

# REDESCRIPTION OF THE GENUS *LAMBERTONIA* LALLEMAND, 1950 (HEMIPTERA: FULGOROMORPHA: RICANIIDAE) FROM MADAGASCAR

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**Abstract.**— The monotypic genus of ricaniid planthoppers (Hemiptera: Fulgoromorpha: Ricaniidae), *Lambertonia* Lallemand, 1950 (type species – *L. insignis* Lallemand, 1950) is redescribed and illustrated for the first time. Habitus, female external and internal genital structures are described and illustrated.



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

## INTRODUCTION

Sixty species of Ricaniidae, belonging to 15 genera, have been recorded from Madagascar so far (Metcalf 1955; Synave 1956, 1966, Stroiński *et al.* 2011, Bourgoin 2020). However, taking into account unpublished data (Stroiński, unpublished) the fauna of the island is weakly known and need more detailed studies including revisions of all known taxa and descriptions many new additional ones for science (Stroiński, in prep.). The present paper is the second in a series on Ricaniidae that aims to described the whole fauna of Madagascar.

The monotypic genus *Lambertonia* was described by Lallemand in 1950 for *L. insignis* based on single female specimen. The species has never been illustrated and fully described.

It was shortly mentioned by Synave in his paper „Ricaniidae de Madagascar” (Synave 1956), and recorded in the “General Catalogue of Homoptera – Ricaniidae” (Metcalf 1955). This unique specimen was placed in the list of the type material deposited in the Royal Belgian Institute of Natural Sciences by Synave (1972).

The lack of morphological illustrations and a comprehensive description based on additional specimens

led to consider the genus and its monospecific species as enigmatic taxa. The purpose of this paper is to disclose some additional morphological and ethological data about this mythic species.

## MATERIAL AND METHODS

Dry pinned specimens were used for this study.

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

Terminology. The nomenclature of fore wing (tegmen) follows the interpretation proposed by Bourgoin *et al.* (2015) and Stroiński (2020). 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 abdomen of the examined specimen was cut off and cleared for 30 min in a warm (50°C) 10% KOH solution with a few drops of black chlorazol (CAS No. 1937-37-7) for staining the ectodermic genital structures, based on the method introduced by Carayon (1969). Dissections and cleaning of the genital structures were carried out in distilled water. Final observations were

made in glycerol using an Olympus stereoscope microscope (SZH10). The photographs of the habitus and internal structures were taken using a stereoscopic microscope Leica MZ 16 with IC3D camera. Final images were adjusted using the Helicon 5.0 software and Adobe Photoshop.

The SEM photographs of uncoated specimens were taken in the Laboratory of Scanning Microscopy, MIZ PAS (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 – measured (in dorsal view) from head apex to tegmina apex;

A/B – width of vertex measured at anterior margin / length of vertex measured 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 measured from the base to the apical margin in median portion / width of tegmen measured at the widest part.

The material studied comes from the entomological collection of Royal Belgian Institute of Natural Sciences, Brussels, Belgium (RBINS).

## TAXONOMY

*Lambertonia* Lallemand, 1950  
(Figs 1–58, Maps 1–2)

*Lambertonia* Lallemand, 1950: 90.

*Lambertonia*: Metcalf 1955; Synave 1966, 1972.

**Diagnosis.** The genus *Lambertonia* Lallemand, 1950 can be distinguished from other Madagascan genera by the following characters: frontal carinae separated at base; mesonotal carinae (median, lateral and anterolateral) present; tegmen translucent with 2 lines of transverse veinlets and nodal line, all longitudinal veins leaving basal cell separately and forking before nodal line; transverse veinlets on tegmen, except for lines, absent; hind tibiae with single lateral spine, posterior margin of gonoplac in female with single row of teeth.

**Type species.** *Lambertonia insignis* Lallemand, 1950, by monotypy.

**Type locality.** Maroantsetra (Analanjirofo Region: Maroantsetra District).

**Distribution.** Madagascar (Maps 1–2).

**Description.** Head with compound eyes (in dorsal view) as wide as mesonotum at level of lateral angles.

Vertex (Figs 3, 5, 7, 9–11, 14–18) transverse, without median carina, distinctly wider than long at midline, all margins well carinated.

Frons (Figs 3, 12, 15–19) with all margins well carinated; at upper margin narrower than high at midline, at widest place of frons a bit wider than long at midline; lateral margins in median portion flattened from middle of compound eyes to frontoclypeal suture; lateral margins covering base of pedicel, not incised near level of ocelli. Frontal disc with 3 carinae; all carinae distinctly separated basally, surpassing half of disc, ending at same level before frontoclypeal suture, separating the frontal disc in 4 subequal longitudinal bands.

Compound eyes with small callus at posterior margin. Ocelli present.

Antennae (Figs 20–25): pedicel cylindrical widening apically, with functional area (trichoid sensilla type 1 and antennal plate organs at top and on tip of frontal side; plate organs of crenellated type with U-shaped ridges (Stroiński *et al.* 2011) surrounded by a ring of elevated spines.

Clypeus (Figs 12, 18–19) distinctly narrower than frons, with median carina. Rostrum with apical segment distinctly shorter than subapical one; ending slightly before metacoxae.

Thorax: pronotum (Figs 14–17) distinctly longer than vertex at midline; disc of pronotum with median carina and two lateral impressions; median portion of anterior margin surpassing half of length of compound eyes (in dorsal view), median portion of posterior margin extending to level of compound eyes (in dorsal view).

Mesonotum (Figs 3, 5, 7, 9–10, 14–16) elongated, diamond shape, distinctly longer at midline than combined length of vertex and pronotum; median, lateral and antero-lateral carinae present; median carina and lateral carinae connected basally by common stem; median carina reaching scutellum, lateral carinae reaching posterior margin; anterolateral carinae connected with lateral carinae slightly after lateral angles; lateral angles placed before midlength of mesonotum.

Tegmina (Figs 1–3, 7–10, 30–35) membranous, elongately rounded, flattened, with distinct venation and without transverse veinlets, except for nodal and transverse lines.

Costal margin weakly arcuate, apical angle distinctly broadly rounded, placed distad to claval angle; claval angle widely rounded, after the end of clavus; posterior margin arcuate; tornus absent.

Costal area with dense transverse veinlets ending slightly before level of tip of clavus, about as wide as costal cell.

Costal cell narrower than costal area, without transverse veinlets.

Basal cell elongately rounded, about 1.5 times longer than wide.

Longitudinal veins ScP+R, MP and CuA leaving basal cell separately; all first forks of longitudinal veins placed distinctly before half of tegmen and before nodal line; veins ScP+R and RP arising as long common stem from basal cell with first fork after MP first fork but before CuA first fork; fork RP<sub>1+2</sub> fused at short distance with ScP+R vein at the level of first fork ScP+R; both forks of MP<sub>1+2</sub> and MP<sub>3+4</sub> at same level on nodal line; CuA with dichotomic model of forking.

