

Rugabinthus, a new genus of Lebinthina (Orthoptera, Gryllidae, Eneopterinae) from New Guinea

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Abstract

Brachypterous crickets from the monophyletic group of Lebinthina were traditionally grouped under the genus *Lebinthus*. However, the morphology and calling song are highly diversified, prompting the erection of numerous genera to reclassify the species. Based on the strong characteristic fold carrying the diagonal vein of the male forewing, a new genus of cricket from the subtribe Lebinthina is described: *Rugabinthus* gen. nov. This brachypterous genus is endemic to the island of New Guinea and nearby islands. We redescribe the type species *Rugabinthus leopoldi* (Chopard, 1931) comb. nov. and describe 12 new species, *R. manokwari* sp. nov., *R. kencana* sp. nov., *R. maoke* sp. nov., *R. nabire* sp. nov., *R. albatros* sp. nov., *R. karimui* sp. nov., *R. yayukae* sp. nov., *R. biakis* sp. nov., *R. mamberamo* sp. nov., *R. tariku* sp. nov., *R. faowi* sp. nov., and *R. baduri* sp. nov. We also transferred *R. newguineae* (Bhowmik, 1981) comb. nov. and provide a key to all known species of *Rugabinthus* gen. nov.

Keywords

Grylloidea, Lebinthini, new species, Papua, Southeast Asia, taxonomy

Introduction

The tribe Lebinthini Robillard, 2004 is comprised of a highly speciose clade of crickets with diverse morphologies, ranging from the tiny brachypterous *Pixibinthus* Robillard & Anso, 2016 to the large and fully winged species of the genus *Cardiodactylus* Saussure, 1878. Male lebinthines produce high-frequency calls (10–28 kHz), and their call structure can also be highly diverse, ranging from a few chirps to a combination of a series of chirps followed by a trill (e.g., Robillard and Desutter-Grandcolas 2004a, 2004b, 2011, Tan et al. 2021). Lebinthines have been demonstrated to be important species for the study of insect communication systems. A new communication system using vibrational responses (including vibrotaxis) to high-frequency male calls and population-specific microevolution and plasticity in acoustic properties was recently discovered (ter Hofstede et al. 2015, Benavides-Lopez et al. 2020, Tan and Robillard 2021a, b).

Among the Lebinthini, the subtribe Lebinthina is distributed in the hyper-diverse yet poorly studied Southeast Asia and the western Pacific. This clade includes many taxa that are still being discovered. In particular, two genera of Lebinthina were described from Southeast Asia, *Fadinthus* Robillard & Tan, 2021, and *Falcerminthus* Robillard & Tan, 2021 (see Tan et al. 2021), which include numerous new species (Baroga-Barbecho et al. 2016, 2020, Tan et al. 2019).

Continued efforts to sample the region where Lebinthina is distributed and discover new species with diverse morphologies have led to recent insights about how species are related and should be classified. Traditionally, *Lebinthus* included most brachypterous species of Lebinthini. However, as new information about these species became available, their classification has been more accurately revised (Tan et al. 2021) and the subtribe Lebinthina Robillard & Tan, 2021 has been defined. Multiple new genera have also been erected, including *Centurarius* Robillard, 2011 (Robillard 2011), *Gnominthus* Robillard & Vicente, 2015 (Vicente et al. 2015), *Microbinthus* Robillard & Dong, 2016, and *Macrobinthus* Robillard & Dong, 2016 (Robillard et al. 2016) from New Guinea; *Pixibinthus* Robillard & Anso, 2016 from New Caledonia (Anso et al. 2016); *Falcerminthus* Robillard & Tan, 2021 and *Fadinthus* Robillard & Tan, 2021 from Southeast Asia (Tan et al. 2021); and *Julverninus* Robillard & Su, 2018 from Australia (Robillard and Su 2018). These studies revealed that most *Lebinthus* species known before 2010 corresponded to distinct genera, and that the island of New Guinea possesses the highest diversity of genera and species of the Lebinthina clade (Tan et al. 2021, Tan and Robillard 2021c).

Pursuing the taxonomic revision of the species described from New Guinea, we found that *Lebinthus leopoldi* Chopard, 1931 (Fig. 1) differs from the Lebinthina genera that are currently recognized. It shows unique morphological features in the male forewing (FW), including a strong fold carrying the diagonal vein (Fig. 2). In addition, study of undetermined material from several natural history museums, mostly collected in the western half of New Guinea, revealed numerous new species that share the characteristics of *L. leopoldi* (Fig. 3). Hence,

we propose a new genus name for these species: *Rugabanthus* **gen. nov.** We redescribe the type species *Rugabanthus leopoldi* (Chopard, 1931) **comb. nov.** and describe 12 new species, as well as providing a key to all known species of *Rugabanthus* **gen. nov.** We also transfer *R. newguineae* (Bhowmik, 1981) **comb. nov.** to this new genus.

Materials and methods

Materials.—Specimens in MNHN were studied in addition to materials loaned from BPBM, MZB, NHMUK, RBINS, RMNH, and ZIN (see abbreviations below).

Morphology.—Male tegminal veins and cells follow the terminology of Robillard and Desutter-Grandcolas (2004a). Male and female genitalia were dissected in softened specimens by cutting the membranes between the paraprocts and the subgenital plate, or between the ovipositor and the subgenital plate, respectively; they were observed after cleaning with cold KOH and then kept in glycerine. Male genitalia are named according to Desutter (1987), modified in Desutter-Grandcolas (2003) and Robillard and Desutter-Grandcolas (2004a). For abbreviations, see below.

Close-up images of habitus and morphological features were obtained using a Canon EOS 6D digital SLR camera with a macro photo lens MP-E 65 mm f/2.8 USM (1–5×). Imaging stacking was done using Helicon Remote version 9.3.1. W and Helicon Focus 6.8.0. Photographs of male and female genitalia were done with a binocular microscope Leica MZ16 with an AMScope Microscope Eyepiece Camera (MU1000, 10 MP Aptina Colour, CMO50) attached via an AmScope FMA050 fixed microscope adaptor and the software ToupView. Image editing was accomplished using CombineZP version 1.0 and Adobe Photoshop CC2014. To highlight the structural components of genitalia, a water solution containing a drop of JBL Punktol was used. To fix orientations and stabilization of genitalia for photography, a clear and viscous hand sanitizer was used following Su (2016).

Abbreviations.—

Depositories:

BPBM	Bernice Pauahi Bishop Museum, Hawaii, U.S.A.;
MNHN	Muséum national d'Histoire naturelle, Paris, France;
MZB	Museum Zoologicum Bogoriense, Bogor, Java, Indonesia;
NHMUK	Natural History Museum, London, U.K.;
RBINS	Royal Belgian Institute of Natural Sciences, Brussels, Belgium;
RMNH	Nationaal Natuurhistorisch Museum (formerly Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands;
ZIN	Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

General morphology:

I, II, III	front, median, hind, respectively (femora, legs, tibiae);
F	femora;

FW	forewing;
TaIII-1	basal segment of hind leg tarsomere;
T	tibiae.

Tegminal venation:

1A–4A	first to fourth anal veins;
CuA	anterior cubital vein;
CuA1, CuA2, ...	first, second, ... bifurcations of CuA;
CuP	posterior cubital vein;
M	median vein;
Sc	subcostal vein;
R	radial vein;
c1–3	first to third cells of C alignment;
d1 cell (mirror)	first cell(s) of D alignment;
d2	second cell of D alignment;
e1	first cell of E alignment;
ha	harp area.

Measurements:

FIIIL	length of hind femora;
FIIIW	width of hind femora;
FWL	forewing length;
FWW	forewing width (at the level of maximal width);
OL	ovipositor length;
PronL	pronotum length;
PronW	pronotum width;
TIIL	length of hind tibiae.

Results

Taxonomy

Family Gryllidae Laicharting, 1781

Subfamily Eneopterinae Saussure, 1874

Tribe Lebinthini Robillard, 2004

Subtribe Lebinthina Robillard & Tan, 2021

Genus *Rugabanthus* Robillard & Tan, gen. nov.

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Type species.—*Lebinthus leopoldi* Chopard, 1931

Etymology.—Genus named after the Latin word “Ruga” for wrinkle or fold, referring to the characteristic fold on the male FW carrying the diagonal vein.

Distribution.—Island of New Guinea: Indonesia (West Papua) and Papua New Guinea (Fig. 3).

Diagnosis.—Among the Lebinthina genera, *Rugabanthus* species are average to large sized and stocky with a dark brown coloration. General shape close to that of *Macrobinthus*, also from New Guinea, from which it differs by male FWs with a narrow triangular harp (shield shaped in *Macrobinthus*) occupying half of FW width, with a characteristic and strong diagonal fold carrying the diagonal vein and cell c1, and separating FWs in two distinct areas; file vein area also characterized by a strong bean-shaped sclerotization; harp with a strong transverse oblique vein, bi- or poly-furcated anteriorly; venation posterior to diagonal fold usually faint and

reticulated, longitudinal veins only strong at apex. Eyes prominent and large as in *Macrobinthus* compared to *Agnotecous* and *Centuriarus*; face as high as wide (higher than wide in *Macrobinthus*), close to that of *Lebinthus*. Microptery in both sexes, FWs not reaching mid-length of abdomen. Mirror not differentiated (slightly differentiated in *Macrobinthus*). CuA almost straight (clearly curved inwards in *Macrobinthus*). Male genitalia with pseudepiphallus usually elongate, its posterior apex highly variable in size and shape, rami short; pseudepiphallal parameres made of two main lobes variable in shape and orientation; endophallic sclerite very long, trifid posteriorly. Female: FWs shorter than in males, very slightly overlapping, generally rounded posteriorly. Ovipositor rather long, its apex slightly denticulate on dorsal edge. Female copulatory papilla usually rounded, with a C-shaped basal sclerite; apex rounded, generally folded ventrally.

Description.—Size variable, medium to large for the subtribe. Dorsum of head rounded, prolonged by trapezoidal fastigium almost as long as wide (Fig. 4). Head dorsum with six wide dark brown longitudinal bands more or less distinct (Fig. 4). Eyes large and prominent. Head triangular in facial view, almost as wide as high (Fig. 5). Face coloration usually red brown to dark brown or black, with various color patterns; most species with four pale brown or yellow dots forming a square on face (two between scapes, and two above epistomal suture) (Fig. 5). Maxillary palpi brown or dark brown (sometimes black in dark species) with lighter brown rings. Ocelli pale, forming a rather wide triangle; median ocellus slightly oval, lateral ocelli small and rounded. Scapes small. Antennae usually dark brown with yellow brown rings. Lateral part of head dark brown with a yellow spot below eye and a yellow band behind eye (Fig. 6). Pronotum dorsal disk trapezoidal, wider than long, its posterior margin straight, usually dark brown with lateral edges yellow (Fig. 4). Lateral lobes of pronotum longer than high, most often uniformly red brown or black dorsally, its ventral margin mostly dark brown, sometimes with a yellow pattern (Fig. 6). Legs: TI with two tympana; inner tympanum covered by a flat sclerotized expansion, its membrane visible along a small longitudinal slit only; outer tympanum ellipsoidal, its membrane transversally plicate in dorsal half. TII with two inner and two outer apical spurs. TIII with two inner and two outer spurs. FIII muscular. TIII serrulate on their whole length, slightly furrowed dorso-longitudinally and with four pairs of subapical spurs and three pairs of apical spurs; inner spurs long and curved, outer spurs shorter and straight. Legs I and II light brown to yellow brown, femora with brown spots and longitudinal patterns, tibiae with brown rings. TaIII-1 with 4–5 spines on dorsal outer edge, without spines on dorsal inner edge. TIIIs and tarsomeres brown with spines and spurs with dark apices. FWs short in both sexes, not reaching abdomen mid-length; hind wings absent. Cerci well developed, nearly as long as abdomen. Abdomen: Tergites brown to dark brown, without longitudinal bands.

Male. Metanotal glands absent. Dorsal field of FWs not distinctly longer than lateral field. FWs longer than wide, longer than pronotum dorsal disk. FW venation (Figs 2, 7): 1A vein (file) transverse part straight, variably curved at basal end, bisinuate anteriorly to angle, forming a notch in most species. Genus characterized by a large bean-shaped sclerotization posterior to transverse part of file vein (1A), including base of chords. Diagonal vein straight or faintly sinusoidal, strong basally, fainter posteriorly. Harp triangular, longer than wide, occupying approximately half of dorsal field surface; with a strong characteristic fold along posterior face,

carrying diagonal vein and cell c1 and delimiting dorsal field of FW in two distinct parts; harp with a strong transverse oblique vein, bi- or poly-furcated anteriorly; area posterior to diagonal fold with weak reticulated venation, cell alignments almost indistinct except at apex and main longitudinal veins weak except at apex. CuA anterior part strong throughout, straight, slightly curved inward near apex. Mirror (d1) usually not differentiated. Apical field short, including one or two cell alignments. Lateral field with 5–6 strong longitudinal veins; Sc vein without bifurcation. Subgenital plate elongated, clog-shaped, slightly pointed; inner side of subgenital plate with lateral swellings. Epiproct and subgenital plate brown.

Male genitalia: (Figs 8, 11, 15, 20, 24) Pseudepiphallus triangular, variable in length but usually elongate, its basal margin straight or variably indented in the middle, posterior apex usually somewhat truncated, sometimes slightly acute, rarely with paired lophi. Rami very short, usually shorter than half of pseudepiphallus length, parallel to slightly diverging anteriorly. Pseudepiphallal parameres average sized and sclerotized, variable in shape, with posterior apex usually enlarged, their basis strong. Ectophallic apodemes parallel and long, usually reaching beyond anterior margin of pseudepiphallal sclerite. Ectophallic arc well sclerotized, transverse. Ectophallic fold with two ventral sclerites of variable shapes, sometimes fused together. Endophallic sclerite Y-shaped, comprising a long anterior region and a short median expansion and lateral arms posteriorly.

Female. FWs very short, shorter than in male, reaching or slightly surpassing posterior margin of first tergite, close together and usually slightly overlapping at their bases. Dorsal field usually oblique posteriorly (more so in some species than others); dorsal field and lateral field with more or less distinct longitudinal veins (Fig. 9). Dorsal field with cells brown and mottled and veins brown; lateral field with cells brown mottled with gray, and veins brown.

Female genitalia: Ovipositor most often slightly longer than FIII, slightly denticulate on dorsal edge, its apex acute. Female copulatory papilla rounded, almost entirely membranous, sometimes with a basal sclerotized ring; apex rounded, generally folded ventrally (Fig. 10).

Calling song.—Unknown.

Natural history.—The rare information obtained from photographs from iNaturalist suggest that these crickets are found in the leaf litter and in the foliage of low-lying vegetation in forest (Fig. 3).

