

Head. Vertex: ratio A/B = 11–12.50. Frons: ratio C/E = 0.88–1.25; D/E = 1.28–1.50.

Thorax. Pronotum: ratio F/B = 5.50–6.50. Mesonotum: ratio G/F = 3.92–4.17; G/B+F = 2.80–3.36; G/H = 0.76–0.91. Tegmina: I/J = 2.38–2.50.

Male terminalia. Dorsal margin of ventral periandrium smooth, without triangular lobe (Fig. 26); lateral process of aedeagus with apical part straight, not twisted ventrad (Fig. 27).

Female terminalia. Pregenital sternite with anterior margin in median portion almost straight, posterior margin medially deeply concave (Fig. 39). Anal tube with basal part wider than apical part, anus placed before midlength (Fig. 40); apical margin, in dorsal view, convex (Fig. 41). Gonoplac with narrow membranous part at ventral margin (Fig. 42). Gonapophysis VIII with subapical 4 massive teeth at dorsal margin (Fig. 43). *Ductus receptaculi* distally with elongate bulba, *diverticulum ductus* tubular (Fig. 47).

Coloration. Ochreous, mottled with dark brown to black markings on the whole tegmen, upper part of frons, lateral parts of mesonotum and scutellum; tubercles orange; abdominal sternites with white margins, teeth of gonoplac black (Figs 1–4).

Type material. Holotype, ♂: [CASENT 8107124] [MADAGASCAR: Tulear/ Province, Cap Ste Marie/ Special Reserve, el 37 m,/ 74 km S of Tsihombe, 25 Feb – 7 March 2003], [25°35.26'S, 45°09.78'E/ California Acad of Sciences/ colls: M. Irwin, F. Parker,/ R. Hain'Hala. malaise trap/ spiny bush MA-02-23-18], [HOLOTYPE]

[*Lembakaria saintemarieae* sp. nov./ det. D. Świerczewski & A. Stroiński] – (dry-mounted, abdomen dissected, terminalia in the vial pinned below the specimen, CAS); Paratypes (13♂♂, 39♀♀, 3 specimens without abdomen): **1a** – same locality as holotype: [CASENT 8107117], [25 Feb – 7 March 2003], [MA-02-23-18] – (1♀, CAS); [CASENT 8107126], [25 Feb – 7 March 2003], [MA-02-23-18] – (1♂, CAS); [CASENT 8107130], [20 – 30 April 2003], [MA-02-23-24] – (1♀, CAS); [CASENT 8107134], [30 April – 11 May 2003] [MA-02-23-29] – (1♂, CAS); [CASENT 8107145], [30 April – 11 May 2003], [MA-03-23-25] – (1♂, CAS); [CASENT 8107164], [10 – 14 June 2003], [MA-02-23-30] – (1♀, CAS); [CASENT 8107168], [13 – 20 July 2003], [MA-02-23-35] – (1♀, CAS); [CASENT 8107174], [10 – 20 August 2003], [MA-02-23-38] – (1♂, MIZ); [CASENT 8107178], [20 – 31 August 2003], [MA-02-23-39] – (1♀, CAS); [CASENT 8107180], [20 – 31 August 2003], [MA-02-23-39] – (1♀, CAS); [CASENT 8107185], [10 – 20 September 2003], [MA-02-23-41] – (1♀, CAS); [CASENT 8107186], [10 – 20 September 2003], [MA-02-23-41] – (1♀, CAS); [CASENT 8107190], [15 – 23 November 2003], [MA-02-23-48] – (1♀, CAS); [CASENT 8107191], [30 Nov – 10 Dec 2003] [MA-02-23-50] – (1♀, CAS). **1b** – [CASENT 8107195], [MADAGASCAR: Tulear/ Province, Cap Ste Marie/ Special Reserve, el 150m,/ 74 km S of Tsihombe/ 10 – 20 August 2003] [25°35.26'S, 45°09.78'E/ California Acad of Sciences/ coll: M. Irwin, R. Harin'Hala/ malaise trap in bush MA-23A-08] – (1♀, CAS); [CASENT 8107198], [20 – 31 August 2003], [MA-02-23A-09] – (1♀, MIZ); [CASENT 8107200], [20 – 28 September 2003], [MA-02-23A-12] – (1♀, CAS); [CASENT 8107204], [28 Sept – 8 Oct 2003], [MA-02-23A-13] – (1♀, CAS). **1c** – [CASENT 3004624], [MADAGASCAR: Toliara/ Prov., Réserve Spéciale de/ Cap Sainte Marie,/ 12.3 km 262°W Marovato/ elev 200m 11-15 Feb 2002], [25°34'54"S 45°10'6"E/ coll: Fisher, Griswold et al./ California Acad. of Sciences/ malaise trap - in spiny forest/ thicket, code: BLF5504] – (1♀, CAS).