Tegmina with 2 lines of transverse veinlets and nodal line; apical and subapical cells longer than wide, apical one distinctly shorter than subapical; arcuate nodal line present, formed by longitudinal veins and transverse veinlets.

Cubital cell without transverse veinlets. Clavus closed; claval veins Pcu and A<sub>1</sub> fused at about midlength of CuP vein; posterocubital cell at basal part with single transverse veinlet, posterior part of posterocubital cell with 1–2 transverse veinlets; postcubital cell without transverse veinlets.

Hind wings with precostal cell present; ScP+R and MP forking distinctly after midlength of wing; first fork ScP+RA before first fork of MP; CuA forking distinctly before ScP+R and MP fork, a bit after half of wing; *rpm*, *mp*<sub>3+4</sub>-*cua* transverse veinlets present in distal part of wing.

Pro- and mesofemur slightly shorter than pro- and mesotibia. Hing legs (Figs 26–29): metatibia distinctly longer than metafemur, partly flattened and widened at distal part; metatibia with one subdistal lateral spine (just before apical row of teeth); apical row of teeth of metatibia with 7 (2+5) well developed spines different in size and without diastema; lateral spines different in size: lateral external one bigger than lateral internal one; external spine not bigger than internal ones; 5 internal spines different in size; basitarsomere of metatarsus about as long as cumulative length of second and apical tarsomeres, with fully developed row of 9 (2+7) apical teeth: 2 lateral teeth equal in size and bigger than internal ones, internal teeth about equal in size; 6 teeth bearing strong seta; mesotarsomere with strong setae on ventral side.

Male. Unkown.

Female terminalia (Figs 36–58). Pregenital sternite with well-developed with distinctly separated lateral lobes; posterior margin medially with wide double peaks processes (Figs 32–41, 44–45, 49, 52).

Anal tube (in lateral view, Figs 38–40, 48) not reaching posterior margin of gonoplac; anal tube (in dorsal

view, Figs 36–37, 50–51) ovoid, wider medially; anal opening placed about midlength; paraproct (anal style) and epiproct short.

Gonoplacs (38–39, 42–43, 46–49, 54) well developed, unilobate, laterally flattened; posterior margin of the gonoplacs with single row of strong teeth; membranous part of gonoplac placed basally on ventral margin.

Gonapophysis VIII (Fig. 53) sabre-like, “v” shape in cross section, with teeth at dorsal and apical margins; apex blunt; endogonocoxal process tapering apicad, as long as gonapophysis VIII, with median sclerotized core surrounded by membranous part.

Gonapophyses IX and gonospiculum bridge well developed (Figs 55–56).

*Bursa copulatrix* of two pouches connected by short ductus; first pouch elongate, with cells and sclerotized ornamentation, except for dorsal side (Fig. 57); second pouch slightly smaller than first one, elongate, with cells and sclerotized plates (Fig. 58). Spermatheca well developed; *ductus receptaculi* elongate and narrow, smooth; *diverticulum ductus* about as long as *ductus receptaculi*, with long narrow smooth ductus, apically with ovoid and smooth bulla.

### *Lambertonia insignis* Lallemand, 1950 (Figs 1–58, Maps 1–2)

*Lambertonia insignis* Lallemand, 1950: 91.

*Lambertonia insignis*: Metcalf 1955; Synave 1966, 1972.

**Description.** Total length 1.00–1.10 cm.

Vertex: proportion A/B = 7.00–7.60; anterior margin arcuate; lateral margins almost straight and parallel; posterior margin arcuate with major curvature, elevated. Frons: proportion C/E = 0.89–0.9; proportion D/E = 1.05–1.09. Pronotum: proportion F/B = 2.00; anterior margin slightly arcuate or almost straight, posterior margin arcuate with major curvature. Mesonotum: proportion G/F+B = 5.00–5.33, proportion G/F = 7.50–8.00, proportion G/H = 1.15–1.20. Tegmina: proportion I/J = 1.37–1.45.

Coloration (Figs 1–5, 7–12, 48–50). Vertex yellow; frons yellow with 2 distinctly and symmetrical, vertical black bands; lateral part of head yellow; clypeus dark brown to black with yellow patch near the frontoclypeal suture; pronotum yellow with 2 subparallel longitudinal brown bands in median portion, lateral lobes with dark brown patch; mesonotum black with 3 yellow longitudinal bands: alongside median carina, alongside anterolateral carinae and alongside lateral angles; scutellum yellow.

Tegmina translucent with longitudinal veins bicoloured – yellow and brown; in holotype specimen costal area transparent with brown patch medially and dark brown apex, in second specimen costal area dark brown to black except for yellow base; tegmen with

2 brown stripes alongside nodal line, apical and sub-apical transverse veinlets; clavus with 2 brown patches – one small near base a bigger one medially; anal and postanal cells dark brown to black. Hind wing transparent with brown narrow band alongside posterior margin. Pro- and mesofemur and pro- and mesotibia yellow; metafemur laterally brown, metatibia yellow. Abdomen (females): sternites black with yellow latero-median part, basal sternites brown; posterior sternites yellow; pregenital sternite yellow with black area on lateral lobes, gonoplac yellow with black area alongside posterior margin; anal tube brown.

**Type material.** Holotype, ♀: [*Maroantsetra / Madagascar*], [*Lambertonia / insignis* Lall / V. Lallemand det.:], [TYPE], [R. I. Sc. N. B. / I. G.18.380], [Holotype], [*Lambertonia / insignis. / Lallemand.*] – deposited in RBINS.

**Additional material.** [Coll. R. I. Sc. N. B. / Madagascar / Forêt de Sianaka / ex coll. Le Moul], [*Lambertonia / insignis* Lall., 1950 / det. A. Stroiński 2020] – ♀ dissected, genitalia in a vial under the specimen, deposited in RBINS.

**Remarks.** Locality (area) Forêt de Sianaka also known as "Sihanaka Forest" is located around coordinates -18.23129° 48.54968°.

**Distribution.** Madagascar (Maps 1–2): Analanjirofo Region: Maroantsetra District: Maroantsetra; Alaotra-Mangoro Region: Ambatondrazaka District: area around coordinates -18.23129° 48.54968°.

## DISCUSSION

The known localities only two representatives of the genus *Lambertonia* suggest that the main habitat of the genus is the evergreen humid forest, located in the eastern part of Madagascar (Map 1).

Other recent studies of Madagascar planthoppers have shown that Flatidae seem to be strongly associated with particular plant assemblages such as *Phleboterum tapiae* (Świerczewski and Stroiński 2012) with tapia woodlands, *Flatopsis medleri* (Świerczewski and Stroiński 2011) and *Latois nigrofasciata* (Świerczewski and Stroiński 2012) with littoral forests. *Lembakaria* (Świerczewski and Stroiński 2019), which seem occurring exclusively in spiny forests. Such strong association with particular vegetation ecosystems of Madagascar might be correlated with vegetation ecosystem fragmentation of Madagascar and need to be better documented, particularly for Ricaniidae (Stroiński, in prep.).