Included species.—(14 in total; ordered by similarity)

- R. leopoldi* (Chopard, 1931) **comb. nov.**
- R. mamberamo* **sp. nov.**
- R. yayukae* **sp. nov.**
- R. faowi* **sp. nov.**
- R. kencana* **sp. nov.**
- R. manokwari* **sp. nov.**
- R. maoke* **sp. nov.**
- R. biakis* **sp. nov.**
- R. nabire* **sp. nov.**
- R. tariku* **sp. nov.**
- R. albatros* **sp. nov.**
- R. baduri* **sp. nov.**
- R. karimui* **sp. nov.**
- R. newguineae* (Bhowmik, 1981) **comb. nov.**

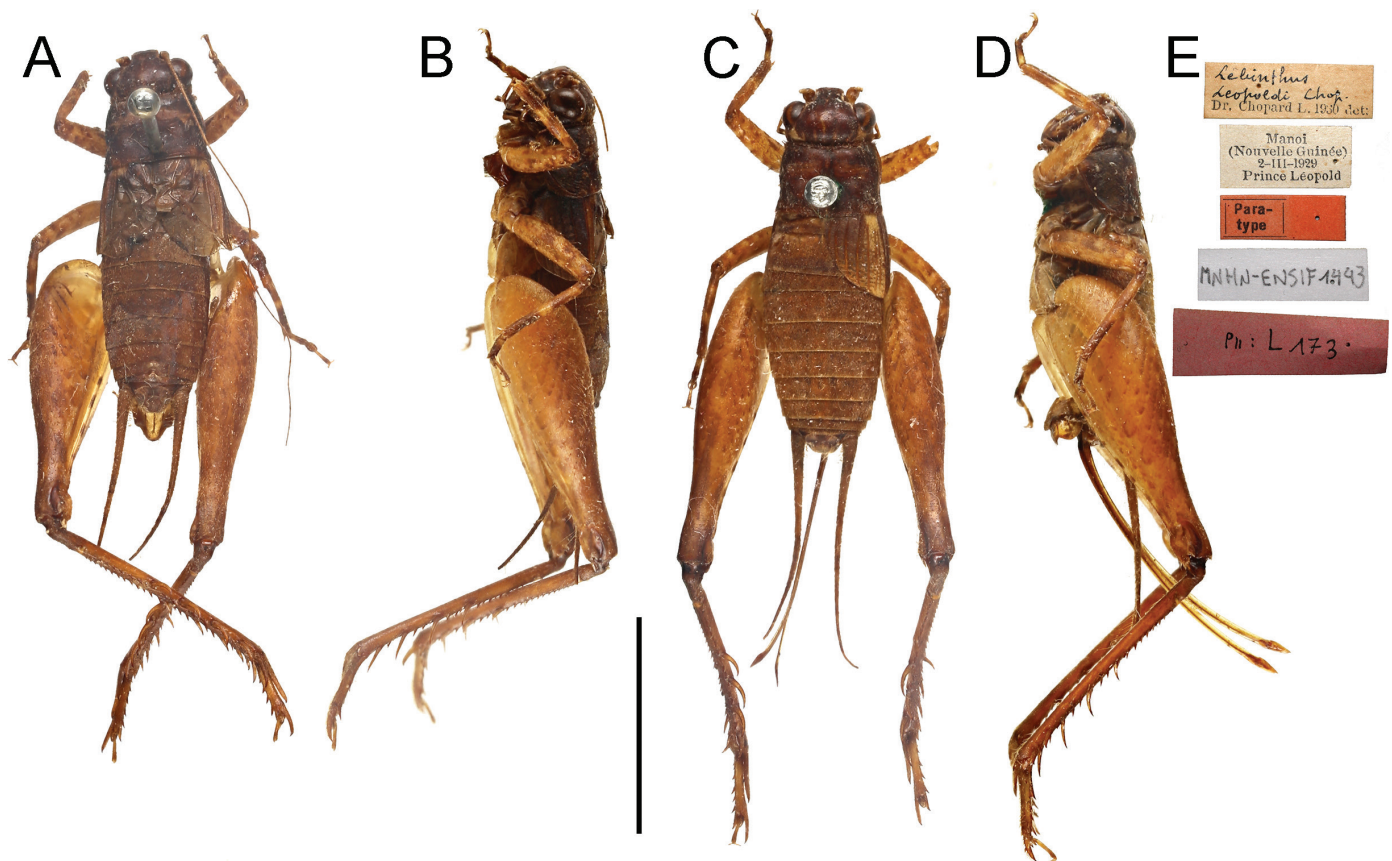


Fig. 1. *R. leopoldi* (Chopard, 1931) **comb. nov.** male (A, B) and female (C, D) habitus in dorsal (A, C) and lateral (B, D) views. Paratype labels (E). Scale bar: 10 mm.

Rugabinthus leopoldi* (Chopard, 1931) **comb. nov.*

(Figs 1, 3, 4A, 5A, 6A, 7A, 8A, 9A, 10A, 11A, 11B)

Lebinthus leopoldi Chopard, 1931: 7; 1968: 354; Cigliano et al. 2021 (Orthoptera species file online).

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Manoi [Sorong Manoi]; 2 March 1929; Prince Leopold leg.; RBINS. **Allotype:** INDONESIA • ♀; same information as holotype; RBINS. **Paratypes:** INDONESIA • 3♂, 4♀; same information as holotype; RBINS • 1♂; West Papua, Manoi [Sorong Manoi]; 2 March 1929; Prince Leopold leg.; MNHN-EO-ENSIF1441 • 1♀; same information as holotype; molecular sample L173; MNHN-EO-ENSIF1443 • 1♀; same information as holotype; MNHN-EO-ENSIF1442.

Type locality.—INDONESIA: West Papua: Manoi

Diagnosis.—This species differs from all congeners by male genitalia with pseudepiphallus more rectangular, very elongate, its posterior part curved posteriorly, its apex truncated with small paired apical lophi; lophi triangular with obtuse apex.

Redescription.—Average size among congeners (Fig. 1). Dorsum of head with broad red brown bands barely separated (Fig. 4A). Fastigium red brown (Fig. 4A). Scapes red brown with some dark patches. Fastigium verticis brown with two vertical yellow brown stripes diverging ventrad, frons brown with two yellow brown

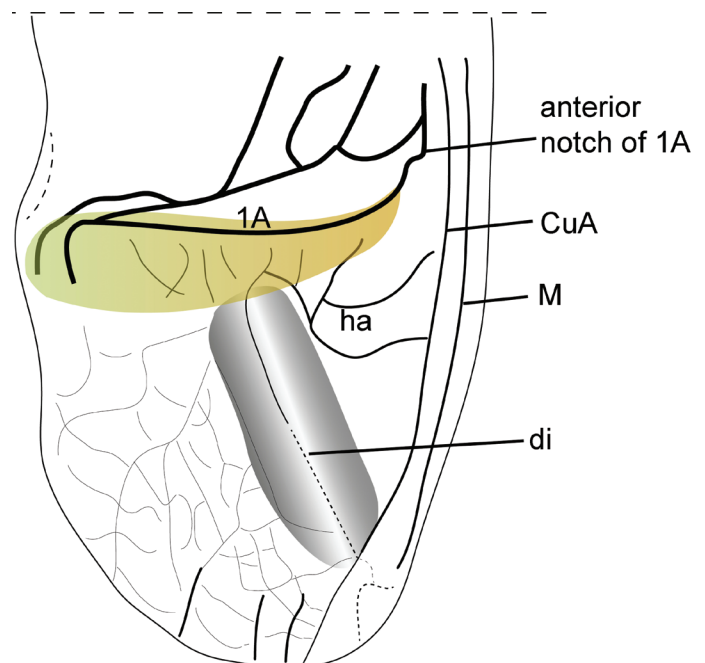


Fig. 2. Schematic venation of male FW of *Rugabinthus*. The gray area represents the diagonal fold carrying the diagonal vein; the yellow area represents the bean-shaped strong sclerotization along 1A vein.

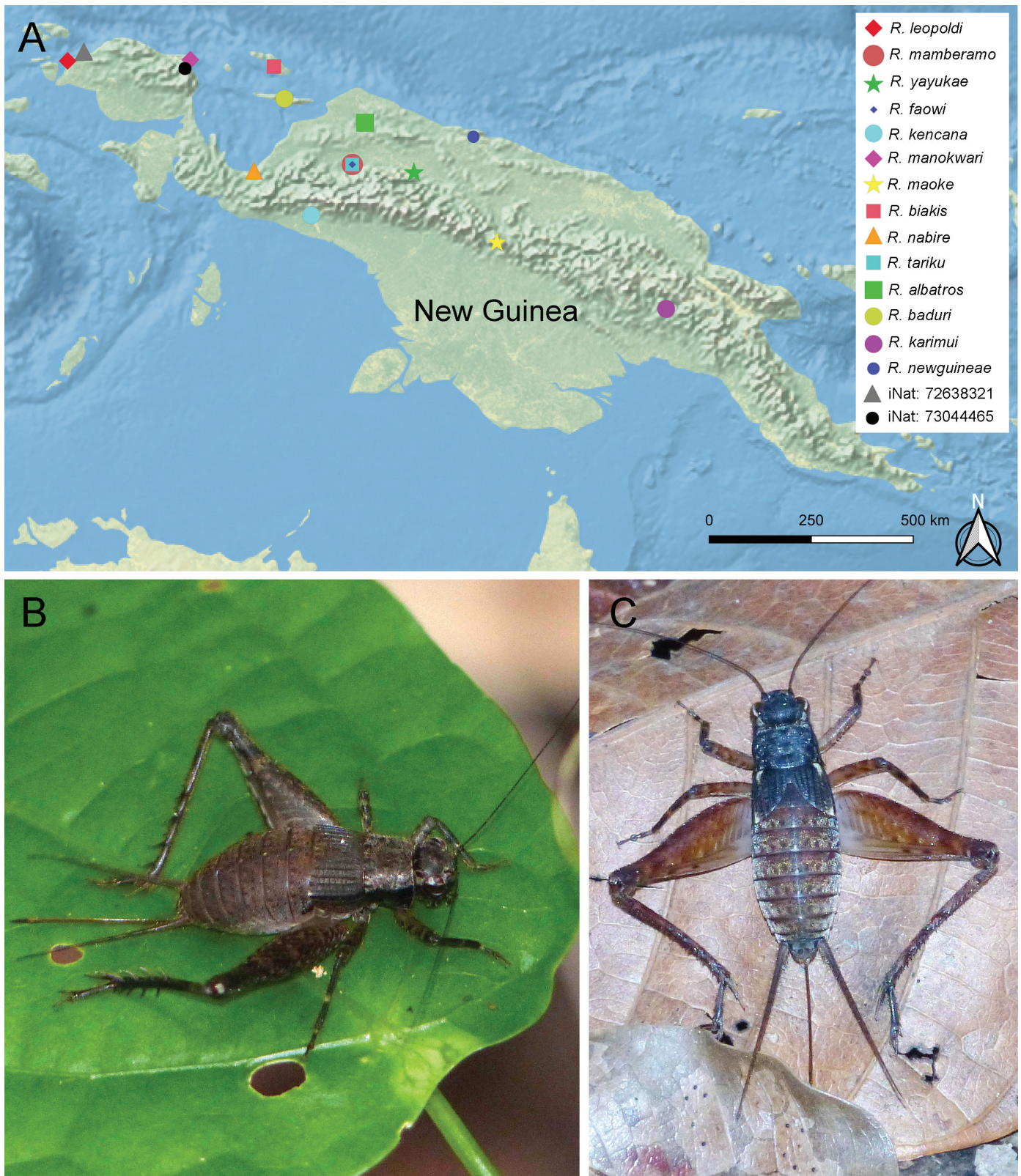


Fig. 3. A. Map of New Guinea island showing the distribution of *Rugabanthus* species; B. Female *Rugabanthus* species in their natural habitats in Acemo, South Manokwari (<https://www.inaturalist.org/observations/73044465>) and C. Malagufuk (<https://www.inaturalist.org/observations/72638321>). Photo credit: Benoît Segerer.

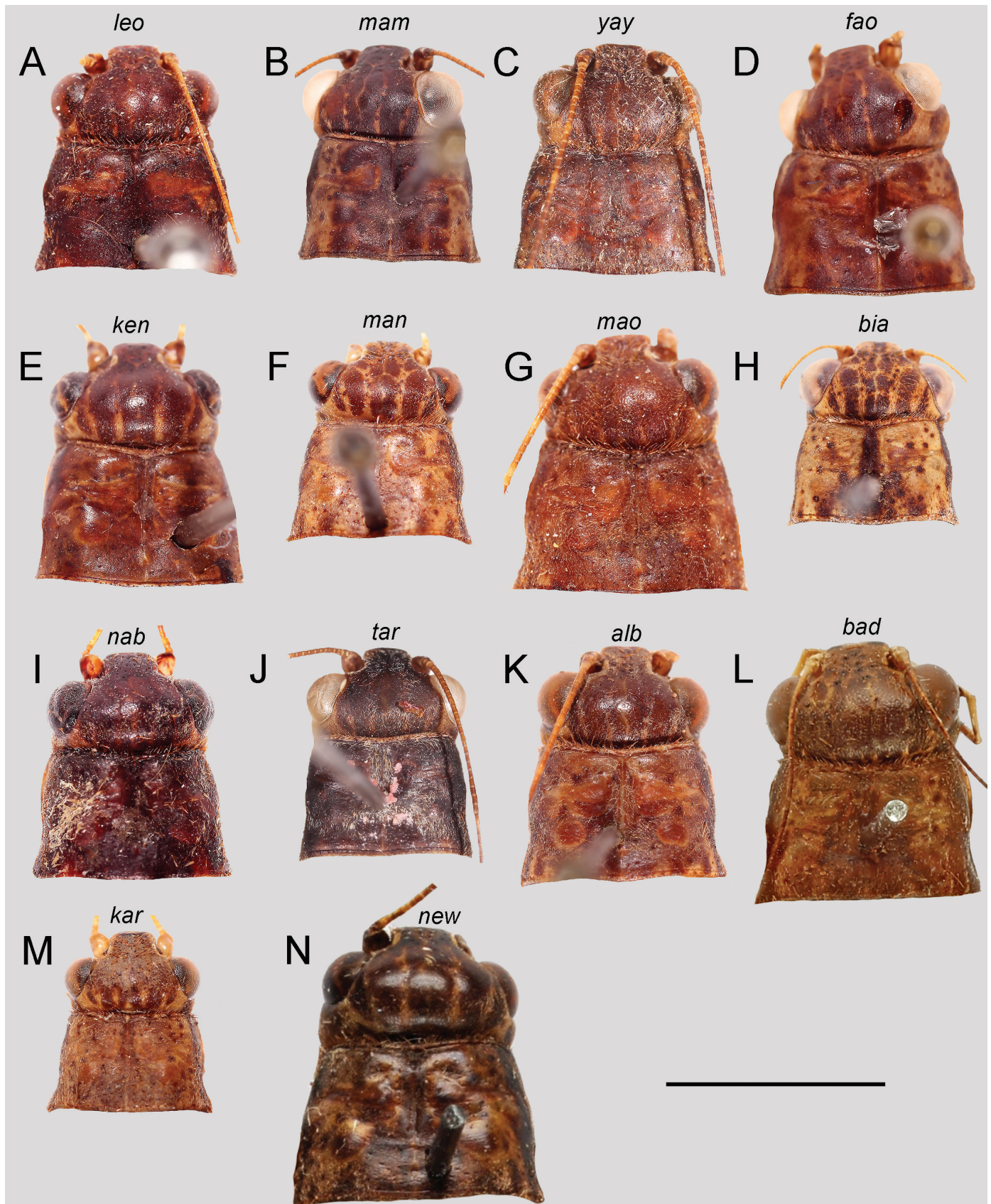


Fig. 4. Head and pronotum in dorsal views: A. *R. leopoldi* (Chopard, 1931) **comb. nov.**; B. *R. mamberamo* **sp. nov.**; C. *R. yayukae* **sp. nov.**; D. *R. faowi* **sp. nov.**; E. *R. kencana* **sp. nov.**; F. *R. manokwari* **sp. nov.**; G. *R. maoke* **sp. nov.**; H. *R. biakis* **sp. nov.**; I. *R. nabire* **sp. nov.**; J. *R. tariku* **sp. nov.**; K. *R. albatros* **sp. nov.**; L. *R. baduri* **sp. nov.**; M. *R. karimui* **sp. nov.**; N. *R. newguineae* (Bhowmik, 1981) **comb. nov.** Scale bar: 5 mm.