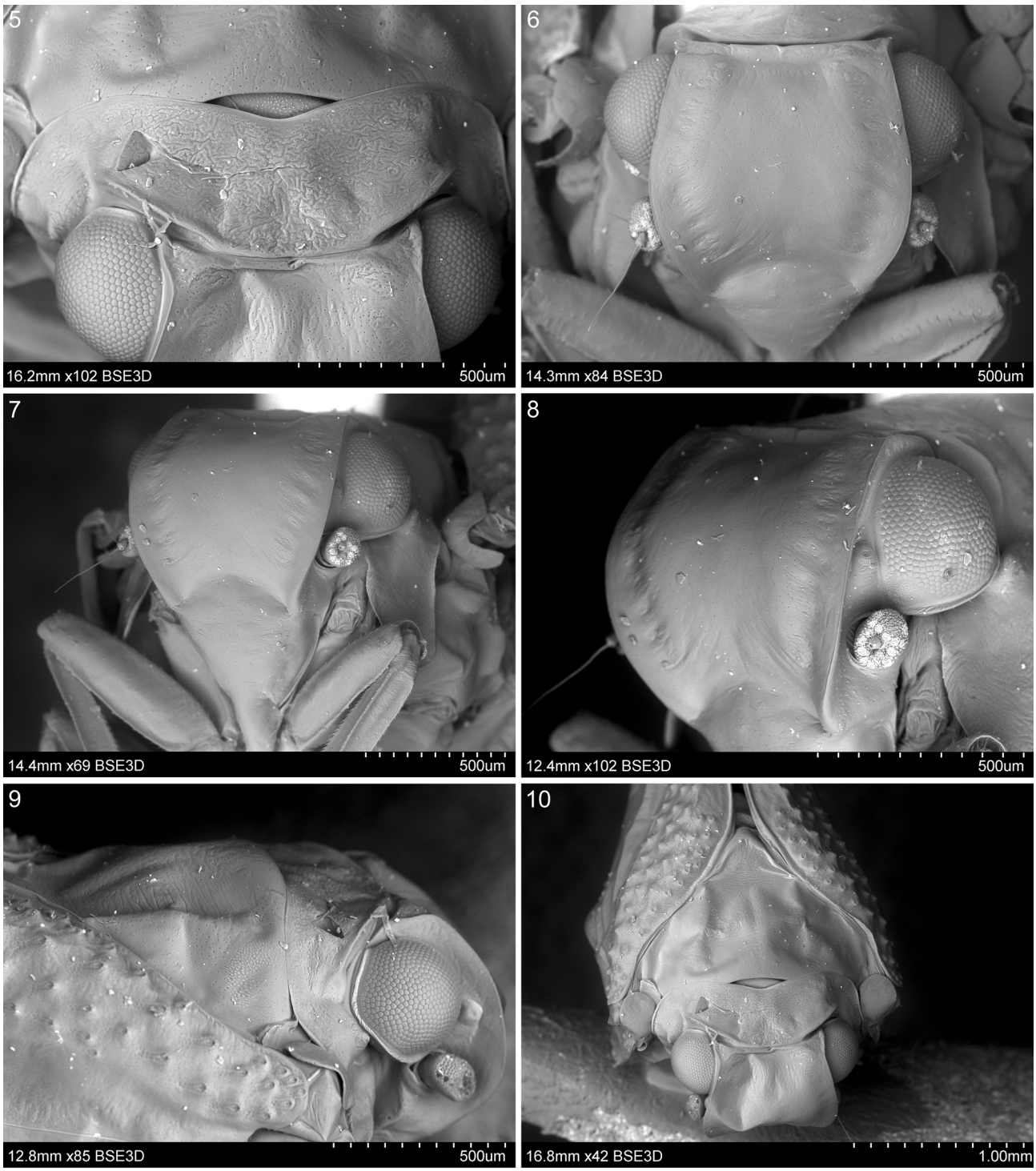
2 – [CASLOT 044441], [MADAGASCAR: Tulear/ Province, Beza Mahafaly/ Reserve, Parcelle I near/ research station/ 10 – 21 November 2001, 23°41.19'S, 44°35.46'E], [California Acad of Sciences/ colls: ME Irwin, FD Parker,/ R. Harin'Hala, malaise/ trap in dry deciduous forest/ elev 165 m, MA-02-14A-02] – (1♀, CAS); [CASLOT 044682], [10 – 21 November 2001], [MA-02-14A-02] – (1♀, CAS); [CASLOT 044529], [4 – 11 December 2001], [MA-02-14A-05] – (1♀, MIZ); [CASLOT 044728], [18 – 28 July 2002], [MA-02-14A 30] – (1♂, CAS); [CASLOT 044437], [28 Oct – 10 Nov 2002], [MA-02-14A-39] – (1♂, CAS); [CASLOT 044667], [22 Nov – 2 Dec 2002], [MA-02-14A-41] – (1♀, CAS); [CASLOT 044667], [22 Nov – 2 Dec 2002], [MA-02-14A-41] – (1ex. without abdomen, CAS); [CASLOT 044667], [22 Nov – 2 Dec 2002], [MA-02-14A-41] – (1♀, CAS); [CASLOT 044443], [24 Dec 2002 – 2 Jan 2003], [MA-02-14A-46] – (1♂, CAS); [CASLOT 044466], [2 – 9 January 2003], [MA-02-14A-17] – (1♀, CAS); [CASLOT 044687], [23 March – 2 April 2003], [MA-02-14A-54] – (1♂, CAS); [CASLOT 044588], [24 May – 1 June 2003], [MA-02-14A-61] – (1♀, CAS); [CASLOT 044448], [1 – 15 June 2003], [MA-02-14A-62] – (1♀, CAS).