Unfortunately, up to date the species is known exclusively from two localities and two specimens, which are both females. The record of additional individuals, especially males, would enrich our knowledge on this interesting and rarely collected taxon. However

this lack of data clearly supports indeed the need for more research and fieldwork.

## ACKNOWLEDGEMENTS

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## REFERENCES

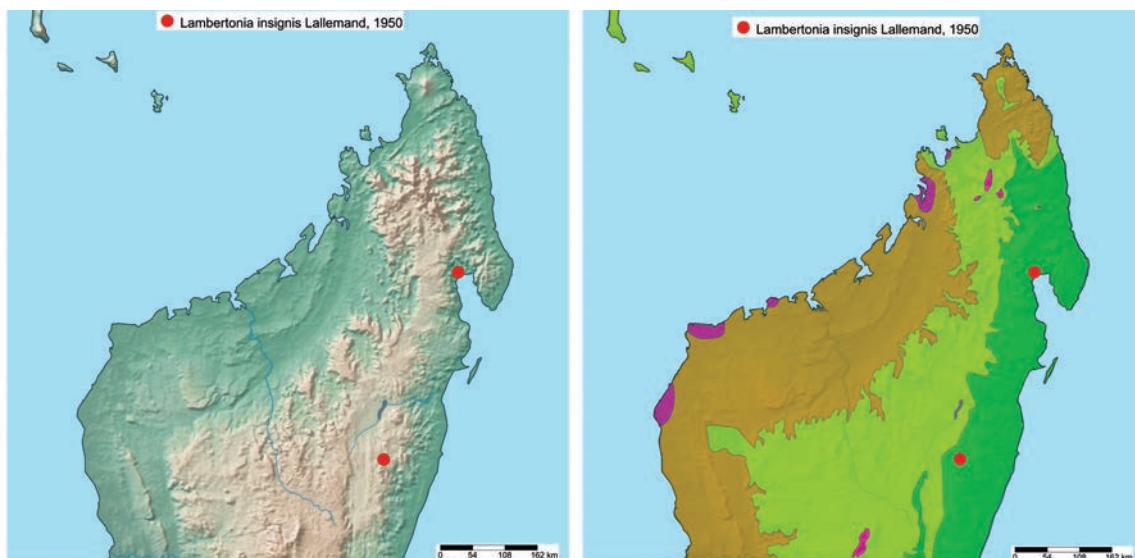
- Amyot, C.J.-B. and J. G. Audinet-Serville. 1843. Deuxième partie. Homoptères. Homoptera Latr. Histoire Naturelle des insectes. Hemiptères, 1843: 1–676.
- Bourgoïn, T. 1993. Female genitalia in Hemiptera Fulgoromorpha morphological and phylogenetic data. Annales de la Société entomologique de France, 29(3): 225–244.
- Bourgoïn, T. 2020. FLOW (Fulgoromorpha Lists On the Web): a world knowledge base dedicated to Fulgoromorpha. Version 8, updated 2020-09-17. Last access 2020-09-21. Available from: <http://hemiptera-databases.org/flow/>.
- Bourgoïn, T. and J. Huang. 1990. Morphologie comparée des genitalia mâles des Trypetimorphini et remarques phylogénétiques (Hemiptera: Fulgoromorpha: Tropicuchidae). Annales de la Société entomologique de France, Nouvelle Série, 26(4): 555–564.
- Bourgoïn, T., Wang, R.-R., Asche, M., Hoch, H., Soulier-Perkins, A., Stroiński, A., Yap, S. and J. Szwedo. 2015. From micropterism to hyperpterism: recognition strategy and standardized homology-driven terminology of the forewing venation patterns in planthoppers (Hemiptera: Fulgoromorpha). Zoomorphology, 134: 63–77. <http://dx.doi.org/10.1007/s00435-014-0243-6>.
- Carayon, J. 1969. Emploi du noir chlorazol en anatomie microscopique des insectes. Annales de la Société entomologique de France, Nouvelle Série, 5, 179–193.
- Lallemand, V. 1950. Contribution à l'étude des Homopteres de Madagascar. Mémoires de l'Institut des Sciences de Madagascar, Ser. A, 4(1): 83–96.
- Metcalf, Z. P. 1955. Ricaniidae. Fascicle IV, Part 16. General Catalogue of the Homoptera: pp. 1–199.
- Shorthouse, D. P. 2010. SimpleMapp, an online tool to produce publication-quality point maps. [Retrieved from <http://www.simplemapp.net>. Accessed October 25, 2020].
- Stroiński, A. 2020. *Hagneia kallea* gen. and sp. nov. (Hemiptera: Fulgoromorpha: Ricaniidae) from North Vietnam. Zootaxa, 4861(2): 241–256. <https://doi.org/10.11646/zootaxa.4861.2.5>.
- Stroiński, A., Gnezdilov, V. and T. Bourgoïn. 2011. Subbrachypterous Ricaniidae (Hemiptera: Fulgoromorpha) of Madagascar with morphological notes for these taxa. Zootaxa, 3145(1): 1–70. <https://doi.org/10.11646/zootaxa.3145.1.1>.

- Synave, H. 1956. Les Ricaniidae de Madagascar (Hemiptera-Homoptera). Mémoires de l'Institut scientifique de Madagascar, Ser. E., 7: 219–242.
- Synave, H. 1966. Homoptères de Madagascar. Families: Cercopidae, Cixiidae, Meenoplidae, Dictyopharidae, Tropiduchidae, Flatidae, Ricaniidae. Verhandlungen der Naturforschenden Gesellschaft in Basel, 77(1): 55–75.
- Synave, H. 1972. Liste du matériel typique conservé dans les collections entomologiques de l'Institut royal des sciences naturelles de Belgique. Homoptera: 4-10. Meenoplidae, Kinnaridae, Dictyopharidae, Fulgoridae, Achilidae, Tropiduchidae et Nogodinidae. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Entomologie, 48(11): 1–28.
- Świerczewski, D. and A. Stroiński. 2011. *Flatopsis medleri* sp. n. – a new flatid species from Madagascar (Hemiptera: Fulgoromorpha: Flatidae). Acta zoologica cracoviensia, 54B(1–2): 23–30.
- Świerczewski, D. and A. Stroiński. 2012. A new species of *Phleboterum* Stål, 1854 (Hemiptera: Fulgoromorpha: Flatidae) from the tapia woodlands of Madagascar. Annales Zoologici, 62(4): 577–592.
- Świerczewski, D. and A. Stroiński. 2012. A new species of the genus *Latois* Stål, 1866 from Madagascar (Hemiptera: Fulgoromorpha: Flatidae). Acta zoologica cracoviensia, 55(1): 65–77.
- Świerczewski, D. and A. Stroiński. 2019. *Lembakaria* gen. nov. – a new genus of Selizini from Madagascar spiny forest ecoregion (Hemiptera: Fulgoromorpha: Flatidae). Annales Zoologici, 69(3): 575–588.