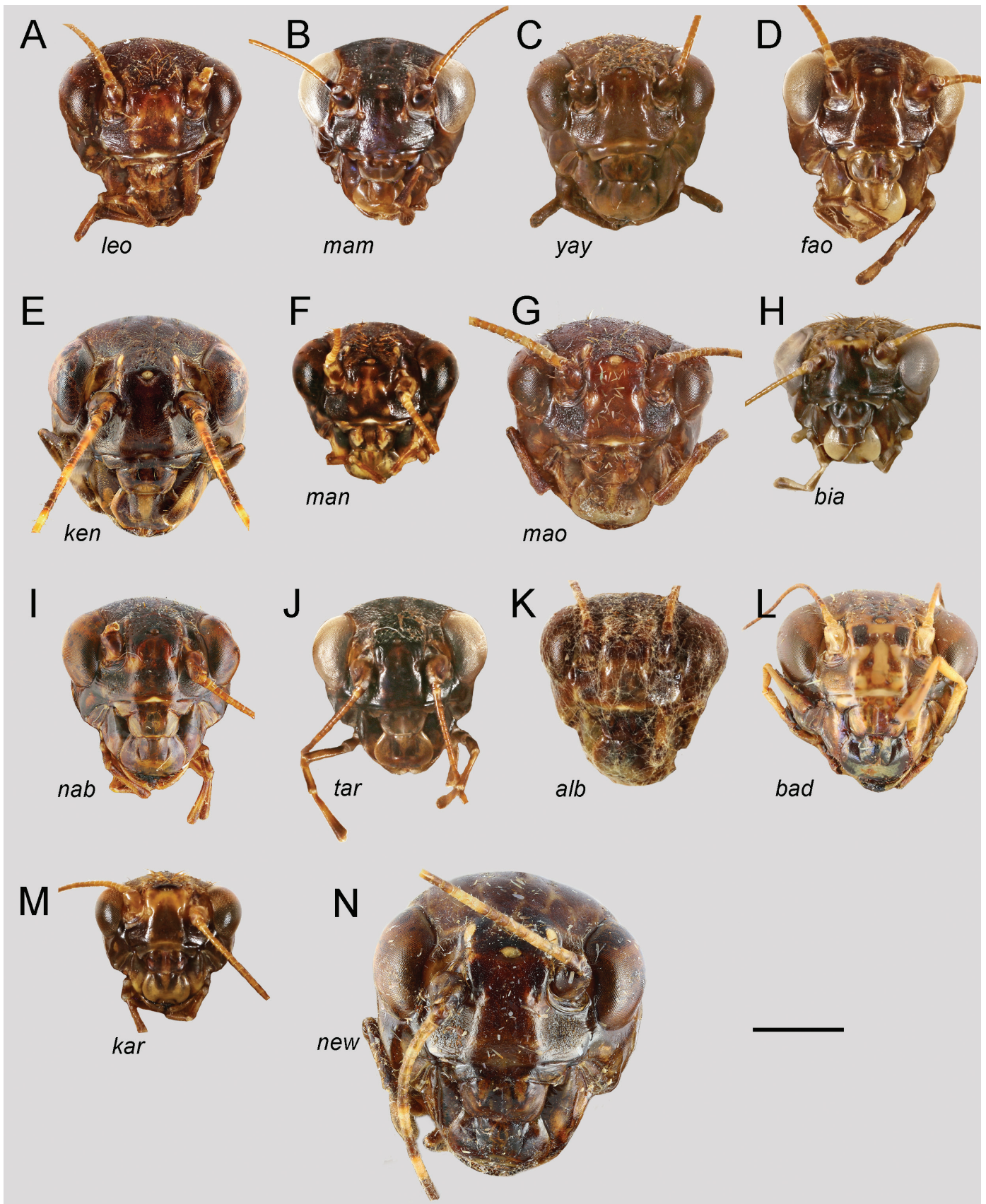


Fig. 5. Face: A. *R. leopoldi* (Chopard, 1931) comb. nov.; B. *R. mamberamo* sp. nov.; C. *R. yayukae* sp. nov.; D. *R. faowi* sp. nov.; E. *R. kencana* sp. nov.; F. *R. manokwari* sp. nov.; G. *R. maoke* sp. nov.; H. *R. biakis* sp. nov.; I. *R. nabire* sp. nov.; J. *R. tariku* sp. nov.; K. *R. albatros* sp. nov.; L. *R. baduri* sp. nov.; M. *R. karimui* sp. nov.; N. *R. newguineae* (Bhowmik, 1981) comb. nov. Scale bar: 2 mm.



Fig. 6. Head and pronotum in lateral views: A. *R. leopoldi* (Chopard, 1931) **comb. nov.**; B. *R. mamberamo* **sp. nov.**; C. *R. yayukae* **sp. nov.**; D. *R. faowi* **sp. nov.**; E. *R. kencana* **sp. nov.**; F. *R. manokwari* **sp. nov.**; G. *R. maoke* **sp. nov.**; H. *R. biakis* **sp. nov.**; I. *R. nabire* **sp. nov.**; J. *R. tariku* **sp. nov.**; K. *R. albatros* **sp. nov.**; L. *R. baduri* **sp. nov.**; M. *R. karimui* **sp. nov.**; N. *R. newguineae* (Bhowmik, 1981) **comb. nov.** Scale bar: 5 mm.

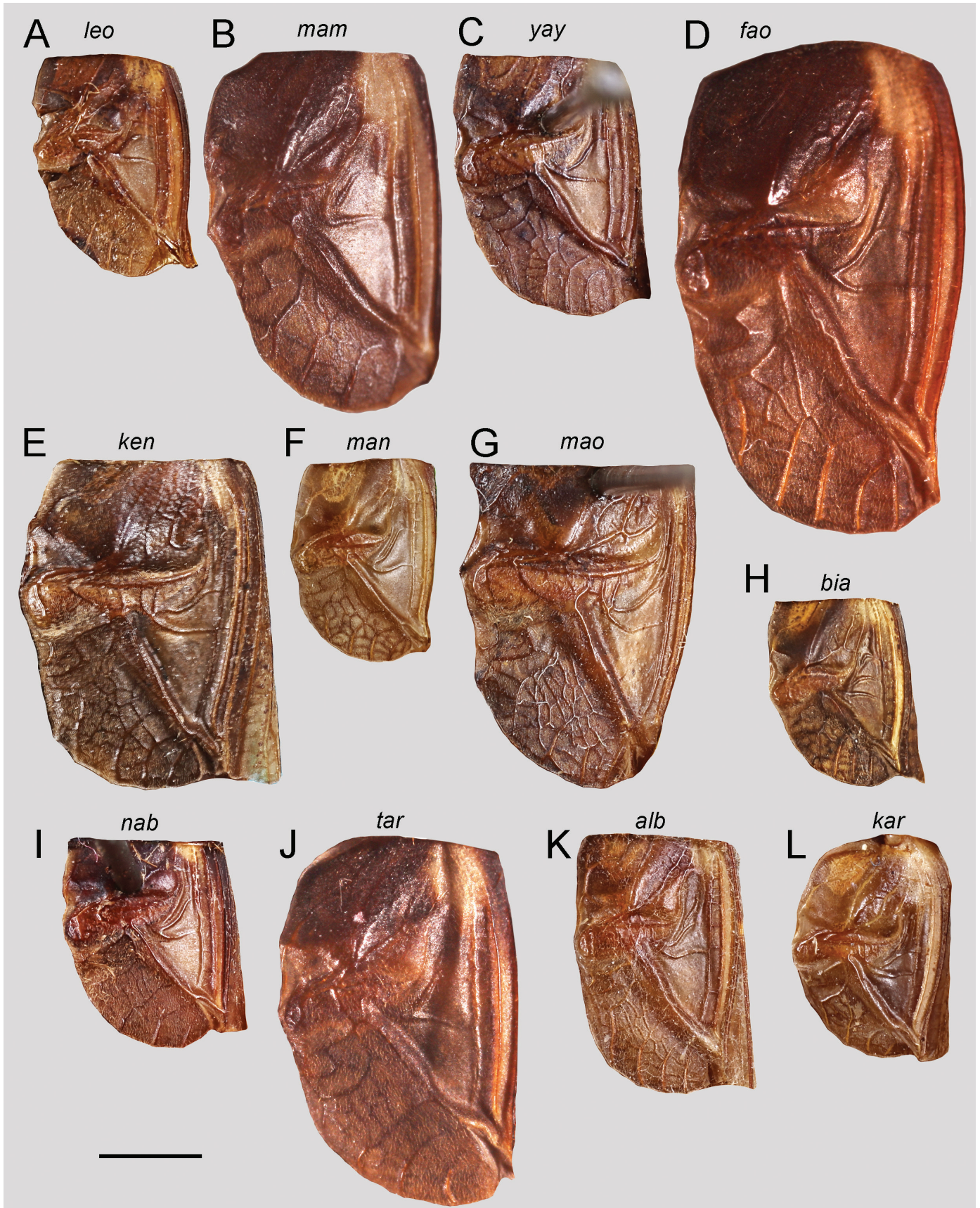


Fig. 7. Male FW in dorsal views: A. *R. leopoldi* (Chopard, 1931) **comb. nov.**; B. *R. mamberamo* **sp. nov.**; C. *R. yayukae* **sp. nov.**; D. *R. faowi* **sp. nov.**; E. *R. kencana* **sp. nov.**; F. *R. manokwari* **sp. nov.**; G. *R. maoke* **sp. nov.**; H. *R. biakis* **sp. nov.**; I. *R. nabire* **sp. nov.**; J. *R. tariku* **sp. nov.**; K. *R. albatros* **sp. nov.**; L. *R. karimui* **sp. nov.** Scale bar: 2 mm.

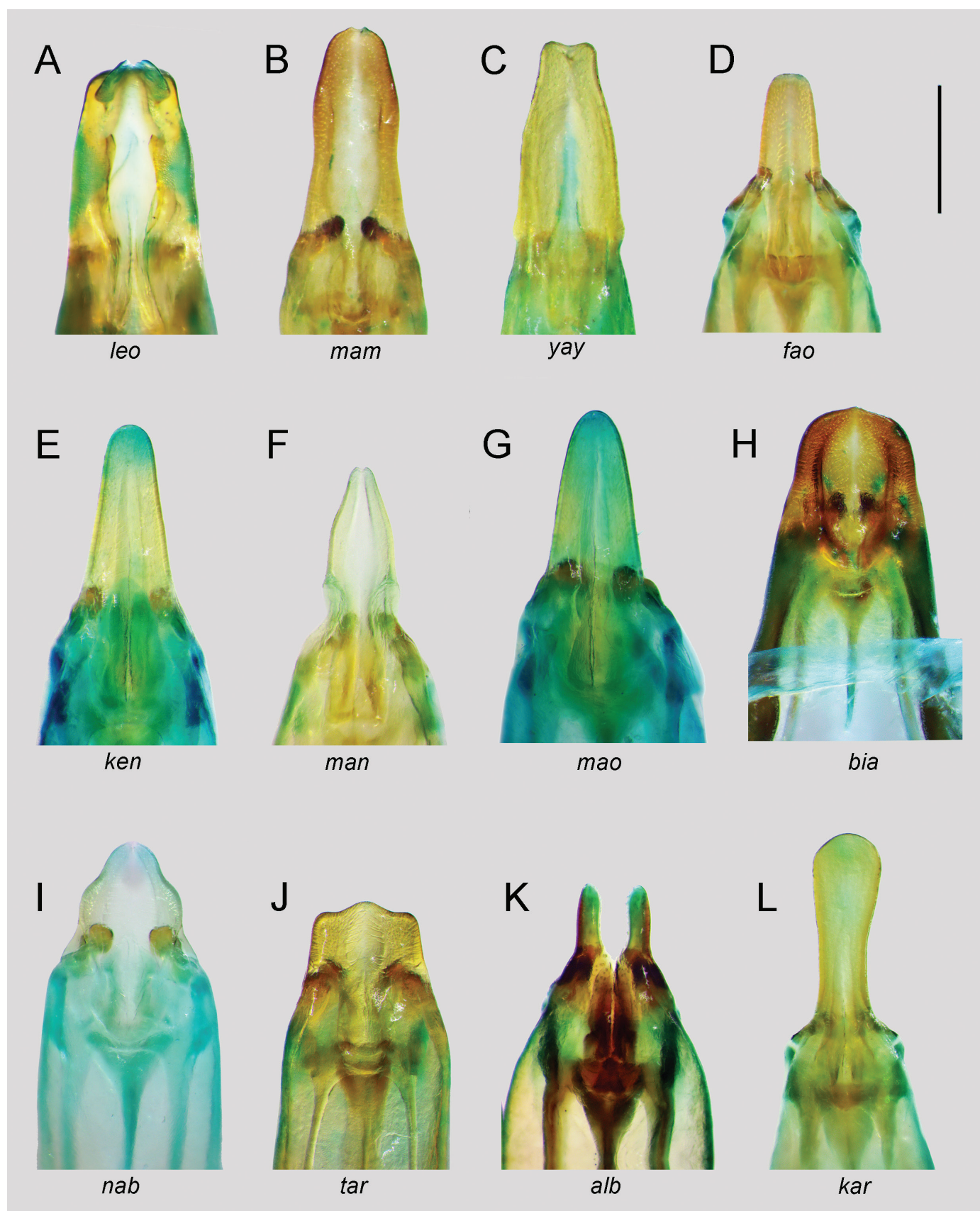


Fig. 8. Male genitalia in dorsal view; posterior apex of pseudepiphallus: A. *R. leopoldi* (Chopard, 1931) **comb. nov.**; B. *R. mamberamo* sp. nov.; C. *R. yayukae* sp. nov.; D. *R. faowi* sp. nov.; E. *R. kencana* sp. nov.; F. *R. manokwari* sp. nov.; G. *R. maoke* sp. nov.; H. *R. biakis* sp. nov.; I. *R. nabire* sp. nov.; J. *R. tariku* sp. nov.; K. *R. albatros* sp. nov.; L. *R. karimui* sp. nov. Scale bar: 0.5 mm.