3 – [CASENT 8082588], [MADAGASCAR: Tulear/ Province, Andohahela Nat'l/ Park, Tsimelahy, Parcelle II/ 24°56.21'S, 46°37.60' E, 6 – 16 January 2003], [California Acad of Sciences/ colls: M. Irwin, F. Parker,/ R. Harin'Hala, el 180 m/ malaise trap in transitional/ forest], [MA-02-20-12] – (1♀, CAS); [CASENT 8082395], [16 – 17 December 2002], [MA-02-20-09] – (1ex. without abdomen, CAS); [CASLOT 044735], [29 June – 10 July 2003], [MA-02-20-31] – (1♀, CAS); [CASLOT 044735], [29 June – 10 July 2003], [MA-02-20-31] – (1♀, CAS); [CASENT 8108680], [1 – 11 October 2003], [MA-02-20-41] – (1♀, CAS); [CASLOT 044733], [1 – 11 October 2003], [MA-02-20-41] – (1♀, CAS); [CASLOT 044733], [1 – 11 October 2003], [MA-02-20-41] – (1♀, CAS); [CASLOT 044702], [30 Oct – 9 Nov 2003], [MA-02-20-44] – (1♀, CAS); [CASLOT 044734], [30 Nov – 11 Dec 2003], [MA-02-20-47] – (1♀, CAS); [CASENT 8078652], [21 – 23 December 2003], [MA-02-20-49] – (1♂, MIZ); [CASENT 8078655], [21 – 23 December 2003], [MA-02-20-49] – (1♂, CAS); [CASENT 8078656], [21 – 23 December 2003], [MA-02-20-49] – (1♂, CAS); [CASENT 8078658], [21 – 23 December 2003], [MA-02-20-49] – (1♀, CAS); [CASLOT 044770], [21 – 23 December 2003], [MA-02-20-49] – (1ex. without abdomen, CAS); [CASENT 8078631], [January 15 – 28 2004], [MA-02-20-52] – (1♀, CAS).

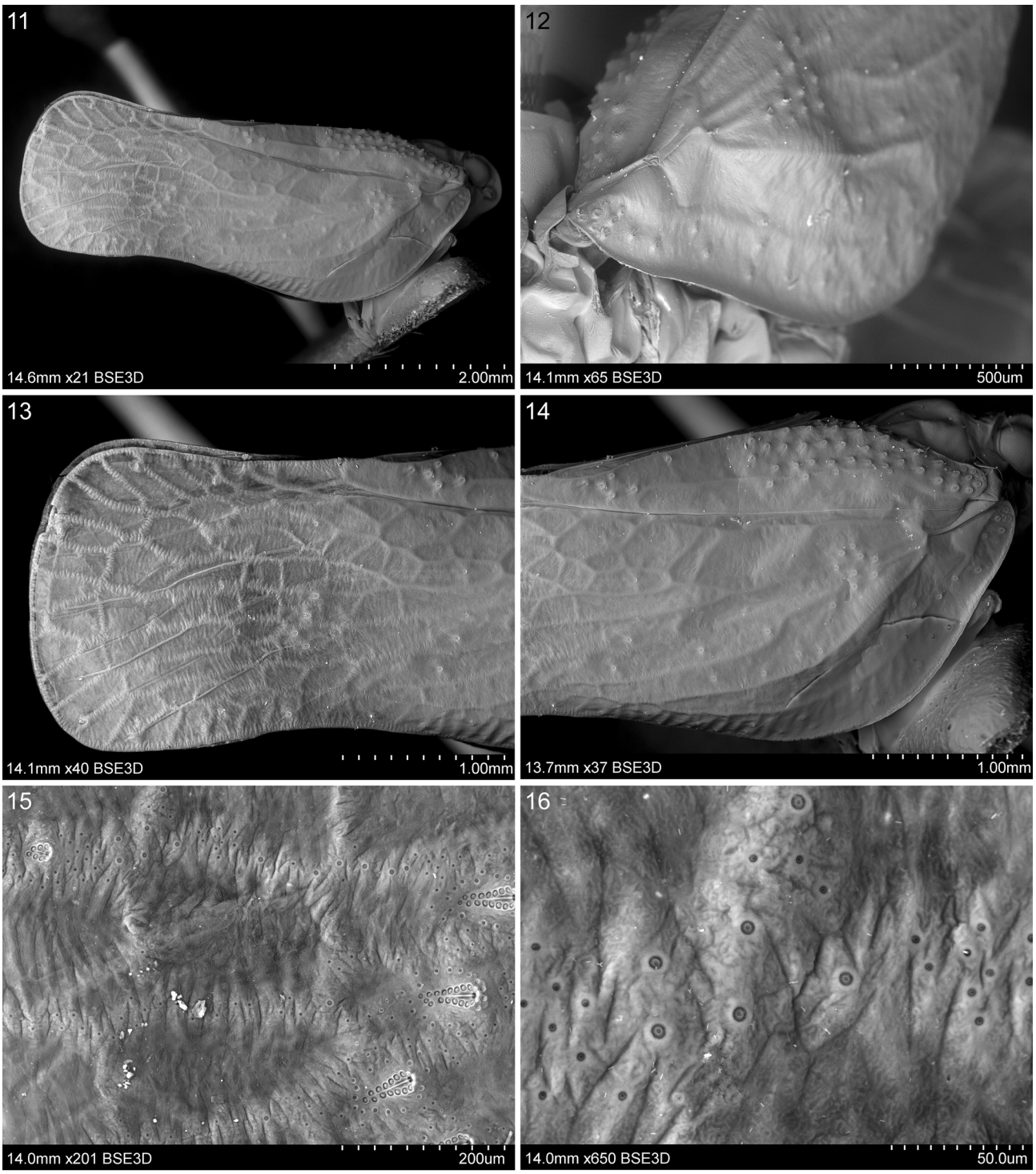
4 – [CASENT 8107012], [MADAGASCAR: Tulear/ Province, Andohahela Nat'l/ Park, Ihazofotsy Parcelle III/ 24°49.85'S, 46°32.17'E/ 15 – 26 January 2003], [California Acad of Sciences/ colls, M. Irwin, F. Parker,/ R. Harin'Hala. elev 80 m/ malaise trap - in dry spiny/ forest, MA-02-21-07] – (1♀, CAS); [CASENT 8107021], [13 – 24 February 2003], [MA-02-21-10] – (1♂, CAS); [CASENT 8107024], [24 Feb – 6 March 2003], [MA-02-21-11] – (1♀, CAS); [CASENT 8107034], [21 – 28 April 2003], [MA-02-21-16] – (1♀, CAS); [CASENT 8107032], [21 – 28 April 2003], [MA-02-21-16] – (1♀, CAS); [CASENT 8107041], [13 – 20 May 2003], [MA-02-21-19] – (1♂, CAS); [CASENT 8107065], [26 Oct – 2 Nov 2003] [MA-02-21-36] – (1♀, CAS).