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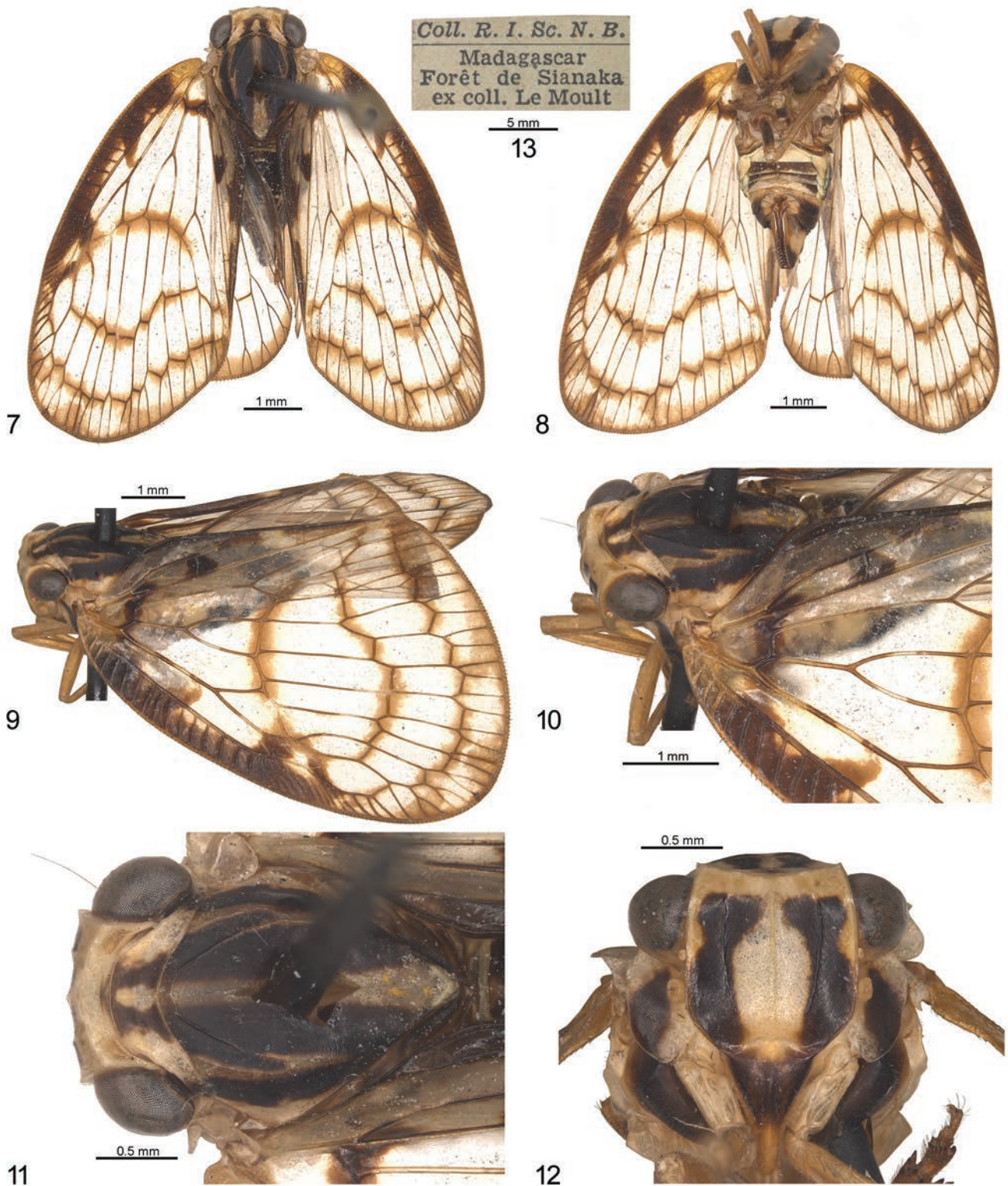
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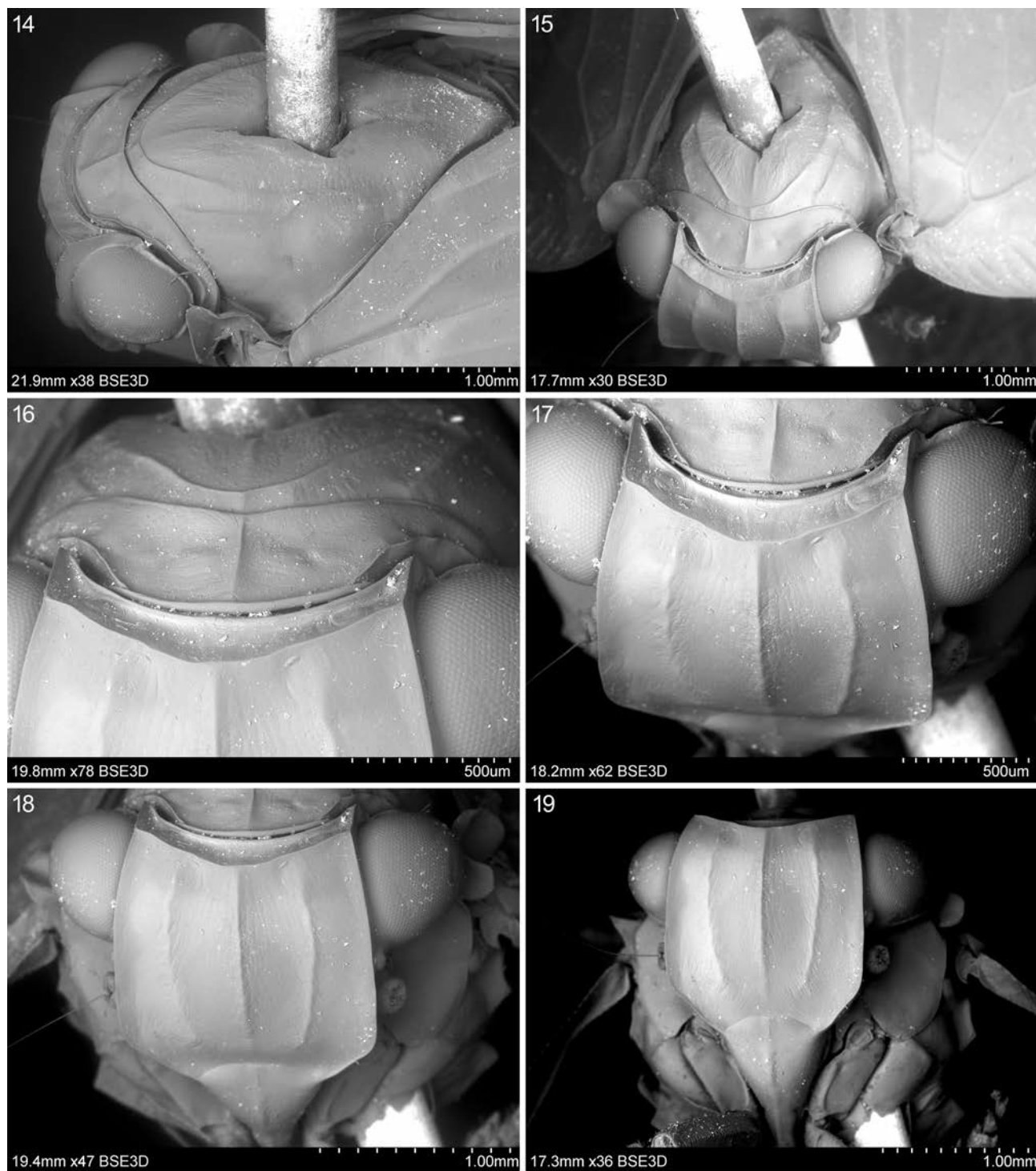
Maps 1–2. *Lambertonia insignis* Lallemand, 1950, distribution map. (1) Physical map; (2) ecoregions of Madagascar.