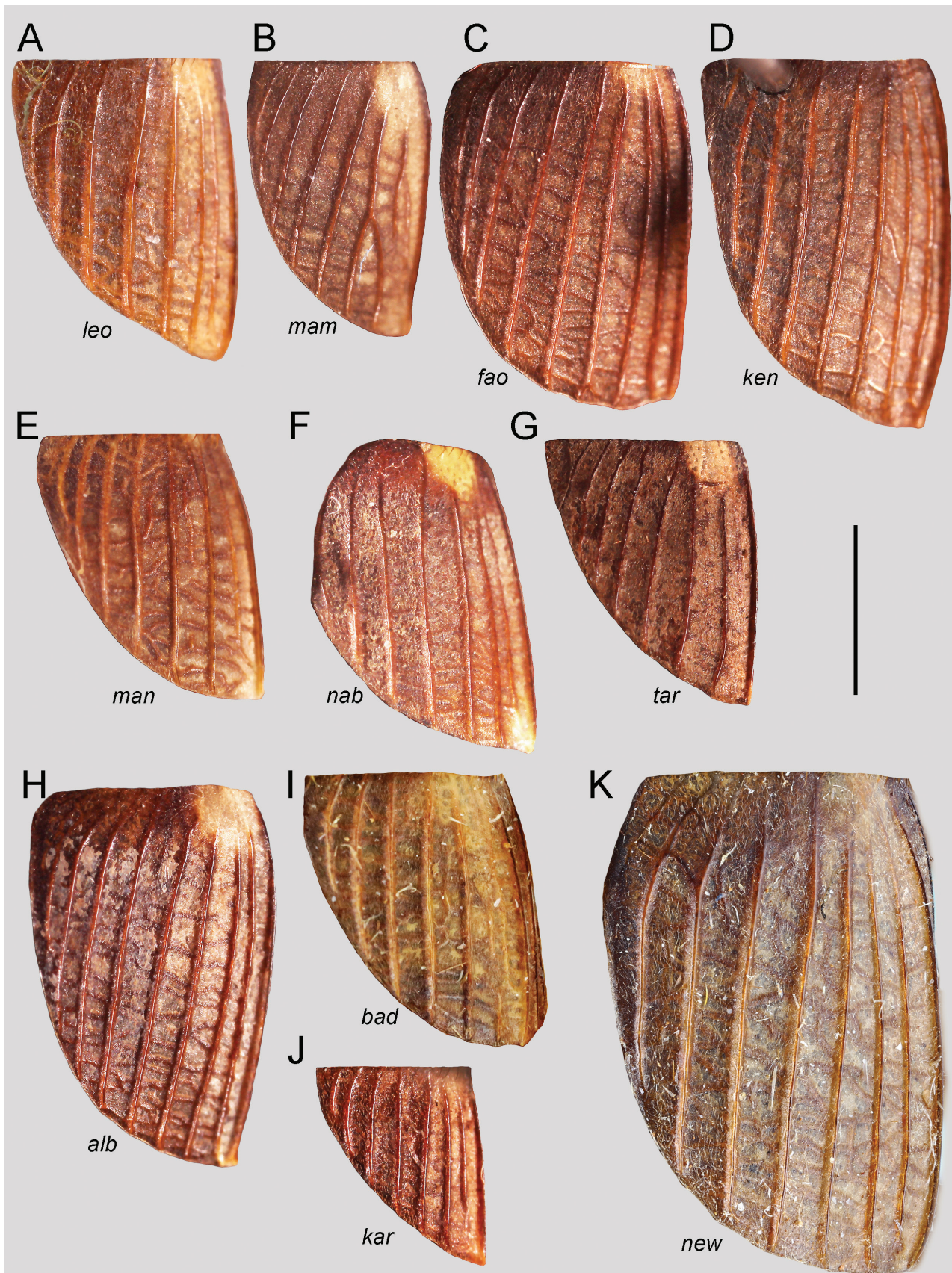


Fig. 9. Female FW in dorsal views: A. *R. leopoldi* (Chopard, 1931) **comb. nov.**; B. *R. mamberamo* **sp. nov.**; C. *R. faowi* **sp. nov.**; D. *R. ken-cana* **sp. nov.**; E. *R. manokwari* **sp. nov.**; F. *R. nabire* **sp. nov.**; G. *R. tariku* **sp. nov.**; H. *R. albatros* **sp. nov.**; I. *R. baduri* **sp. nov.**; J. *R. karimui* **sp. nov.**; K. *R. newguineae* (Bhowmik, 1981) **comb. nov.** Scale bar: 2 mm.

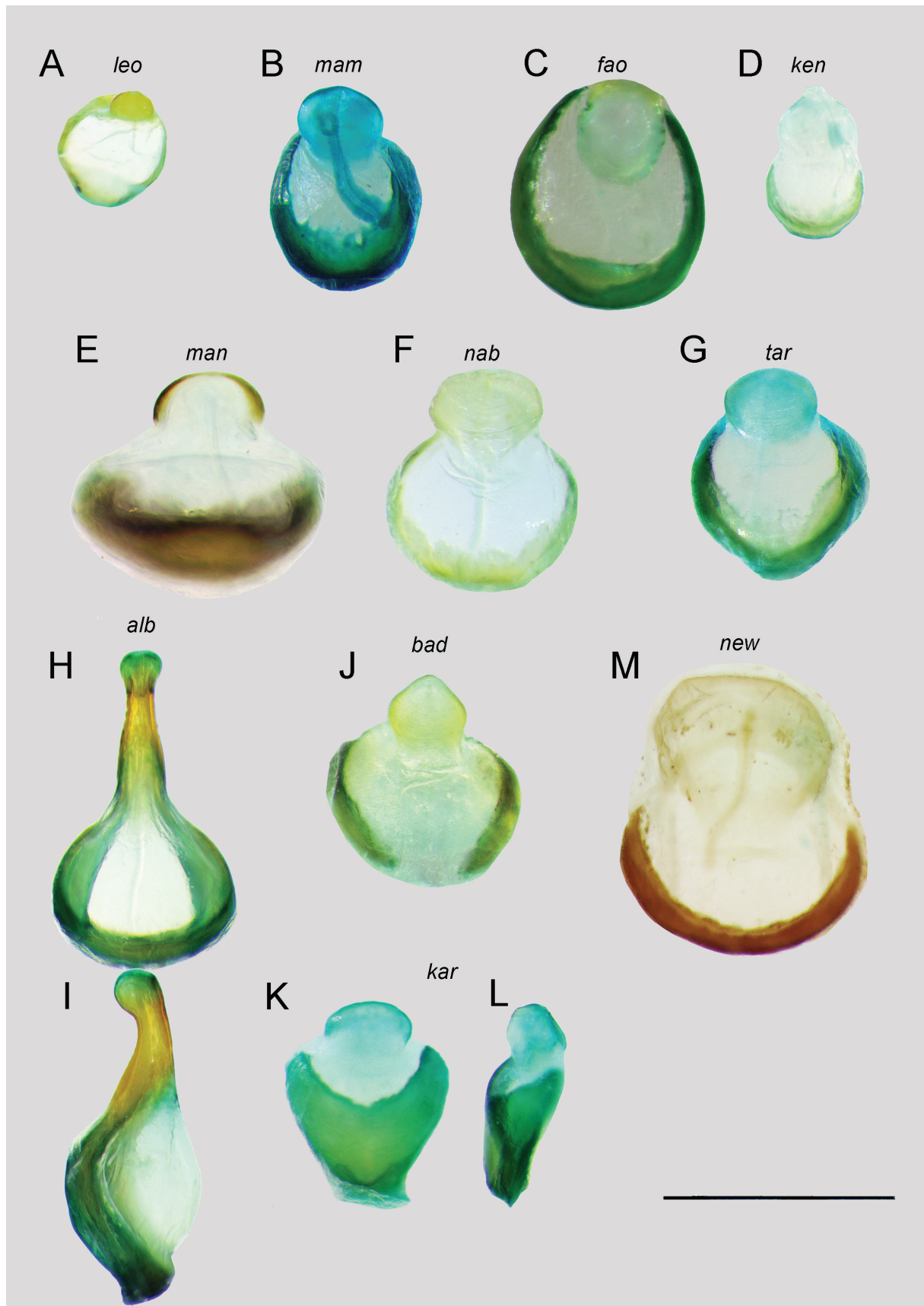


Fig. 10. Female copulatory papilla in ventral (all except I, K) and lateral (I, K) views. A. *R. leopoldi* (Chopard, 1931) **comb. nov.**; B. *R. mamberamo* sp. nov.; C. *R. faowi* sp. nov.; D. *R. kencana* sp. nov.; E. *R. manokwari* sp. nov.; F. *R. nabire* sp. nov.; G. *R. tariku* sp. nov.; H, I. *R. albatros* sp. nov.; J. *R. baduri* sp. nov.; K, L. *R. karimui* sp. nov.; M. *R. newguineae* (Bhowmik, 1981) **comb. nov.** Scale bar: 0.5 mm.

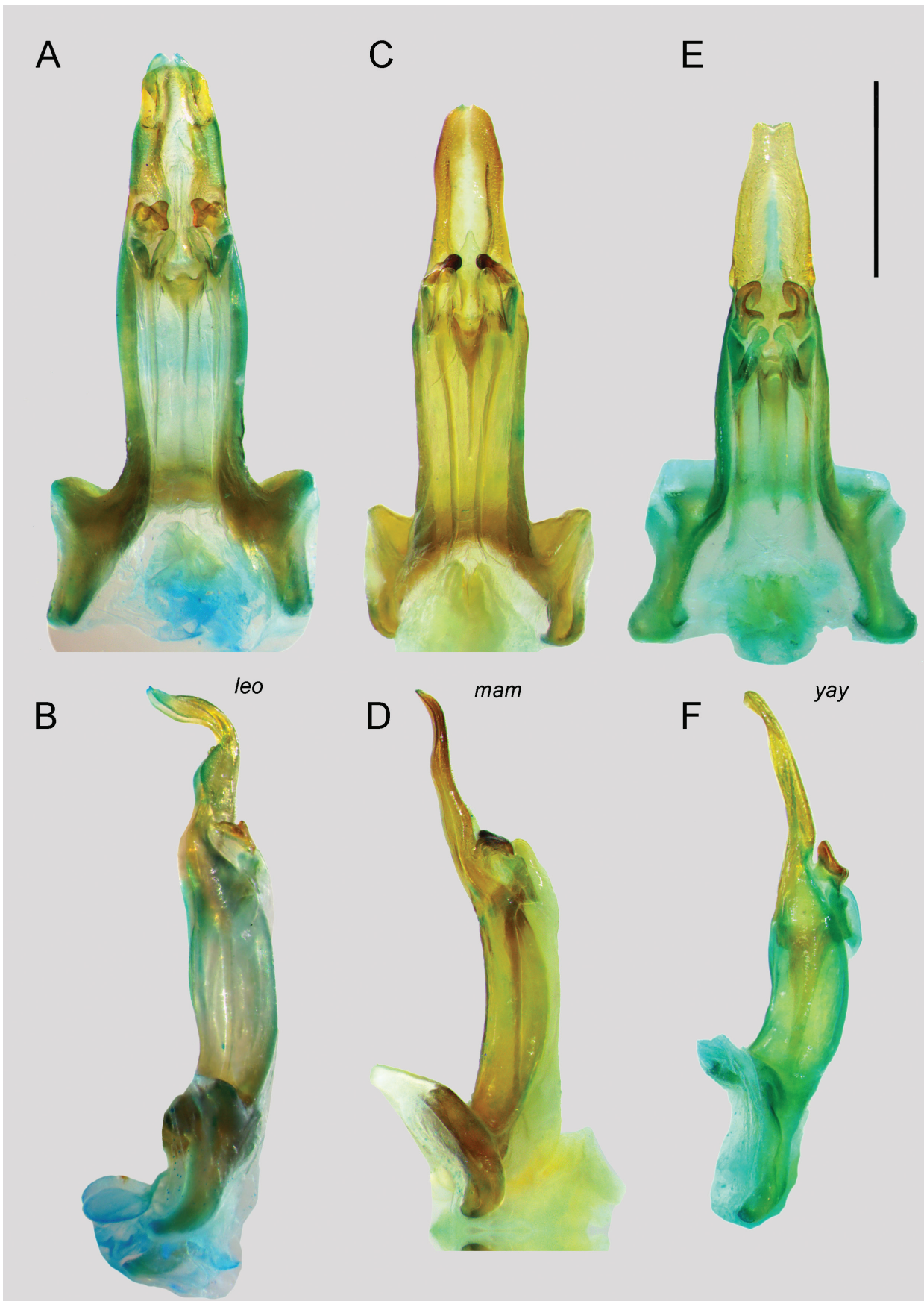


Fig. 11. Male genitalia ventral (A, C, E) and lateral (B, D, F) views: A, B. *R. leopoldi* (Chopard, 1931) comb. nov.; C, D. *R. mamberamo* sp. nov.; E, F. *R. yayukae* sp. nov. Scale bar: 1 mm.

spots ventral of stripes; clypeus sometimes darkened, mouthparts yellow brown to red brown (Fig. 5A). Pronotal disk red brown with lighter lateral ovular spots near anterior half and some faint lighter spots along posterior margin (Fig. 4A). Lateral lobes of pronotum dark brown, with yellow spot at anterior ventral corner (Fig. 6A). FIs and FIIs generally yellow brown with brown spots and rings; TIs and TIIs brown with two yellow brown rings. FIIIs brown, knees slightly darker.

Male. FW reaching apex of third tergite; apex rounded. FW coloration (Fig. 7A): Dorsal field cells and veins mostly brown; area between M and R yellow brown; basal area with a wide cream-colored spot on external corner. Lateral field dark brown. FW venation typical of genus; 1A slightly bisinuate anterior to angle; oblique vein trifurcated, posterior branch straight and transverse.

Male genitalia: (Figs 8A, 11A, 11B) Pseudepiphallus forming a very elongate rectangle, its basal margin slightly indented in the middle, lateral margins widened basally, forming wide shoulders carrying base of rami; posterior part of pseudepiphallus narrow, distinctly curved dorsally posterior to pseudepiphallus parameres, with two short dorsal pre-apical expansions (Fig. 8A); posterior apex truncated, posterior apex with small paired lophi, triangular with obtuse apex. Rami wide, very short, way shorter than half the pseudepiphallus length, diverging anteriorly, with posterior end protruding externally. Pseudepiphallus parameres strongly bent in basal half ($\sim 90^\circ$), with posterior apex enlarged, bean shaped. Ectophallic apodemes thin, parallel, and long, reaching beyond anterior margin of pseudepiphallus sclerite. Endophallic sclerite with anterior region very short and not reaching anterior margin of pseudepiphallus sclerite, with lateral arms elongated, tongue-shaped, and longer than median expansion.

Female. FW reaching base of third tergite, with basal area with a cream-colored oblong spot without clearly defined margin,

forming two indistinct spots near base and apex; lateral field dark brown (Fig. 9A).

Female genitalia: Ovipositor about as long as FIII. Copulatory papilla very small, rounded, apex folded ventrally, short, pointed; dorsal face with a sclerotized area; ventro-anterior end base forming an oval ring (Fig. 10A).

Measurements.—See Table 1.

***Rugabanthus mamberamo* sp. nov.**

<http://zoobank.org/31AB9356-DC05-4203-AD3B-F7257C4B611E>

(Figs 3, 4B, 5B, 6B, 7B, 8B, 9B, 10B, 11C, 11D, 12)

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Fawi [Faowi] village in upper part of Tariku River (tributary of Mamberamo River), partly low-lying forest and partly forest on hills; 29 January–17 February 2012; A. Gorochoy leg.; molecular sample L94; ZIN. **Paratype:** INDONESIA • 1 ♀; same information as holotype; MNHN-EO-ENSIF1758.

Type locality.—INDONESIA: West Papua: Faowi

Etymology.—This species is named after Mamberamo River; noun in apposition. The name is derived from the main river rather than the tributary Tariku River because it has more elongated and larger male genitalia compared to the sympatric species *R. tariku* sp. nov.