5 – [CASENT 3004594], [MADAGASCAR: Toliara/ Prov., Mahafaly Plateau,/ 6.2 km 74°ENE Itampolo/ 24° 39'13"S 43°59'48"E/ elev 80m, 21-25 Feb 2002], [coll: Fisher, Griswold et al./ Calif. Acad. of Sciences/ malaise trap – spiny forest/ thicket, code: BLF5759] – (1♀, CAS).

Distribution and habitat. Madagascar: Toliara province. The species occurs in southern and southwestern part of the island, confined to spiny forest and its transitional variations.

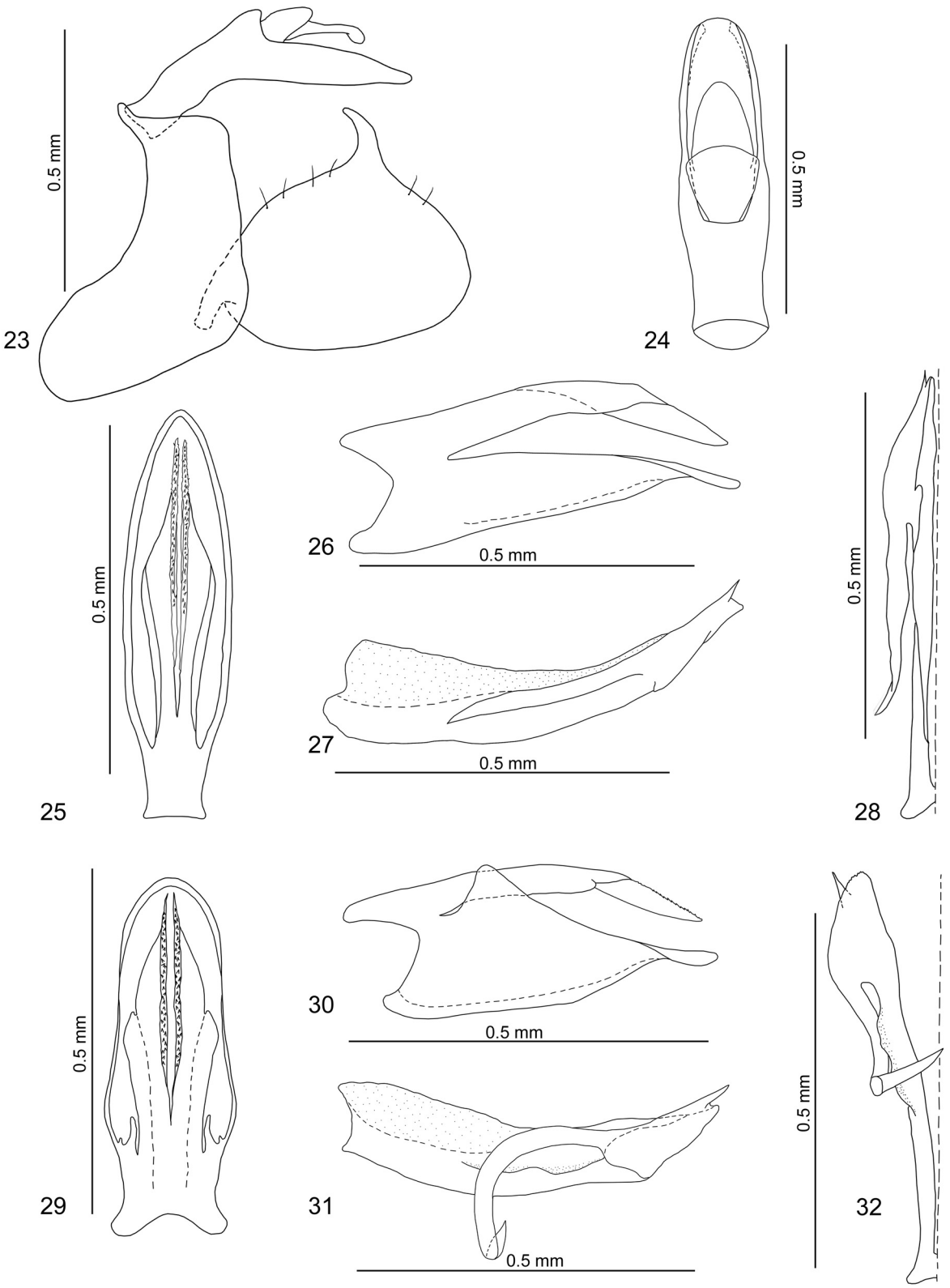


Figures 5–10. *Lembakaria saintemariae* gen. et sp. nov., SEM photographs. (5) Head and thorax, fronto-dorsal view; (6) head, frontal view; (7–8) same, fronto-lateral view; (9) anterior part of body, dorso-lateral view; (10) same, fronto-dorsal view.