Figures 1–6. *Lambertonia insignis* Lallemand, 1950; holotype, female. (1) Habitus, left side, lateral view; (2) habitus, right side, lateral view; (3) habitus, dorsal view; (4) head, frontal view; (5) head and thorax, dorsal view; (6) labels.

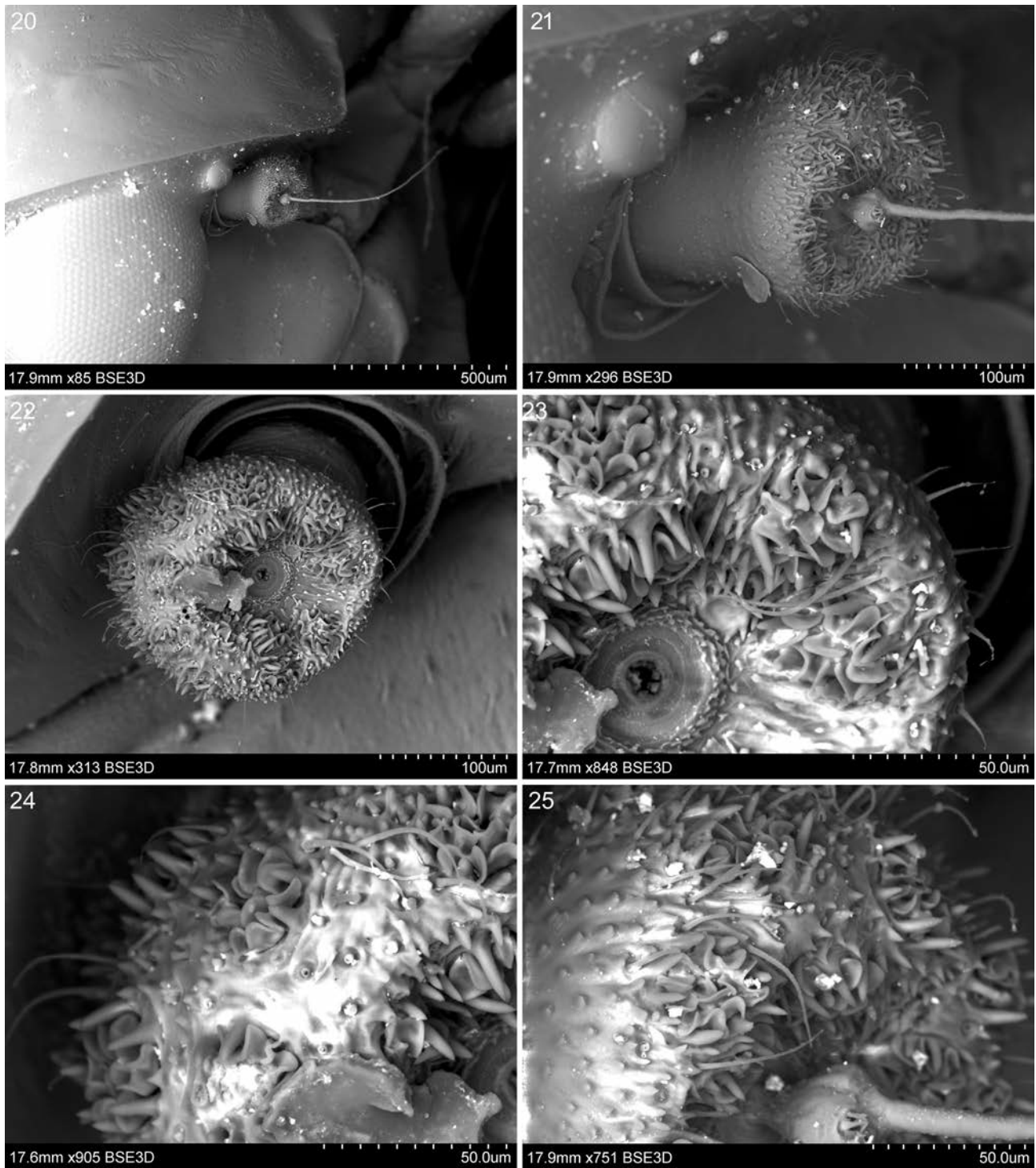


Figures 7–13. *Lambertonia insignis* Lallemand, 1950; specimen from Sianaka. (7) Habitus, dorsal view; (8) same, dorsal view; (9) habitus, lateral view; (10) anterior part of body, lateral view; (11) head, frontal view; (12) head and thorax, dorsal view; (13) labels