Diagnosis.—This new species differs from all congeners by male genitalia, with pseudepiphallus very slender and very elongate, close to that of *R. leopoldi* from which it differs by posterior apex forming a long flat spoon slightly curved dorsally near apex, looking like a simpler version of *R. leopoldi*, with thinner pre-apical expansions, apex somewhat truncated, without lophi; pseudepiphallus

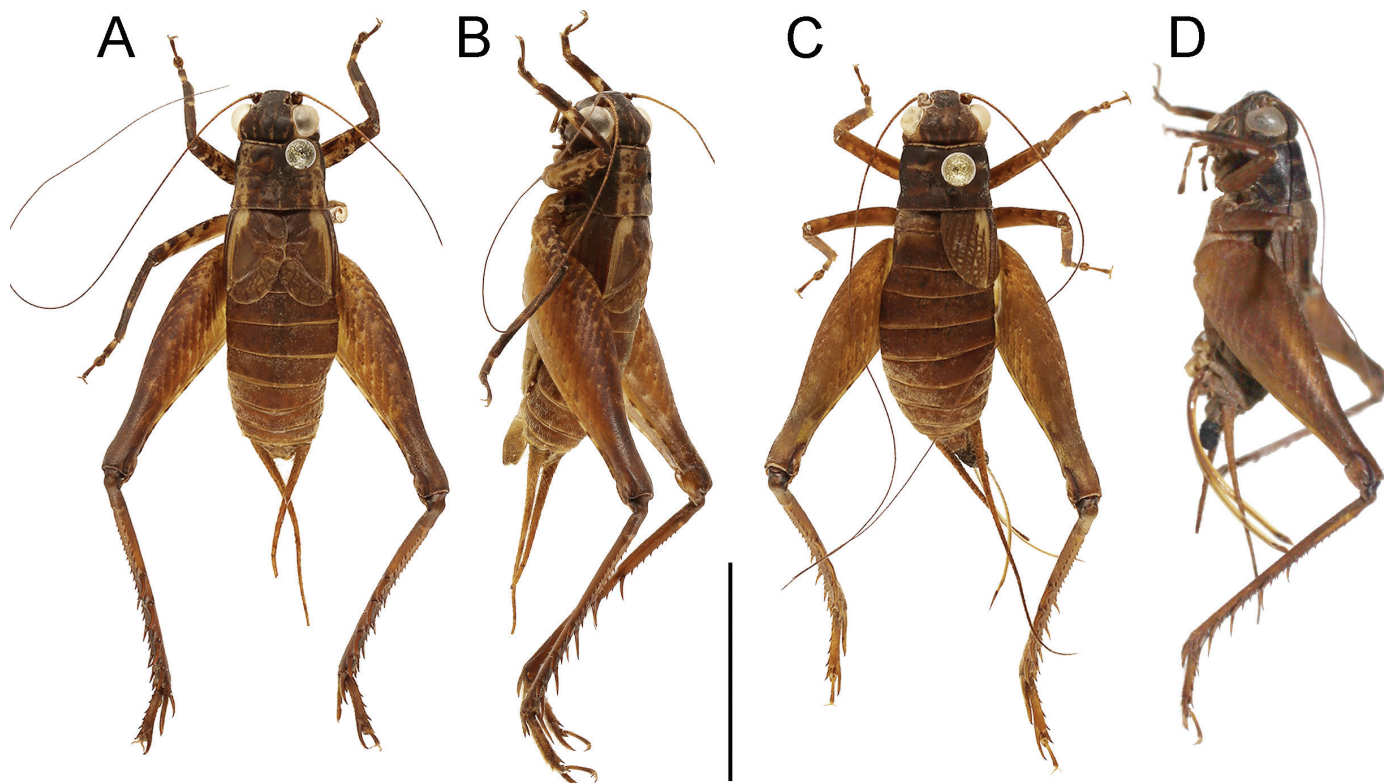


Fig. 12. *R. mamberamo* sp. nov. male (A, B) and female (C, D) habitus in dorsal (A, C) and lateral (B, D) views. Scale bar: 10 mm.

Table 1. Measurements (in mm).

	PronL	PronW	FWL	FWW	FIIL	FIHW	TIIL	OL
<i>R. leopoldi</i> (Chopard, 1931)								
Male paratype MNHN1441	3.0	4.9	4.5	3.0	13.7	3.9	10.4	-
Female paratype MNHN1443	3.3	4.9	3.8	2.8	14.3	4.5	12.2	14.1
Female paratype MNHN1442	3.2	5.0	4.0	2.6	14.2	4.5	10.9	14.8
<i>R. mamberamo</i> sp. nov.								
Male holotype	3.0	4.4	4.3	2.8	12.4	3.6	11.0	-
Female paratype	3.0	4.4	3.7	2.6	12.3	3.9	10.7	9.1
<i>R. yayukae</i> sp. nov.								
Male holotype	2.8	4.8	5.7	3.8	13.9	4.1	10.1	-
Males (n = 4)	2.6–3.3 (2.9)	4.7–5.0 (4.8)	4.9–6.0 (5.5)	3.8–4.5 (4.0)	13.4–15.6 (14.2)	4.1–4.7 (4.3)	10.1–12.6 (11.7)	-
<i>R. faoui</i> sp. nov.								
Male holotype	2.9	3.6	4.6	2.6	11.9	3.7	10.7	-
Males (n = 4)	2.9–3.3 (3.0)	3.6–5.2 (4.6)	4.6–6.7 (5.8)	2.6–3.5 (3.2)	11.9–15.8 (13.9)	3.7–4.5 (4.1)	10.7–13.1 (11.9)	-
Females (n = 4)	3.4–3.6 (3.5)	5.0–5.3 (5.1)	4.4–4.6 (4.5)	2.8–2.8 (2.6)	16.4–17.0 (16.7)	4.9–5.2 (5.0)	15.0–15.6 (15.4)	19.2–21.0 (20.2)
<i>R. kencana</i> sp. nov.								
Male holotype	3.0	5.0	6.9	5.0	-	-	-	-
Males (n = 2)	3.0–3.4 (3.2)	5.0–5.1 (5.13)	6.4–6.9 (6.7)	4.3–5.0 (4.7)	14.9 (14.9)	4.6 (4.6)	13.9 (13.9)	-
Female paratype	3.2	5.1	4.5	2.8	16.2	4.7	14.1	17.9
<i>R. manokwari</i> sp. nov.								
Male holotype	2.9	4.4	4.1	3.2	11.7	3.8	10.4	-
Female paratype	2.9	4.4	3.5	2.5	13.4	3.7	12.1	10.9
<i>R. maoke</i> sp. nov.								
Male holotype	3.4	5.8	6.5	4.7	18.0	5.2	11.0	-
Male paratype	3.6	5.5	6.5	5.0	17.3	4.9	15.8	-
<i>R. biakis</i> sp. nov.								
Male holotype	2.5	3.9	3.9	2.7	10.7	2.7	8.6	-
Males (n = 4)	2.4–2.5 (2.5)	3.9–4.0 (4.0)	3.7–2.4 (3.9)	2.7 (2.7)	10.4–11.3 (10.8)	2.7–3.5 (3.1)	7.9–9.1 (8.5)	-
<i>R. nabire</i> sp. nov.								
Male holotype	3.1	4.5	4.4	3.1	12.8	4.0	11.1	-
Males (n = 3)	2.8–3.1 (3.0)	4.3–4.7 (4.6)	4.1–4.4 (4.3)	3.1–3.4 (3.3)	12.8 (12.8)	3.8–4.0 (3.9)	11.0–11.1 (11.1)	-
Female paratype	3.0	4.6	4.4	2.8	15.2	3.1	11.5	13.6
<i>R. tariku</i> sp. nov.								
Male holotype	2.7	4.0	4.3	2.8	12.1	3.1	9.8	-
Males (n = 4)	2.6–3.0 (2.7)	4.0–4.4 (4.2)	4.2–4.7 (4.4)	2.3–2.8 (2.6)	11.8–12.6 (12.2)	3.1–3.8 (3.6)	9.8–10.7 (10.2)	-
Female (n = 2)	2.8–3.2 (3.0)	4.0–4.7 (4.4)	3.5 (3.5)	2.7 (2.7)	12.2–13.2 (12.7)	3.8 (3.8)	10.8–11.9 (11.4)	9.5–10.8 (10.2)
<i>R. albatros</i> sp. nov.								
Male holotype	2.9	4.7	5.8	3.5	15.7	4.6	13.0	-
Males (n = 3)	2.9–3.1 (3.0)	4.5–4.8 (4.7)	5.2–5.8 (5.5)	3.0–3.5 (3.3)	14.8–15.7 (15.4)	4.6–4.7 (4.6)	12.5–13.7 (13.0)	-
Female paratype	3.1	4.8	4.7	2.8	14.2	4.6	12.9	19.0
<i>R. baduri</i> sp. nov.								
Female holotype	3.2	5.2	3.5	2.5	13.0	4.5	10.4	13.4
<i>R. karimui</i> sp. nov.								
Male holotype	2.0	3.6	3.7	3.0	9.5	3.3	8.0	-
Male paratype	2.7	3.9	4.2	2.9	8.8	2.9	8.1	-
Female paratype	2.3	3.2	2.4	2.0	7.7	3.0	7.8	8.0

lic parameres stout, weakly curved, apex strongly sclerotized and rounded. From the sympatric species *R. tariku* sp. nov., the new species differs by larger size and by male and female genitalia.

Description.—Average sized among congeners (Fig. 12). Dorsum of head with broad red brown bands narrowly separated (Fig. 4B). Fastigium red brown (Fig. 4B). Scapes dark brown. Fastigium verticis and frons dark brown, frons without spots; clypeus and mouthparts dark brown, labrum yellow brown (Fig. 5B). Pronotal disk dark red brown, lateral parts yellow brown mottled with red brown patterns (Fig. 4B). Lateral lobes of pronotum dark brown, distinctly darker than disk (Fig. 6B). FIs and FIIs yellow brown with dense dark spots and patterns; TIs and TIIs dark brown with a cream-colored spot or incomplete ring in middle. FIIs brown, knees dark brown to black. Tergites brown, with posterior margin darker.

Male. FWs reaching middle of third abdominal tergite. FW coloration (Fig. 7B): Dorsal field cells and veins mostly brown; with area between M and R infumate cream-colored; basal area with a me-

dium cream-colored spot on external corner. Lateral field brown in dorsal half, gray brown in ventral half. FW venation typical of genus; 1A angle broken by a flat segment; oblique vein posterior branch almost straight. Apical field very small, with only one straight cell alignment posterior to D alignment. Apex of dorsal field rounded.

Male genitalia: (Figs 8B, 11C, 11D) Pseudepiphallus very slender and elongate, very sclerotized; slightly concave in lateral view, raised dorsally at base and apex; its basal margin almost straight, with a dorsal sclerotized plate; widened laterally, forming wide shoulders carrying bases of rami; lateral margins substraight; posterior part of pseudepiphallus elongate, forming a flat narrow spoon slightly concave, with two thin dorsal pre-apical expansions (Fig. 11C); posterior apex somewhat truncated, without lophi. Rami very short, way shorter than half the pseudepiphallus length. Pseudepiphallic parameres stout, weakly curved, their apex strongly sclerotized and rounded. Endophallic sclerite narrow, Y-shaped, with anterior region short and not reaching anterior margin of pseudepiphallic sclerite, with lateral arms elongated and slender, without median posterior expansion.

Female. FWs slightly surpassing second tergite. Dorsal field with a cream-colored oval spot at base without clearly defined margin (Fig. 9B).

Female genitalia: Ovipositor distinctly shorter than FIII. Copulatory papilla globular, its basal part with an irregular sclerotization forming a basal rim, with a large, rounded apex, mostly membranous and curved ventrally (Fig. 10B).

Measurements.—See Table 1.

***Rugabanthus yayukae* sp. nov.**

<http://zoobank.org/F2E2AF2E-A052-4128-A8F2-2E050707A859>

(Figs 3, 4C, 5C, 6C, 7C, 8C, 11E, 11F, 13)

Material examined.—**Holotype:** INDONESIA • ♂; Mountain slope above Bernhard Camp, 750 m; 19 March 1939; L. J. Toxopeus leg.; MZB-ORTH10791. **Paratypes:** INDONESIA • 1♂; Mountain slope above Bernhard Camp, 100 m; 8? April 1939; L. J. Toxopeus leg.; molecular sample L178; MZB-ORTH9414 • 1♂; Araucaria Camp 800 m; 3 March 1939; L. J. Toxopeus leg. (MZB-ORTH9417); molecular sample L212; MNHN-EO-ENSIF1728 • 1♂; N. Guinea, Bor?, ca. 400 m?; 8 April 1911; Dr P. N. Kampen Ned N.W Guinea Exp. leg.; RMNH.

Type locality.—INDONESIA: West Papua, Bernhard Camp.

Etymology.—The species is dedicated to Prof. Yayuk R. Suhardjono from the Zoological Museum, Cibinong Science Centre in Jakarta-Bogor (Indonesia).

Diagnosis.—This new species differs from all congeners by male genitalia, with characteristic shape of pseudepiphallus, its apical part tapering into a subacute apex and pseudepiphallic parameres including a median inner process and a triangular apex. The new species is close to *R. faowi* sp. nov. by general shape of male genitalia and shape of endophallic sclerite but differs by apex of pseudepiphallus and pseudepiphallic parameres.

Description.—Average to large sized among congeners (Fig. 13). Dorsum of head with broad red brown bands barely separated (Fig. 4C). Fastigium red brown (Fig. 4C). Scapes dark brown. Antennae yellow brown basally, distally brown with yellow rings. Fastigium verticis red brown with a faint yellow brown T-shaped pattern; frons brown without spots; clypeus and mouthparts brown (Fig. 5C). Pronotal disk red brown with very few irregular yellow brown patterns, with a yellow brown stripe near the latero-posterior margin (Fig. 4C). Lateral lobe of pronotum slightly darker than disk (Fig. 6C). Fls and FIIIs brown with few spots; TIs and TIIs dark brown with one yellow brown ring in middle. FIIIs brown, knees dark brown to black. Tergites brown, with posterior margin darker.

Male. FWs reaching middle of fourth abdominal tergite. FW coloration (Fig. 7C): Dorsal field cells and veins mostly brown, with a faint spot on external corner. Lateral field red brown, with ventral margin cream-colored. FW venation typical of genus, 1A slightly bisinuate anterior to angle. Harp longer than wide; posterior branch of oblique vein almost straight and transverse. Mirror (d1) slightly differentiated. Apical field with three parallel cell align-

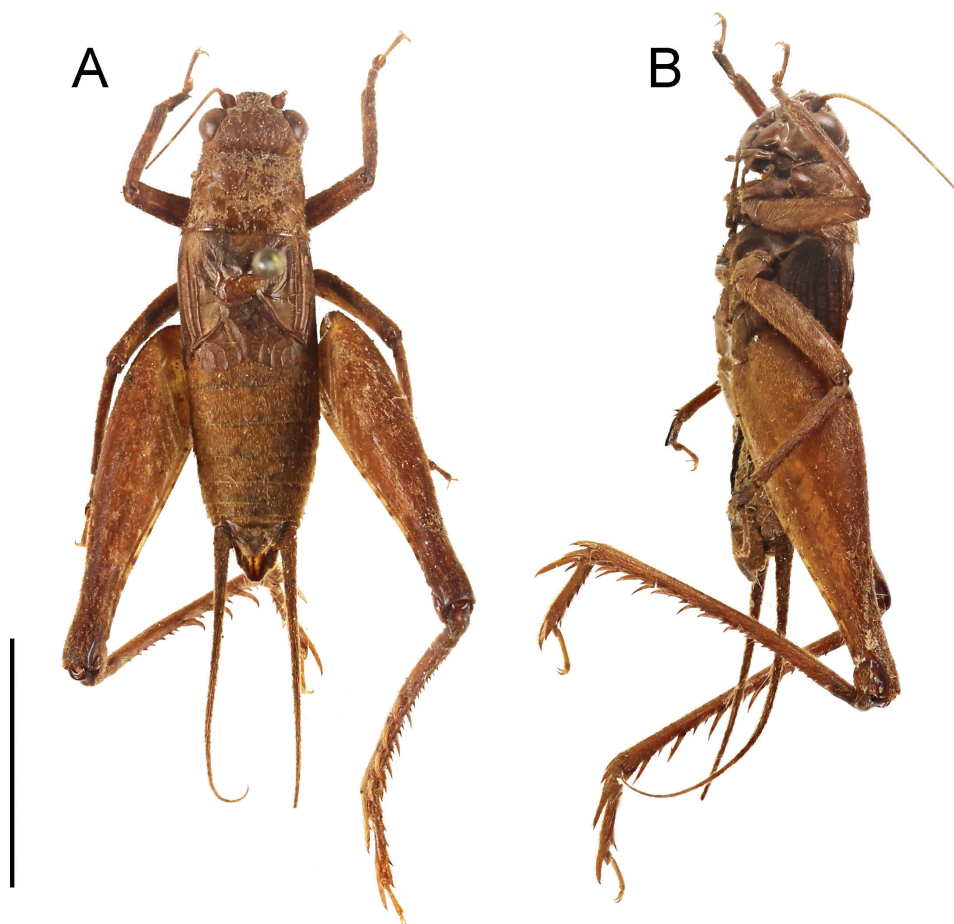


Fig. 13. *R. yayukae* sp. nov. male habitus in dorsal (A) and lateral (B) views. Scale bar: 10 mm.

ments (E–F–G) posterior to mirror. Apex of dorsal field obliquely rounded. Lateral field with projections of Sc slightly sinuous.