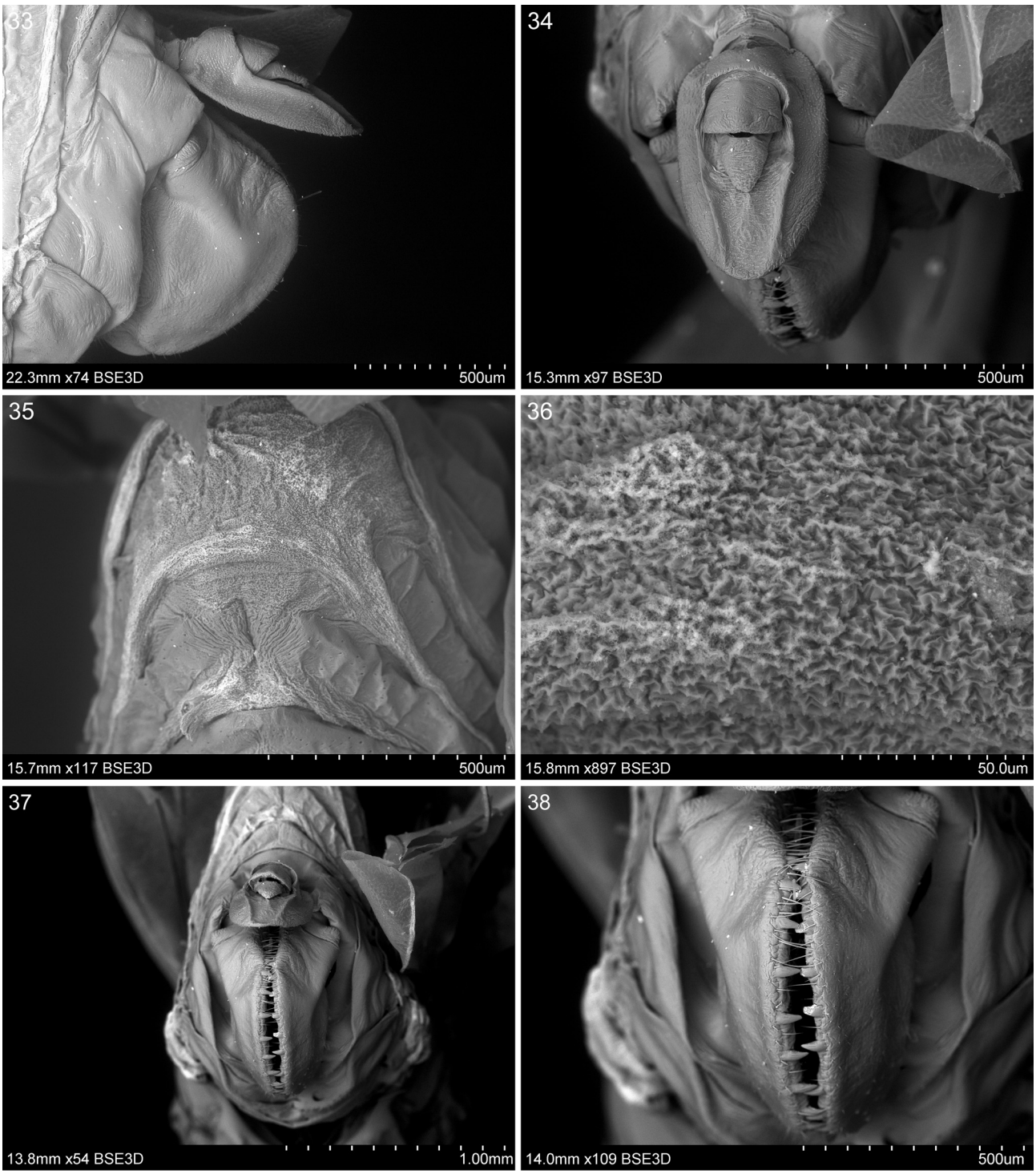


Figures 11–16. *Lembakaria saintemariae* gen. et sp. nov., SEM photographs. (11) Tegmen, lateral view; (12) same, basal part, fronto-dorsal view; (13) same, apical half, lateral view; (14) same, basal