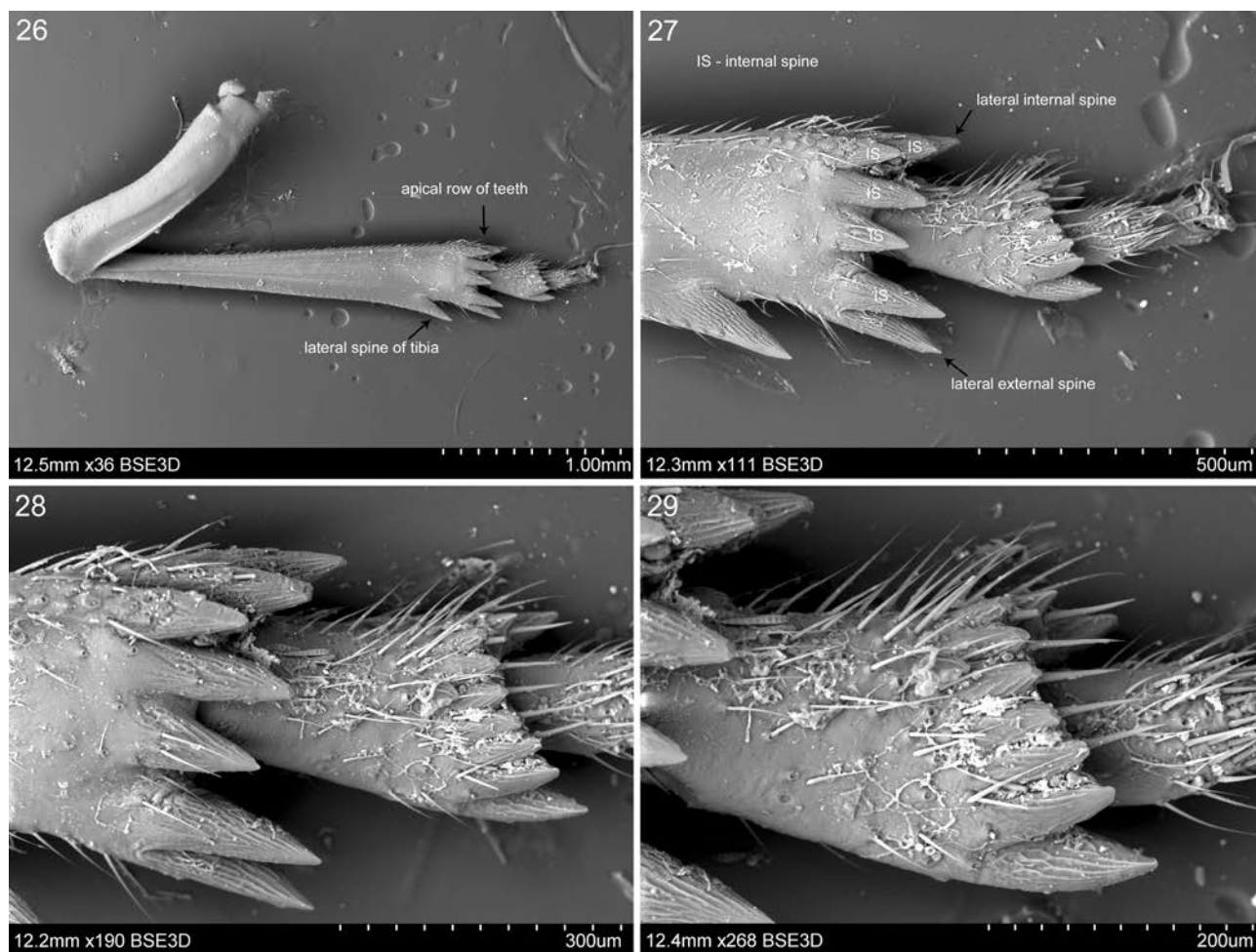


Figures 14–19. *Lambertonia insignis* Lallemand, 1950, SEM photographs. (14) Anterior part of body, dorso-lateral view; (15) same, fronto-dorsal view; (16) vertex and pronotum, fronto-dorsal view; (17) frons and vertex, fronto-dorsal view; (18–19) head, frontal view