Male genitalia: (Figs 8C, 11E, 11F) Pseudepiphallus elongate, not convex dorsally, its basal margin straight, slightly widened laterally at base of rami and raised dorsally; lateral margin at basal half parallel and wider, tapering in middle into apical half; apical half faintly tapering then straightening at apex; posterior apex truncated and faintly indented in the middle. Rami very short, much shorter than half the pseudepiphallus length. Pseudepiphallallic parameres C-shaped, with inner lobe in middle with apical half triangular, tapering into a subacute apex; inner lobe straight, perpendicular to paramere. Ectophallic apodemes parallel and long, usually reaching beyond anterior margin of pseudepiphallallic sclerite. Endophallic sclerite with anterior region elongate, almost reaching anterior margin of pseudepiphallallic sclerite; posterior part with short triangular lateral arms, without median expansion.

Female. Unknown.

Measurements.—See Table 1.

***Rugabinthus faowi* sp. nov.**

<http://zoobank.org/40095825-464D-47BA-8171-19AE6950E3D9>

(Figs 3, 4D, 5D, 6D, 7D, 8D, 9C, 10C, 14, 15A, 15B)

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Fawi [Faowi] village in upper part of Tariku River (tributary of Mamberamo River), partly low-lying forest and partly forest on hills; 29 January–17 February 2012; A. Gorochoy leg.; molecular sample L92; ZIN. **Paratypes:** INDONESIA • 1♀; same information

as holotype; ZIN • 4♂, 6♀; same information as holotype; ZIN • 1♂, 1♀; same information as holotype; MZB • 1♂, 1♀; same information as holotype; MNHN-EO-ENSIF11144–ENSIF11145.

Type locality.—INDONESIA: West Papua: Faowi.

Etymology.—This species is named after the type locality Faowi; noun in apposition. Even though three species of *Rugabinthus* are found in Faowi, this species was the most abundantly collected.

Diagnosis.—This new species is close to *R. manokwari* sp. nov., *R. kencana* sp. nov., and *R. maoke* sp. nov. in terms of male FW venation with 1A not indented, and by male genitalia with pseudepiphallus triangular. This new species differs from *R. manokwari* sp. nov. by larger size, darker coloration, apex of pseudepiphallus not indented, and slight difference in shape of pseudepiphallallic parameres. This new species differs from *R. kencana* sp. nov. and *R. maoke* sp. nov. by lateral margins of pseudepiphallus more indented in the middle and shape of pseudepiphallallic parameres.

Description.—Large sized among congeners (Fig. 14). Dorsum of head with broad red brown bands narrowly separated (Fig. 4D). Fastigium red brown (Fig. 4D). Scapes red brown. Fastigium verticis and frons brown, frons with very faint light spots; clypeus and mouthparts brown, labrum distinctly cream-colored (Fig. 5D). Pronotal disk red brown with some irregular yellow brown patterns laterally and near the anterior margin, with lighter lateral ovular spots near anterior half and with a yellow brown stripe near the latero-posterior margin (Fig. 4D). Lateral lobes not darker

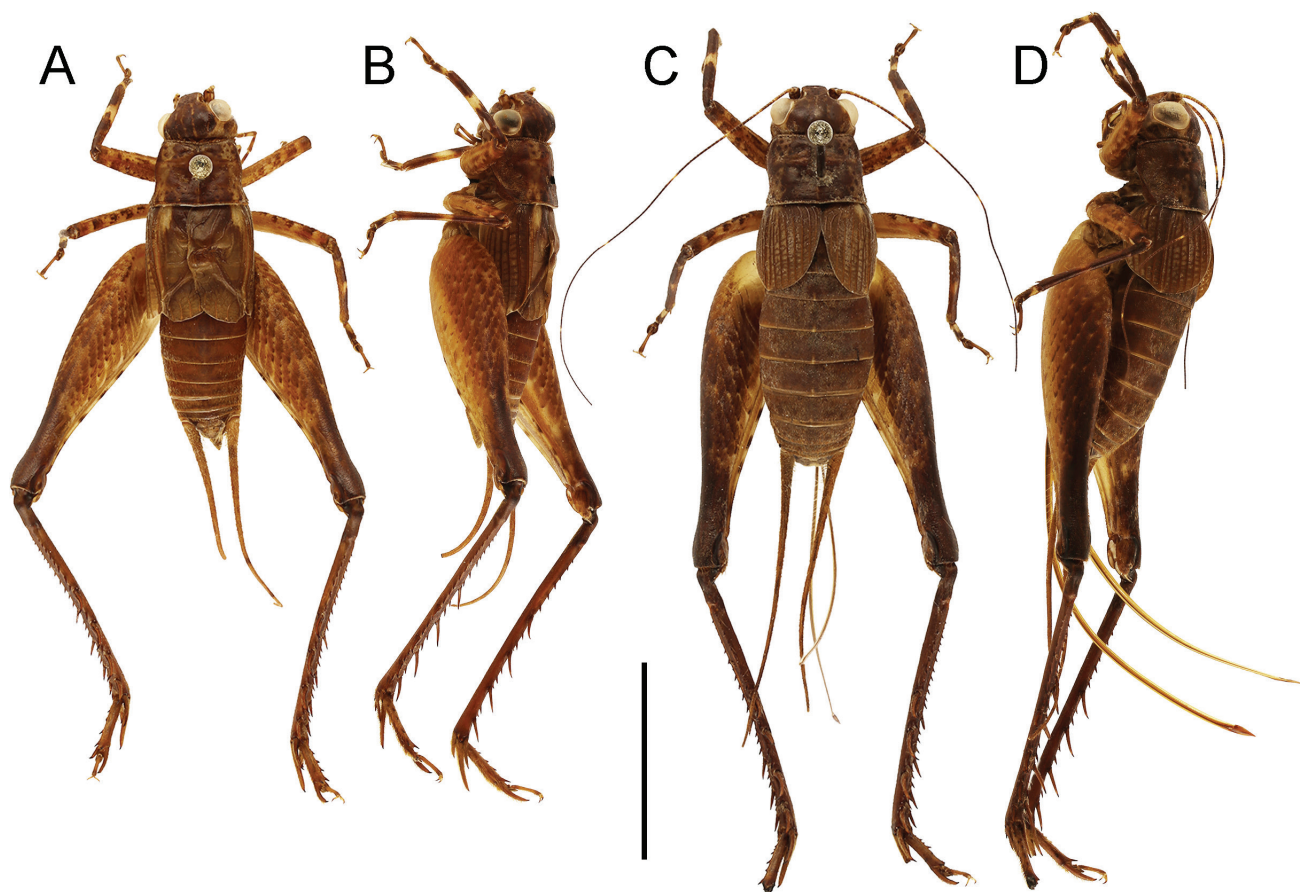


Fig. 14. *R. faowi* sp. nov. male (A, B) and female (C, D) habitus in dorsal (A, C) and lateral (B, D) views. Scale bar: 10 mm.

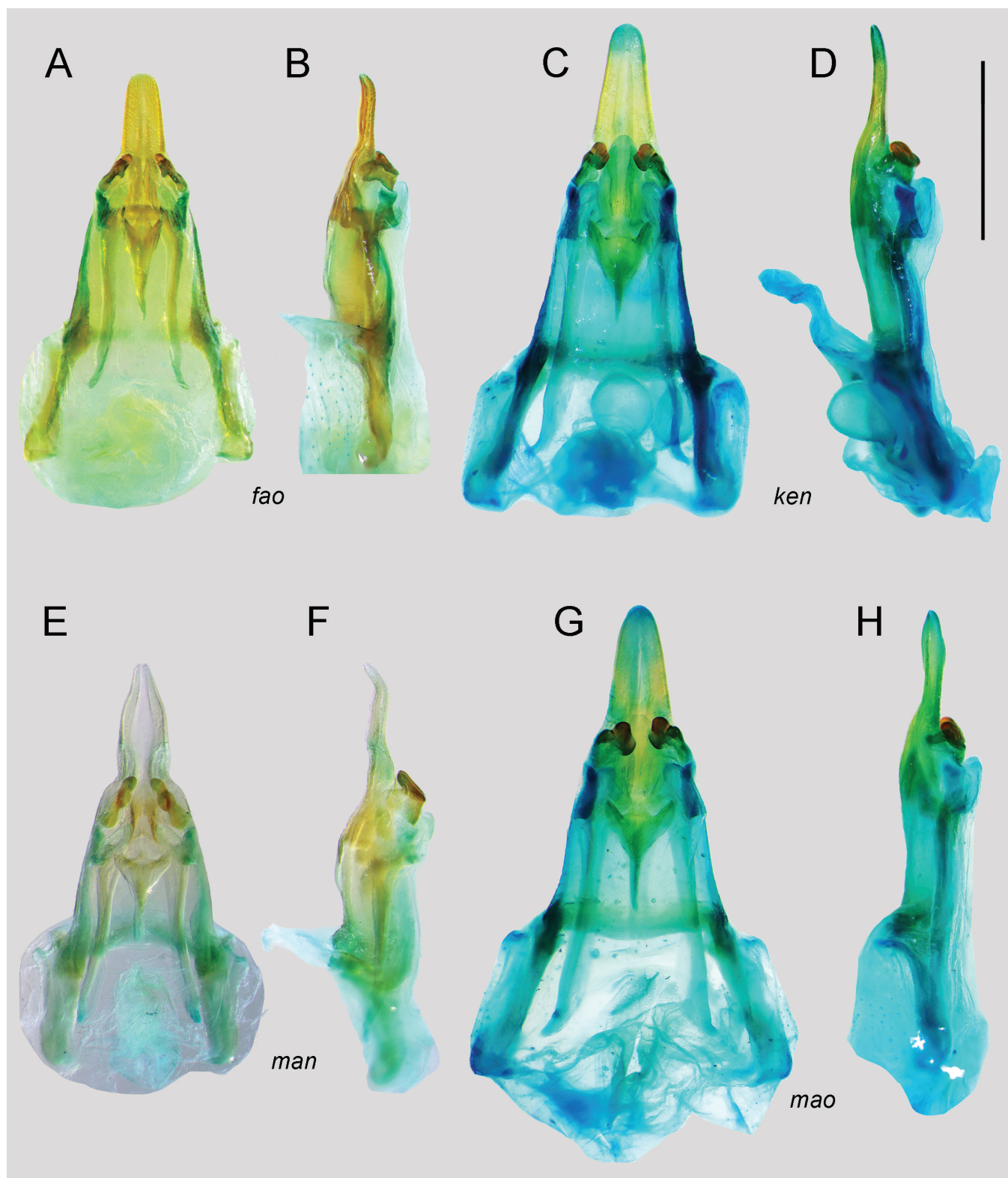


Fig. 15. Male genitalia ventral (A, C, E, G) and lateral (B, D, F, H) views: A, B. *R. faowi* sp. nov.; C, D. *R. kencana* sp. nov.; E, F. *R. manokwari* sp. nov.; G, H. *R. maoko* sp. nov. Scale bar: 1 mm.

than disk (Fig. 6D). FIs and FIIs yellow brown with dense dark spots and patterns (less dense in inner surface of FIIs); TIs dark brown with a broad cream-colored ring in middle, TIIs with one or two incomplete rings. FIIs brown, knees dark brown to black. Tergites brown, with posterior margin darker.

Male. FWs reaching middle of fourth abdominal tergite. FW coloration (Fig. 7D): Dorsal field cells and veins mostly brown; with area between M and R infumate cream-colored; basal area with a cream-colored spot on external corner. Lateral field with brown veins, cells with dorsal part brown, otherwise cream-color-

ed. FW venation typical of genus; 1A forming a right angle, slightly bisinuate anterior to angle; oblique vein posterior branch almost straight, anterior one bifurcated. Apical field with two cell alignment posterior to D alignment. Apex of dorsal field rounded.

Male genitalia: (Figs 8D, 15A, 15B) Pseudepiphallus triangular, slightly convex dorsally in lateral view; its basal margin straight, not indented, slightly widened laterally at base of rami; basal third much wider and lateral margins tapering to a narrower apical third; posterior third forming a thick spoon-like finger, gently tapering into a narrow posterior apex, truncated and without lophi. Rami short, shorter than half of pseudopiphallus length, slightly diverging anteriorly. Pseudopiphallus parameres stout, somewhat straight, and not bent or curved, with small internal lobule in middle, apex not swollen and obtuse. Ectopiphallus fold triangular, membranous apically, with parallel lateral sclerites. Ectopiphallus apodemes parallel and long, surpassing beyond anterior margin of pseudopiphallus sclerite with lateral arms elongated triangular. Endopiphallus sclerite with anterior region triangular, barely reaching anterior margin of pseudopiphallus sclerite; its posterior apex trident-like, with tongue-shaped lateral arms not surpassing large median posterior expansion.

Female. FW slightly surpassing second tergite, with a small cream-colored rounded spot at base and one fainter at apex (Fig. 9C).

Female genitalia: Ovipositor distinctly longer than FIII. Copulatory papilla globular, its base with a semi-complete ring-like sclerotization; apex folded ventrally, short and rounded, slightly sclerotized on apical face (Fig. 10C).

Measurements.—See Table 1.

***Rugabinthus kencana* sp. nov.**

<http://zoobank.org/DE3097D6-3C0D-4170-9657-807576C2BC19>
(Figs 3, 4E, 5E, 6E, 7E, 8E, 9D, 10D, 15C, 15D, 16)

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Timika (Irian Jaya Freeport Concession Timika); lowland forest,

Kuala Kencana nr. sewage plant; 4°26.21'S, 136°51.84'W, 100 m; 17–24 March 1997; S. Miller, Peggie, Yaku, Ubaidillah leg.; molecular sample L46; MZB-ORHT97020. **Paratypes:** INDONESIA • 1♀; West Papua, Timika (Irian Jaya Freeport Concession Timika); lowland rainforest, Kuala Kencana Light Ind. Park 4°26.21'S 136°52.59'W, 100 m, Malaise trap 1 (site 5); (MZB 97024); MNHN-EO-ENSIF3552 • 1♂; West Papua, Freeport MT2 plot #5; 12–25 March 1997; molecular sample L11LFRE1; (MZB-ORTH97025-5); MNHN-EO-ENSIF1760.

Type locality.—INDONESIA: West Papua: Kuala Kencana.

Etymology.—The species is named after the type locality: Kuala Kencana; noun in apposition.

Diagnosis.—This new species differs from all congeners by its large size, the large triangular shape of male pseudopiphallus, and stout pseudopiphallus parameres, gently curved but not bent in middle, apex swollen and bilobate. The new species is very similar to *R. maoke* sp. nov. but differs by overall smaller size, male FW venation with two cell alignments in apical field (instead of one in *R. maoke* sp. nov.), shape of oblique vein, and male genitalia with distinctly smaller pseudopiphallus and endopiphallus sclerite shorter anteriorly (forming a Y-shape in *R. maoke* sp. nov.), with lateral arms pointing more posteriorly. The male genitalia are also similar to *R. manokwari* sp. nov. but differ by the absence of indentation at base of the apical third of lateral margin and shape of pseudopiphallus parameres.

Description.—Large sized among congeners (Fig. 16). Dorsum of head with broad red brown bands faintly to narrowly separated (Fig. 4E). Fastigium red brown (Fig. 4E). Scapes dark brown, posterior part yellow with a dark spot. Fastigium verticis and frons black, and black beneath scapes; clypeus and mouthparts pale brown with darker patterns (Fig. 5E). Pronotal disk red brown with some faint and irregular paler brown patterns (Fig. 4E).