half, lateral view; (15–16) same, veins of apical half.

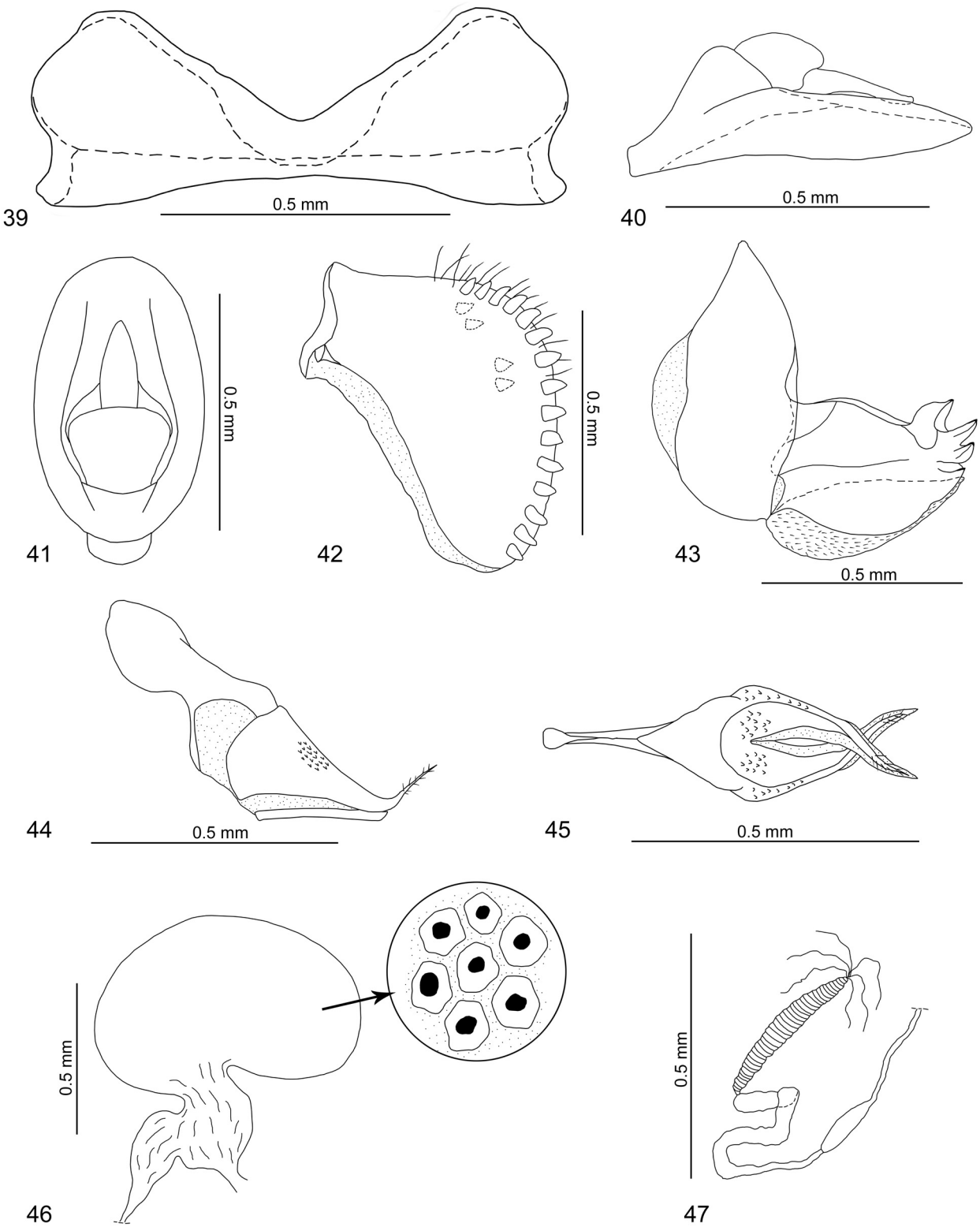
Figures 17–22. *Lembakaria saintemariae* gen. et sp. nov., SEM photographs. (17–20) Antenna; (21–22) apical part of metatibia and metatarsus, internal view.