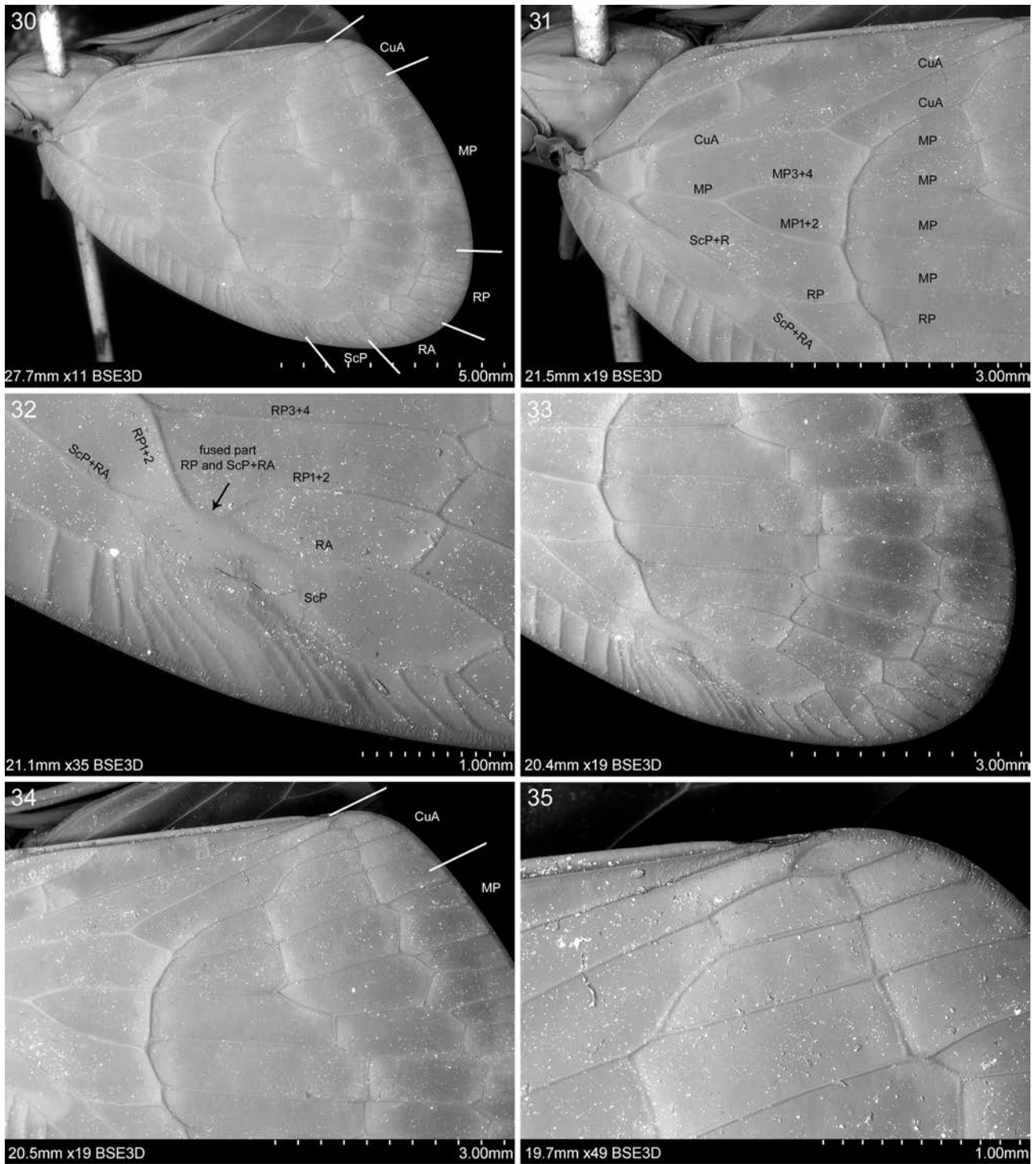




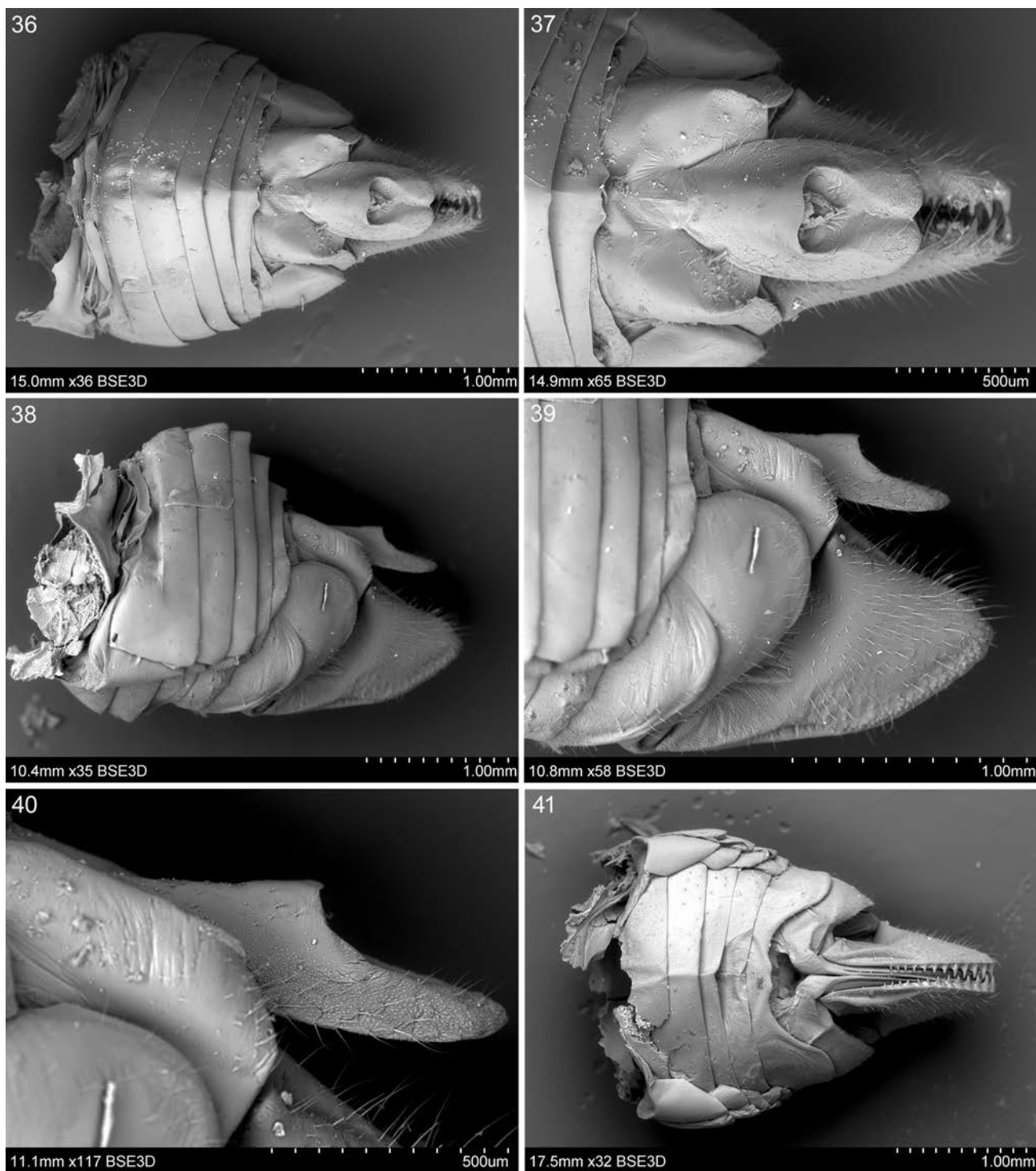
Figures 20–25. *Lambertonia insignis* Lallemand, 1950, antenna, SEM photographs. (20–21) Antenna, dorsal view; (22) apical part, frontal view; (23–25) functional area (trichoid sensilla and antennal plate organs)



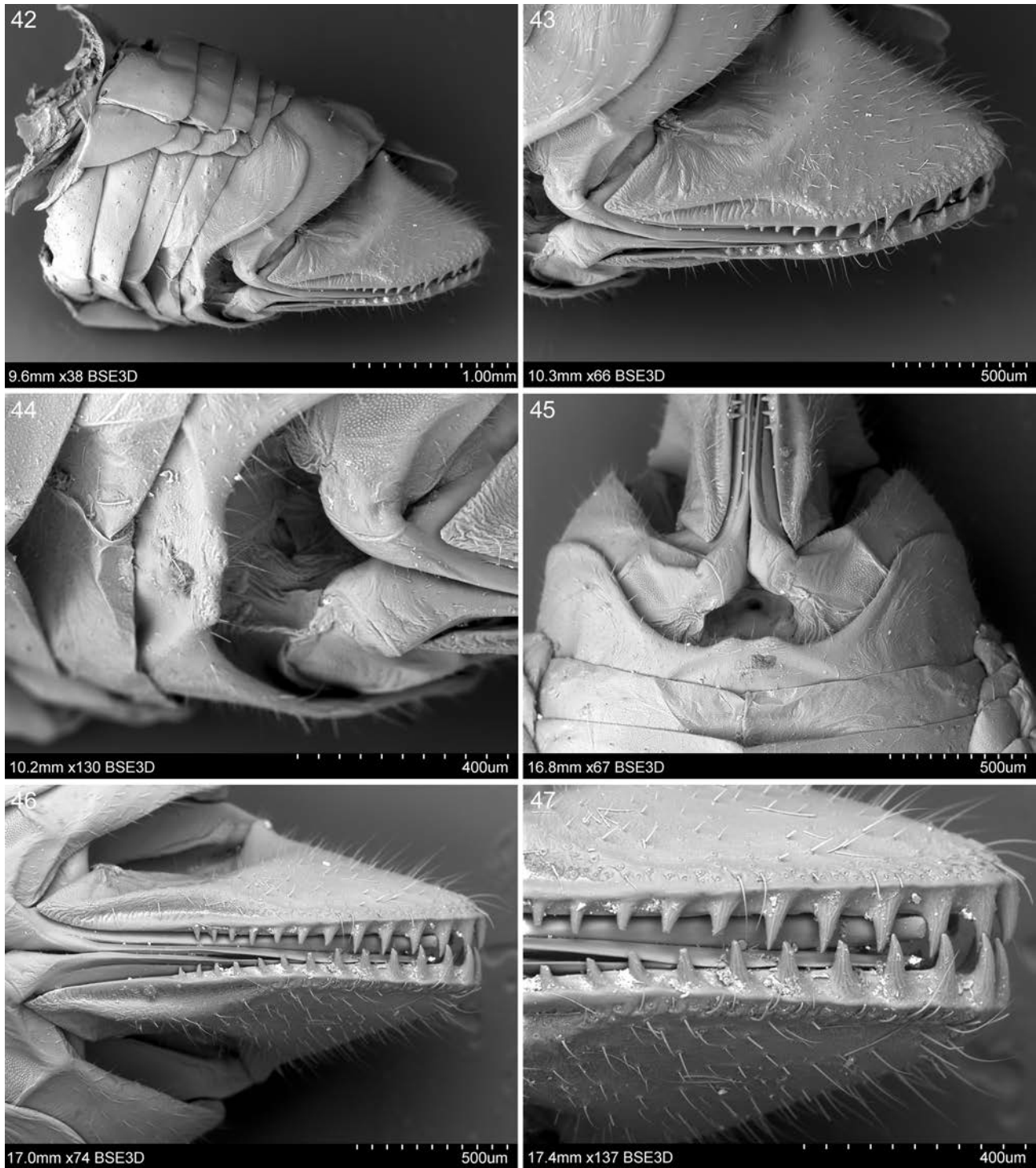
Figures 26–29. *Lambertonia insignis* Lallemand, 1950, hind legs, SEM photographs. (26) Hind leg, ventral view; (27–29) apical part of metatibia and metatarsus, internal view.