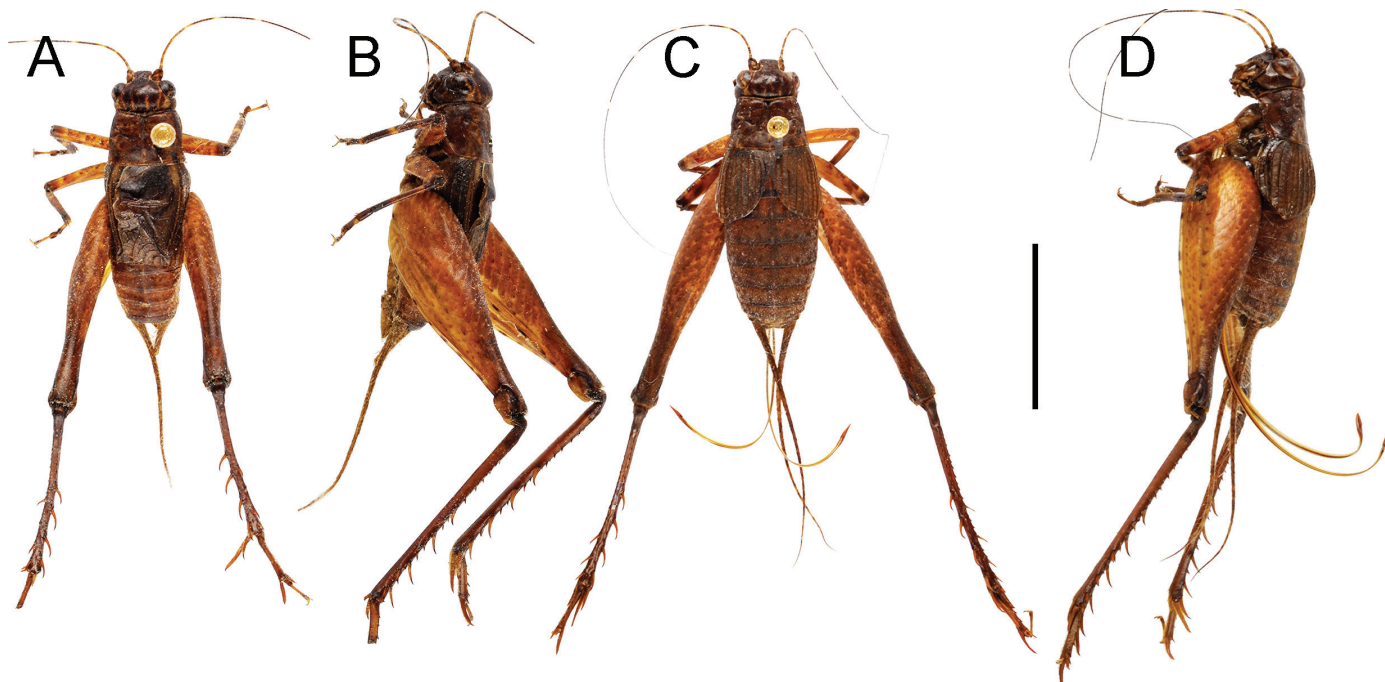


Fig. 16. *R. kencana* sp. nov. male (A, B) and female (C, D) habitus in dorsal (A, C) and lateral (B, D) views. Scale bar: 10 mm.

Lateral lobes slightly darker than disk, dark brown except a yellow spot on ventral margin (Fig. 6E). FIs and FIIs brown with a few dark spots near knees, TIs and TIIs dark with pale yellow rings. FIIs brown, knees dark brown. Tergites brown, with posterior margin darker.

Male. FWs reaching apex of fourth abdominal tergite. FW coloration (Fig. 7E): Dorsal field cells and veins mostly brown; with area between M and R dark brown; basal area with a small cream-colored spot on external corner. Lateral field red brown, with ventral region more yellow brown. FW venation typical of genus; 1A forming a right angle, without notch anterior to angle; oblique vein bifurcated, posterior branch almost straight. Cells of D alignment homogeneous. Apex of dorsal field obliquely rounded. Apical field with two cell alignments.

Male genitalia: (Figs 8E, 15C, 15D) Pseudepiphallus triangular, its basal margin straight, not indented; basal third much wider, lateral margin tapering to a narrower apical third; apical third tapering into a narrow posterior apex, not narrowed preapically, apex subacute, without lophi. Rami short, slightly shorter than half of pseudepiphallus length, slightly diverging anteriorly. Pseudepiphallic parameres stout, gently curved but not bent in middle, apex swollen and bilobate. Ectophallic apodemes parallel and long, widened apically, surpassing beyond anterior margin of pseudepiphallic sclerite. Endophallic sclerite with anterior region triangular, barely reaching anterior margin of pseudepiphallic

sclerite; its posterior apex trident-like, with short lateral arms not surpassing median posterior expansion.

Female. FW faintly surpassing apex of third tergite, homogeneously brown, without a basal spot (Fig. 9D).

Female genitalia: Ovipositor slightly longer than FIII. Copulatory papilla very small, somewhat rectangular, its basal part with sclerotization forming a basal rim, apex almost as wide as base, ended by a narrow stout and truncated lobule (Fig. 10D).

Measurements.—See Table 1.

Rugabanthus manokwari sp. nov.

<http://zoobank.org/AB112D2B-497F-4577-A9EE-42160922A12C>

(Figs 3, 4F, 5F, 6F, 7F, 8F, 9E, 10E, 15E, 15F, 17)

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Manokwari, Vogelkop, 75 m; 24 July 1957; D. Elmo Hardy leg.; BPBM. **Paratype:** INDONESIA • 1♀; West Papua, Manokwari town, primary forest on hills near sea; 4–6 November 2004; A. Gorochoy leg.; molecular sample L88; ZIN.

Type locality.—INDONESIA: West Papua: Manokwari

Etymology.—The species is named after the type locality Manokwari; noun in apposition.

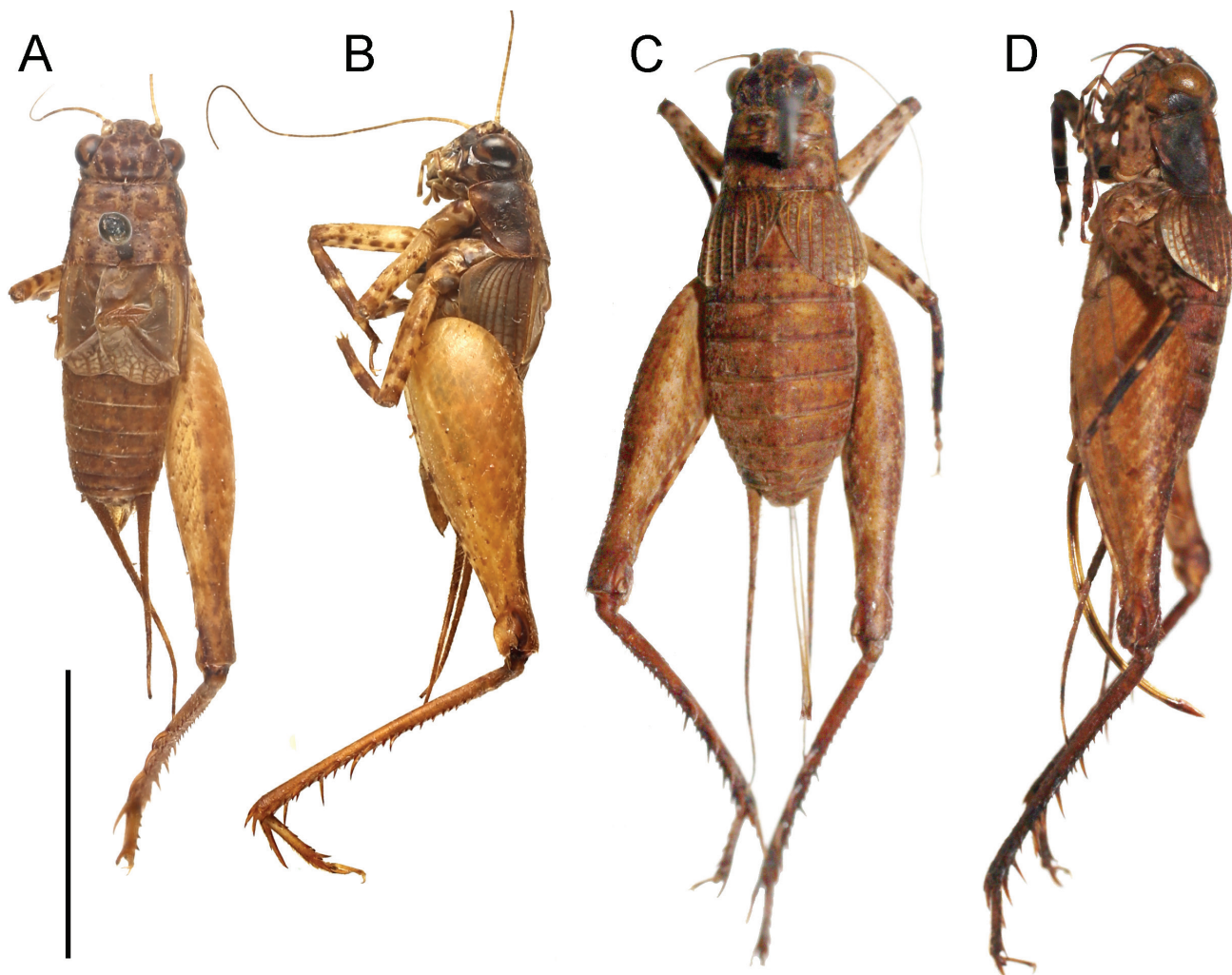


Fig. 17. *R. manokwari* sp. nov. male (A, B) and female (C, D) habitus in dorsal (A, C) and lateral (B, D) views. Scale bar: 10 mm.

Diagnosis.—This new species differs from all congeners by lighter coloration, including pronotal disk yellow brown with sparse red brown patterns, and shape of male genitalia. Among species group, *R. manokwari* sp. nov. differs by male genitalia with pseudepiphallus indented dorsally at base of apical region and tapering to a narrower apex. This species has similar pale coloration as *R. biakis* sp. nov. but differs by absence of longitudinal median stripe in the pronotal disk and by shape of male genitalia.

Description.—Size average for the genus (Fig. 17). Dorsum of head yellow brown with five well-separated red brown longitudinal bands, middle one corresponding to incomplete fusion of two bands (Fig. 4F). Fastigium yellow brown with red brown patterns. Scapes yellow brown with dark patterns. Antennae yellow basally, distally brown with pale yellow rings. Fastigium verticis black with a yellow cross-shaped pattern; frons dark brown to black with two lateral yellow spots, black beneath scapes; clypeus and mouthparts black dorsally, pale yellow ventrally (Fig. 5F). Head lateral side red brown, genae slightly lighter with a triangular pale spot. Pronotal disk yellow brown mottled with dark brown (Fig. 4F). Lateral lobes of pronotum distinctly darker than disk, dark red brown, with a paler stripe near ventral margin (Fig. 6F). FIs and FIIs mostly cream-colored with a few well-defined brown spots, knee areas brown; TIs and TIIs dark brown with a cream-

colored ring in middle. FIIs yellow brown, knees brown. Tergites unicolorous brown.

Male. FW reaching base of fourth abdominal tergite. FW coloration (Fig. 7F): Cells and veins of dorsal field mostly brown; area between M and R cream-colored; basal area with a cream-colored spot on external corner. Lateral field red brown, with ventral region more yellow brown. FW venation typical of genus; 1A slightly bisinuate anterior to angle; oblique vein bifurcated, posterior branch slightly sinuous. Apex of dorsal field rounded; apical parts of its longitudinal veins very strong. Apical field reduced, including few cells of E alignment only.

Male genitalia: (Figs 8F, 15E, 15F). Pseudepiphallus triangular, its basal margin slightly indented in the middle, basal third much wider, lateral margins indented and tapering to a narrower apical third, elongate as characteristic of the species group. Apical third narrowed in dorsal view, slightly concave dorsally, tapering into a narrow posterior apex; slightly truncated and indented apically. Rami short, slightly shorter than half of pseudepiphallus length, slightly diverging anteriorly. Pseudepiphallic parameres stout, not bent in middle, apical half finger-like with subacute apex. Ectophallic apodemes parallel and long, surpassing beyond anterior margin of pseudepiphallic sclerite. Endophallic sclerite with anterior region short and barely reaching anterior margin of pseudepiphallic sclerite, with posterior lateral arms tongue-shaped and slightly longer than median expansion.

Female. FW reaching middle of second tergite, with an apical indistinct cream-colored spot (Fig. 9E).

Female genitalia: Ovipositor shorter than FIII. Copulatory papilla conical, smaller and stout; apex folded ventrally, short, pointed; dorsal face with a sclerotized area; ventro-anterior end forming an oval to pyriform rim (Fig. 10E).

Measurements.—See Table 1.

Rugabinthus maoke sp. nov.

<http://zoobank.org/DA4BAC81-EDD1-4F86-921B-4AC602F47257>

(Figs 3, 4G, 5G, 6G, 7G, 8G, 15G, 15H, 18)

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Star Range; 25 m; 10 September 1959; Neth. New Guinea Exped 1959 leg.; RMNH. **Paratype:** INDONESIA • 1♂; West Papua, Star Range; 25 m; 10 September 1959; Neth. New Guinea Exped 1959 leg.; molecular sample L179; MNHN-EO-ENSIF1757.

Type locality.—INDONESIA: West Papua: Star Range

Etymology.—This species is named after the Maoke Mountain Range where Star Range was situated within; noun in apposition.

Diagnosis.—This new species is very similar to *R. kencana* but differs by overall larger size, distinctly larger pseudepiphallus, and endophallic sclerite with lateral arms more elongated and pointing more externally.

Description.—Large sized among congeners (Fig. 18). Dorsum of head with broad red brown bands faintly to narrowly separated (Fig. 4G). Fastigium red brown (Fig. 4G). Scapes dark red brown. Fastigium verticis and frons dark red brown, black beneath scapes; clypeus and mouthparts pale brown with darker patterns (Fig. 5G). Pronotal disk red brown with some faint and irregular paler brown patterns (Fig. 4G). Lateral lobes faintly darker than disk, dark brown except for a yellow spot on ventral margin (Fig. 6G).



Fig. 18. *R. maoke* sp. nov. male habitus in dorsal (A) and lateral (B) views. Scale bar: 10 mm.

FIs and FIIs yellow brown with a few dark spots near knees, TIs dark brown with a pale yellow ring in middle, TIIs mostly dark. FIIIs brown, knees dark brown. Tergites brown, with posterior margin darker.

Male. FWs reaching base of fourth abdominal tergite. FW coloration (Fig. 7G): Dorsal field cells and veins mostly brown; with area between M and R dark brown; basal area with a small cream-colored spot on external corner. Lateral field red brown, with ventral region more yellow brown. FW venation typical of genus; 1A forming a right angle, without notch anterior to angle; oblique vein bifurcated, posterior part sinuated. Cells of D alignment widened posteriorly. Apex of dorsal field obliquely rounded.

Male genitalia: (Figs 8G, 15G, 15H) Pseudepiphallus very similar to *R. kencana*, triangular with an indented, narrow apical third with subacute apex, but differs by being distinctly larger. Rami, pseudepiphallallic parameres and ectophallallic apodemes similar. Endophallallic sclerite with anterior region triangular, not reaching anterior margin of pseudepiphallallic sclerite, with long posterior lateral arms pointing diagonally and surpassing median expansion.

Female. Unknown.

Measurements.—See Table 1.