Figures 23–32. *Lembakaria* gen. nov., male, drawings. *Lembakaria saintemariae* gen. et sp. nov. (23) Terminalia, lateral view; (24) anal tube, dorsal view; (25) periandrium, dorsal view; (26) same, lateral view; (27) aedeagus, lateral view; (28) aedeagus, ventral view. *Lembakaria mikeae* gen. et sp. nov. (29) periandrium, dorsal view; (30) periandrium, lateral view; (31) aedeagus, lateral view; (32) aedeagus, ventral view.



Figures 33–38. *Lembakaria saintemariae* gen. et sp. nov., female, SEM photographs. (33) Terminalia, lateral view; (34) same, postero-dorsal view; (35–36) membranous part of tergites; (37–38) gonoplac, anterior view.



Figures 39–47. *Lembakaria saintemariae* gen. et sp. nov., female, drawings. (39) Pregenital sternite, flattened, ventral view; (40) anal tube, lateral view; (41) same, dorsal view; (42) gonoplac, lateral view, external side; (43) gonapophysis VIII, lateral view, external side; (44) gonapophyses IX and gonospiculum bridge, lateral view; (45) same, dorsal view; (46) bursa copulatrix with cells, lateral view; (47) spermatheca.

Lembakaria mikeae sp. nov.
(Figs 29–32, 49)

Etymology. From the *locus typicus* of the species – Mikea Forest.

Diagnosis. The species differs from *Lombakaria saintemariae* by the following characters: dorsal margin of ventral periandrium with triangular lobe (without triangular lobe in *L. saintemariae*); lateral process of aedeagus with apical part twisted ventrad (lateral process of aedeagus with apical part straight, not twisted ventrad in *L. saintemariae*).

Description. Total length – 5 mm.

Head. Vertex: ratio A/B = 10.00. Frons: ratio C/E = 1.27; D/E = 1.67.

Thorax. Pronotum: ratio F/B = 4.50. Mesonotum: ratio G/F = 4.22; G/B+F = 3.45; G/H = 0.95. Tegmina: I/J = 2.37.

Male terminalia. Dorsal margin of ventral periandrium with triangular lobe (Fig. 30); lateral process of aedeagus with apical part twisted ventrad (Fig. 31).

Female terminalia. Female unknown.

Coloration. Similar to that of *L. saintemariae*.

Type material. Holotype, ♂: [CASLOT 044698], [MADAGASCAR: Tulear/ Province, Mikea Forest,/ NW of Manombo, el 30 m,/ 14 – 28 November 2002], [22° 54.22'S, 43°28.53'E/ coll: M. Irwin, R. Harin'Hala/California Acad of Sciences/ malaise trap – in deciduous/ dry forest MA-02-18A-40], [HOLOTYPE], [*Lembakaria mikeae* sp. nov./ det. D. Świerczewski & A. Stroiński] – (dry-mounted, abdomen dissected, terminalia in the vial pinned below the specimen, CAS).

Distribution and habitat. Madagascar: Toliara province. The species occurs in the area of spiny forest known as Mikea Forest in south-western Madagascar.