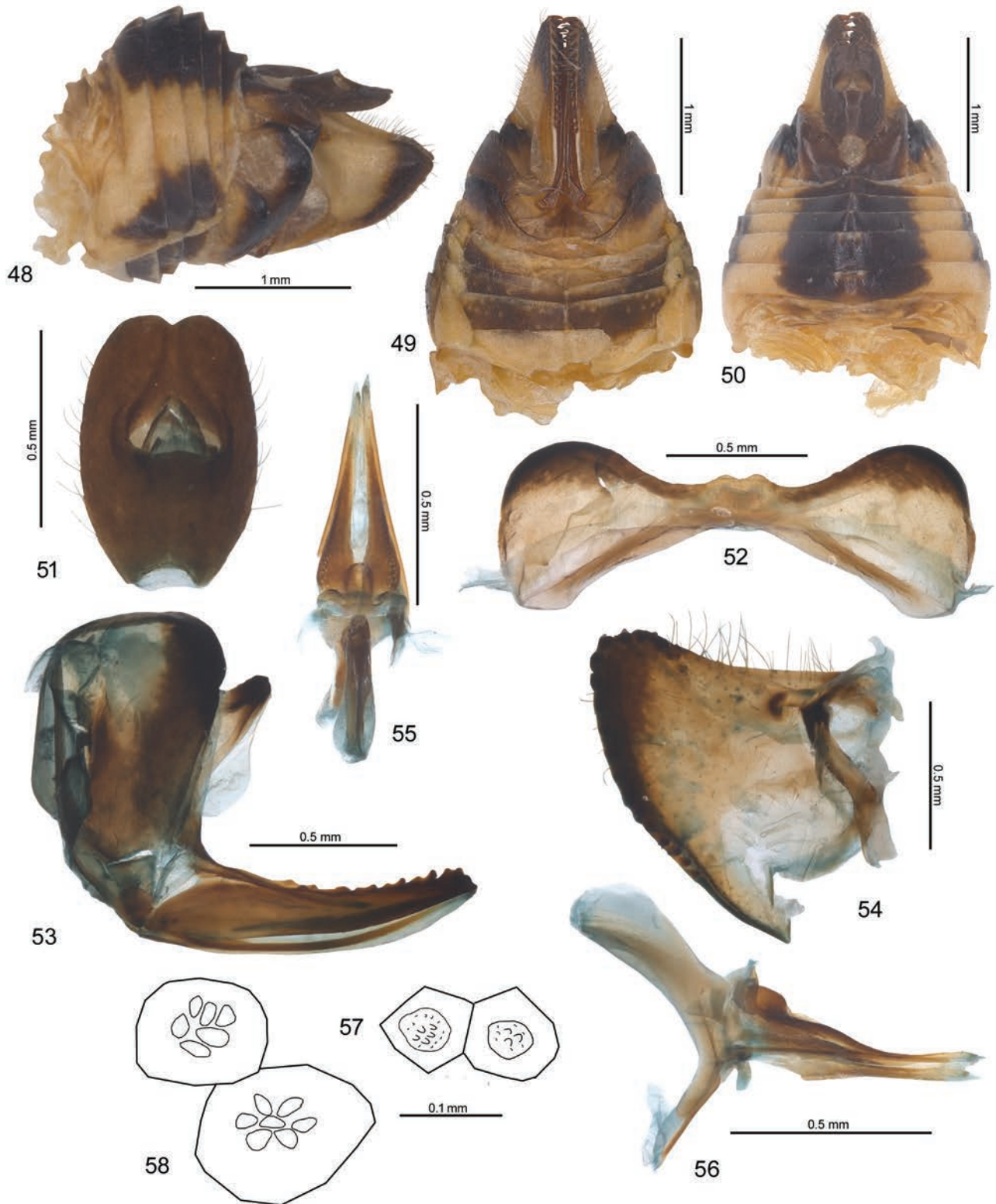
Figures 30–35. *Lambertonia insignis* Lallemand, 1950, tegmen, SEM photographs. (30) Whole tegmen, lateral view; (31) basal part, lateral view; (32) end of costal area and costal cell; (33) dorso-apical part, lateral view; (34–35) ventro-apical part, lateral view.



Figures 36–41. *Lambertonia insignis* Lallemand, 1950, female, SEM photographs. (36) Abdomen and terminalia, dorsal view; (37) terminalia, dorsal view; (38) abdomen and terminalia, lateral view; (39) terminalia, lateral view; (40) anal tube, lateral view; (41) abdomen and terminalia, ventral view.



Figures 42–47. *Lambertonia insignis* Lallemand, 1950, female, SEM photographs. (42) Abdomen and terminalia, latero-ventral view; (43) gonoploc, latero-ventral view; (44) pre genital sternit, latero-ventral view; (45) same, ventral view; (46–47) posterior margin of the gonoploc, ventral view.



Figures 48–58. *Lambertonia insignis* Lallemand, 1950 female. (48) Abdomen and terminalia, latero view; (49) same, ventral view; (50) same dorsal view; (51) anal tube, dorsal view; (52) pregenital sternite, ventral view; (53) gonoplaque, lateral view; (54) gonapophysis VIII and endogonocoxal process, lateral view; (55) gonapophyses IX and gonospiculum bridge, dorsal view; (56) same, lateral view; (57) ornamentation of wall of first pouch of bursa copulatrix; (58) ornamentation of second pouch.