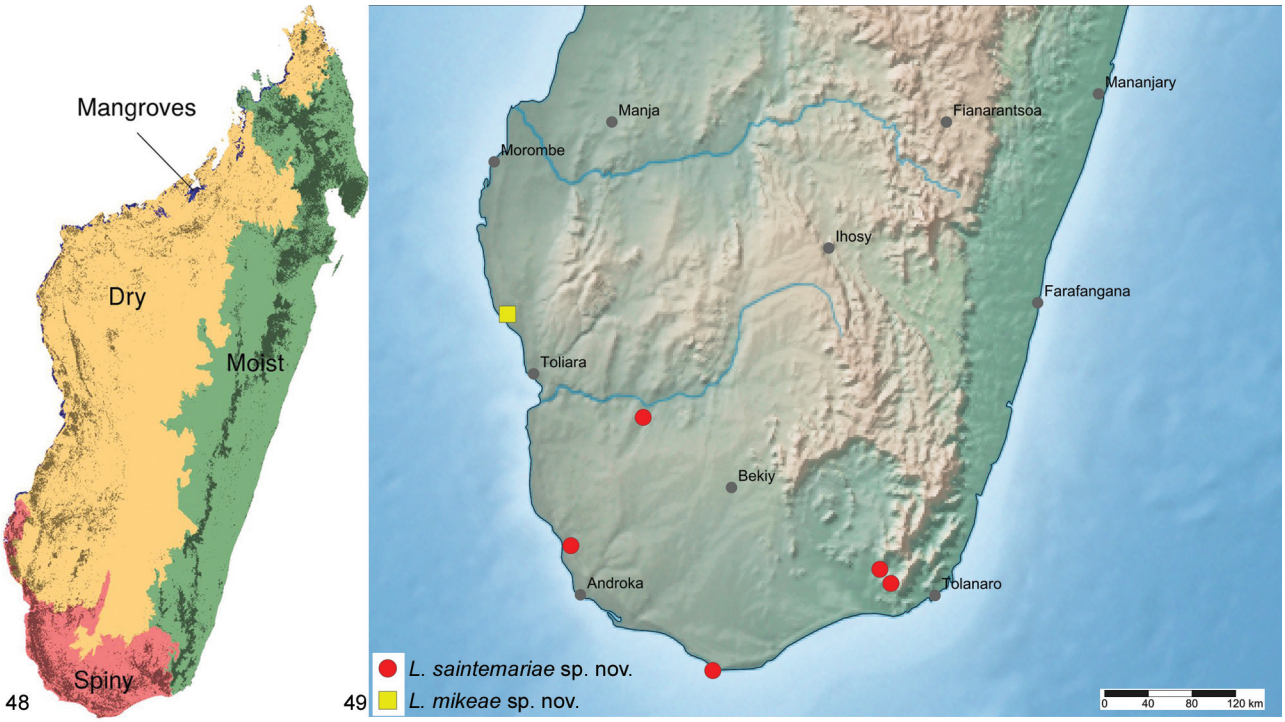
Discussion

The associations between Flatidae as phytophagous hemipterans and vegetational formations they inhabit have been poorly investigated so far. However, our previous research show that there are strong relations of Flatinae with particular Madagascar floral assemblages. *Flatopsis medleri* Świerczewski et Stroiński, 2011 and *Latois nigrofasciata* Świerczewski et Stroiński, 2012 are two species characteristic for littoral forests. Representatives of the following genera are linked to high altitude mountain rainforest: *Urana* Melichar, 1902, *Peyrierasus* Stroiński et Świerczewski, 2013, *Sogalabana* Stroiński et Świerczewski, 2014 and *Griveaudus* Stroiński et Świerczewski, 2014. Moreover, *Phlebopterum tapiae* Świerczewski et Stroiński, 2012 is confined to central and southern Madagascar and is associated with an endemic and endangered formation known as tapia woodlands, whereas another species *Phlebopterum planicapitis* Świerczewski et Stroiński, 2017 prefers mainly coastal mangroves and riverside vegetation. Finally, in this paper we associate another genus *Lembakaria* gen. nov. with dry spiny forest formations of Madagascar.

The first species *Lembakaria saintemariae* sp. nov. is distributed within south and south-western Madagascar known as Spiny Forest Ecoregion (Fig. 48). This area covers three vegetational formations (Moat and Smith 2007): 1) southwestern dry spiny forest-thicket covering an area of 15 491 km^2; it is found along the west to the south coast of Madagascar and is dominated by the members of the family Didiereaceae together with species of *Euphorbia*, 2) degraded southwestern dry spiny forest covering an area of 9 255 km^2; the physiognomy of this vegetation type depends on local rainfall and substrate conditions and can take different forms, from patchy forests to bushland and low scrub formations, 3) southwestern coastal bushland covering an area of 1 762 km^2; it occurs along the south coast and forms open stands (40% canopy cover) of 3–7 m in height.

Dry forests have generally been considered one of the most intact of Madagascar's climax vegetation types and accordingly, have received little conservation effort (Seddon *et al*. 2000). On the other hand, they play an important socio-economic role in western Madagascar, providing building materials, firewood, medicinal plants, grazing habitat for cattle, and land reserves for future agricultural expansion (Waeber *et al*. 2015). All factors mentioned above led to the alarming loss of the vegetation cover, with observed deforestation rates in spiny and dry forests between the years 2000 and 2005 at 1.11% and 0.42% per year, respectively, as compared to 0.35% for rainforests (Brinkmann *et al*. 2014).

The second species *Lembakaria mikeae* sp. nov. is described from the area known as Mikea Forest – one of the most important areas of dry forests zone in Madagascar. It is a unique place between the Manombo and Fiharenana rivers, supporting remarkably diverse flora and fauna (Seddon et al. 2000). Originally, Mikea Forest formed a coastal strip of 30–60 km wide and 200 km long at 0–200 m a.s.l. The climate is dry, tropical and stochastic, with 100–1300 mm of rainfall per annum. Rainfall increases northwards and eastwards, which together with heterogeneous geology, may reflect variations in vegetation structure. The vegetation can be defined as a complex mosaic, but predominantly represents a dense, highly xerophytic flora with a maximum height of 6 m towards the coast and 8–12 m further inland. The canopy is formed by woody euphorbias and baobabs, the mid and lower strata are dominated by a variety of lianas and numerous Euphorbiaceae and leguminous plants. The Mikea



Figures 48–49. (48) Ecoregions of Madagascar after Vieilledent *et al.* (2018); (49) *Lembakaria* gen. nov., distribution map.

Forest harbours a relatively rich fauna, including 98 bird species with 2 monotypic genera restricted entirely to this area and 49 reptile species, with many extremely poorly known and locally endemic taxa.

Summarizing, to better understand how the unique wildlife of Madagascar was formed, we need wide studies on the insect fauna of the island especially in the aspect of its association with poorly known and endangered ecosystems. This would lead to more effective conservation practices in respect to current levels of habitat degradation and continued high rates of deforestation.

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