***Rugabinthus biakis* sp. nov.**

<http://zoobank.org/D074F7D3-D6C5-463C-8D3E-4EFD304AD4C9>
(Figs 3, 4H, 5H, 6H, 7H, 8H, 19, 20A, 20B)

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Biak Island (not far from N. coast of W New Guinea), secondary forest on hill near vill. Corem; 14–15 November 2004; A. Gorochoy leg.; ZIN. **Paratypes:** INDONESIA • 1♂; same information as holotype; molecular sample L86; MZB • 1♂; Biak Island (not far from N. coast of W New Guinea), secondary forest on hill near

vill. Corem; 14–15 November 2004; A. Gorochoy leg.; MNHN-EO-ENSIF1745.

Other material.—INDONESIA • 1 juvenile; West Papua, Biak Island, Biak Town, forest on not high hill near airport; 17–20 January 2012; leg. A. Gorochoy; molecular sample L85; ZIN.

Type locality.—INDONESIA: West Papua: Biak.

Etymology.—The species is named after the type locality: Biak Island.

Diagnosis.—This new species differs from all congeners by its small size; dorsum of head yellow brown with five well-separated and well-defined dark brown longitudinal bands; pronotal disk yellow brown with a median dark brown longitudinal band and sparse but well defined dark brown spots of different sizes; lateral lobe contrasting dark in coloration. It also differs from all congeners by male genitalia with pseudepiphallus rectangular, stouter than congeners, apex truncated forming a short posterior plate with a small median nodule.

Description.—Small sized among congeners (Fig. 19). Dorsum of head yellow brown with five well-separated and well-defined dark brown longitudinal bands, middle band widest resulting from fusion of two bands, partly split anteriorly (Fig. 4H). Fastigium yellow brown with dark brown patterns. Scapes brown. Antennae yellow brown basally, distally brown with yellow rings. Fastigium verticis and frons black, frons with two faint yellow brown spots, eyes underlined with yellow; clypeus and mouthparts dark brown to black, labrum distinctly cream-colored (Fig. 5H). Maxillary palpi cream-colored with brown patterns. Pronotal disk yellow brown with a median dark brown longitudinal band and sparse but well defined dark brown spots of different size (Fig. 4H). Lateral lobes of pronotum entirely dark brown, distinctly darker than disk (Fig. 6H). Legs pale yellow brown with well-defined brown spots and rings. FIs and FIIs mostly cream-colored with a few well-defined brown spots, knees brown; TIs and TIIs dark brown with a cream-colored ring in middle. FIIIs cream-colored with numerous oblique dark brown bands, knees dark brown. Tergites unicolorous dark brown.

Male. FWs reaching middle of fourth abdominal tergite. FW coloration (Fig. 7H): Dorsal field cells and veins mostly brown; some veins near basal area cream-colored; M vein orange brown; area between M and R infumate cream-colored; basal area with a large cream-colored spot on anterior corner and another one near 1A and 2A. Lateral field dark red brown in dorsal half, gray brown in ventral half. FW venation typical of genus, 1A bisinuate anterior to angle; oblique vein base faded, both its posterior and anterior branches almost straight. Apex of dorsal field obliquely rounded.

Male genitalia: (Figs 8H, 20A, 20B) Pseudepiphallus rectangular, stouter, and shorter than in congeners, very wide laterally at base of rami, its basal anterior margin almost straight, lateral margin generally parallel, apex truncated, forming a short posterior plate, slightly concave dorsally, with a small median nodule. Rami short, but longer than half of pseudepiphallus length. Pseudepiphallallic parameres strongly bent 90° in the middle, apex strongly sclerotized and forming two stout lobules. Ectophallallic apodemes surpassing anterior margin of pseudepiphallallic sclerite. Endophallallic sclerite short, barely reaching anterior margin of pseudepiphallus, with thin posterior lateral arms and a very small medio-posterior expansion.

Female. Unknown.

Measurements.—See Table 1.



Fig. 19. *R. biakis* sp. nov. male habitus in dorsal (A) and lateral (B) views. Scale bar: 10 mm.

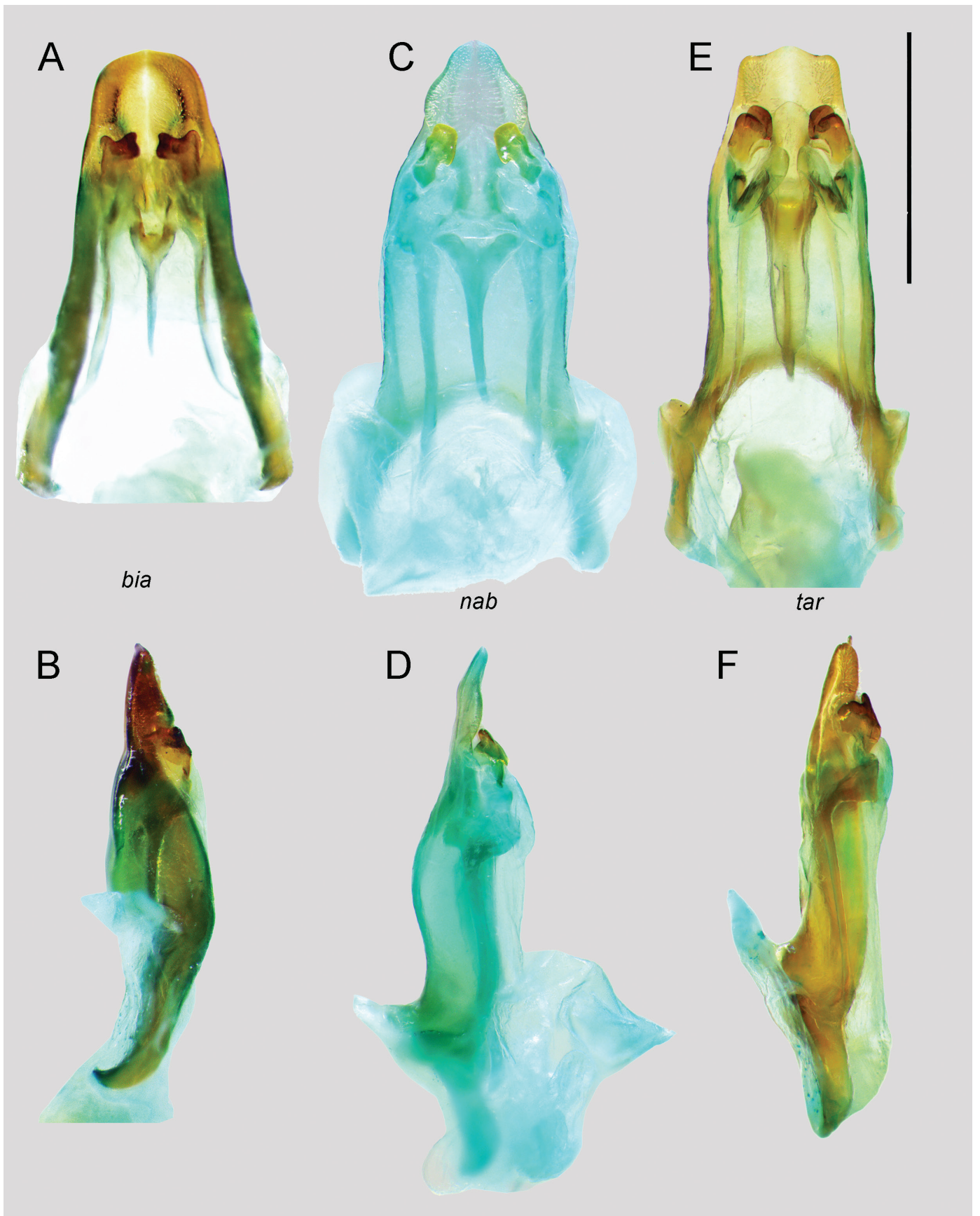


Fig. 20. Male genitalia ventral (A, C, E) and lateral (B, D, F) views: A, B. *R. biakis* sp. nov.; C, D. *R. nabire* sp. nov.; E, F. *R. tariku* sp. nov. Scale bar: 1 mm.

Rugabinthus nabire sp. nov.

<http://zoobank.org/EB99A2A4-2D8A-46A9-89B8-247023253B58>

(Figs 3, 4I, 5I, 6I, 7I, 8I, 9F, 10F, 20C, 20D, 21)

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Nabire, S. Geelvink Bay, 5–50 m; 25 August–2 September 1962; J. Sedlacek leg.; BPBM. **Paratypes:** INDONESIA • 1♀; West Papua, Nabire, S. Geelvink Bay, 0–30 m; 2–9 September 1962; J. L. Gressitt leg.; BPBM • 1♂; West Papua, Nabire, S. Geelvink Bay, 10–40 m; 13 October 1962; N. Wilson leg.; molecular sample L162; BPBM • 1♂; West Papua, Nabire, S. Geelvink Bay; 16 September 1962; Malaise trap, in jungle; H. Holtmann leg.; MNHN-EO-EN-SIF11332 • 1♂; West Papua, Nabire, S. Geelvink Bay, 10–40 m; sweeping; 12 October 1962; N. Wilson leg.; BPBM.

Type locality.—INDONESIA: West Papua: Nabire.

Etymology.—The species is named after the type locality, Nabire; noun in apposition.

Diagnosis.—This new species differs from all congeners by male subgenital plate rounded apically (pointed in all congeners) and male genitalia with stout pseudepiphallus, slightly convex dorsally, its posterior part very short, slightly concave dorsally, with apex narrowed forming two small lophi with subacute apices; basal margin of pseudepiphallus strongly indented in the middle; pseudepiphallic parameres stout, posterior half forming an

internal lobe, apex truncated. Except for the respective original characters of each species, in particular in the shape of the apical part of the pseudepiphallus, the male genitalia of the new species resemble that of *R. karimui* sp. nov. and *R. albatros* sp. nov.

Description.—Average sized among congeners (Fig. 21). Dorsum of head with 6 broad dark red brown bands barely separated (Fig. 4I). Fastigium dark red brown (Fig. 4I). Scares yellow brown with red brown bands. Fastigium verticis dark brown with a faint M-shaped yellow brown pattern, frons dark brown with two faint yellow brown spots; clypeus and mouthparts yellow brown with dark brown patterns (Fig. 5I). Pronotal disk and lateral lobe unicolorous dark red brown, pronotal disk with two faint lateral spots along posterior margin, lateral lobe not darker than disk (Figs 4I, 6I). FIs and FIIs cream-colored with dark spots, TIs and TIIs dark brown with one median pale ring. FIIs yellow brown in ventral half to red brown in dorsal half, knees dark brown. Tergites brown.

Male. FWs slightly surpassing apex of fourth abdominal tergite. FW coloration (Fig. 7I): Dorsal field cells and veins mostly brown; area between M and R whitish; basal area with a small cream-colored well-defined spot on external corner. Lateral field dark red brown, with ventral margin cream-colored. FW venation typical of genus; 1A bisinuate anteriorly to angle; oblique vein bifurcated, posterior branch almost straight. Apex of dorsal field rounded. Apical field with only few cells in E alignment. Apex of longitudinal veins in dorsal field strong. Subgenital plate short, its apex rounded.

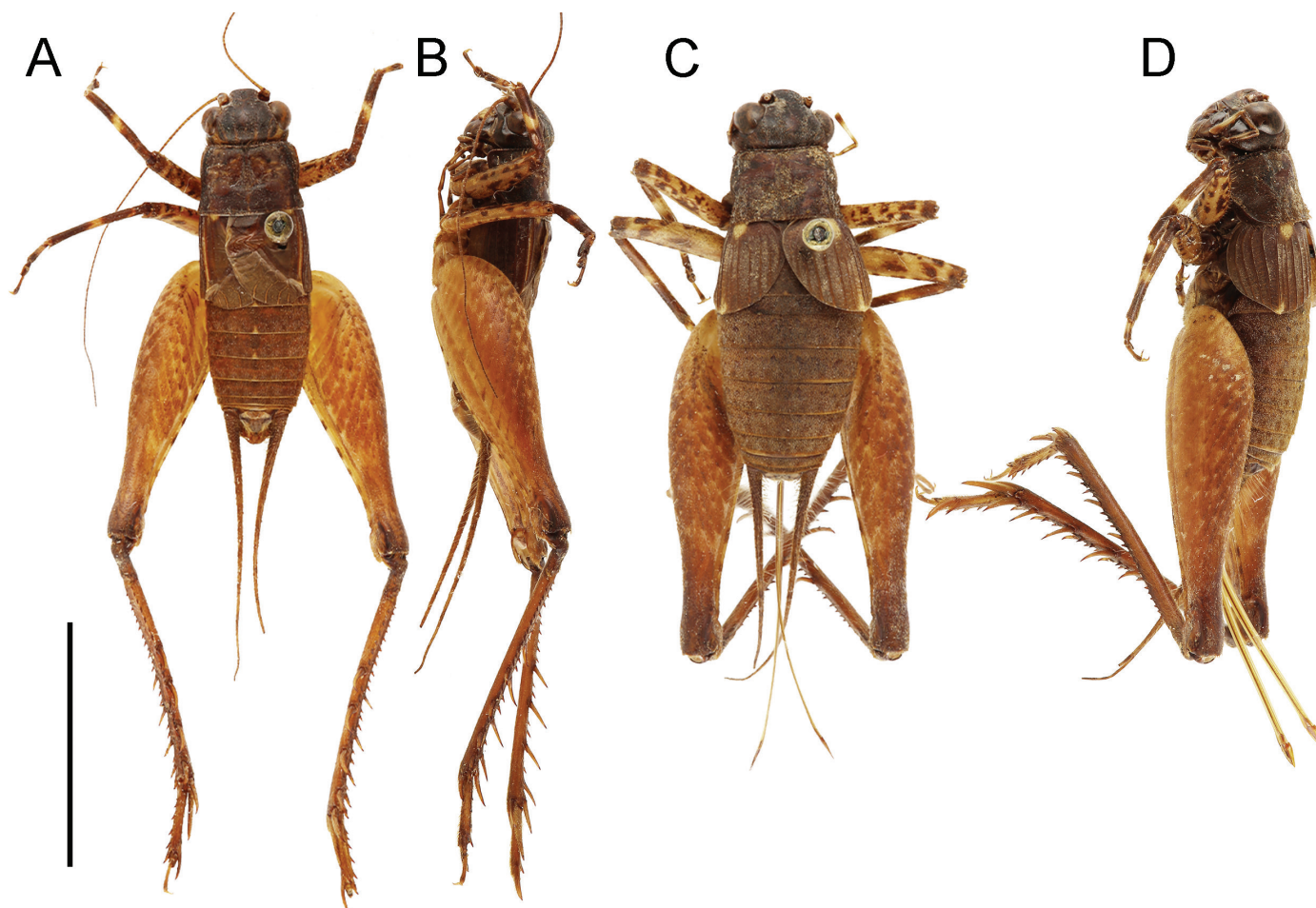


Fig. 21. *R. nabire* sp. nov. male (A, B) and female (C, D) habitus in dorsal (A, C) and lateral (B, D) views. Scale bar: 10 mm.

Male genitalia: (Figs 8I, 20C, 20D) Pseudepiphallus triangular, stouter, convex dorsally, its basal margin straight but strongly indented in the middle and slightly raised dorsally. Lateral margins generally parallel, tapering near apex into a narrow posterior end. Posterior part of pseudepiphallus short, concave dorsally, its apex indented in the middle, forming two small lophi with subacute apices; lophi more developed ventrally, slightly setose. Rami very short, shorter than half of pseudepiphallus length. Pseudepiphallic parameres stout, posterior half forming an internal lobe, apex truncated. Ectophallic apodemes surpassing anterior margin of pseudepiphallic sclerite. Endophallic sclerite with anterior region slightly surpassing anterior margin of pseudepiphallic sclerite; posterior apex of endophallic sclerite with long, rounded and diverging arms, median expansion not distinct.

Female. FW reaching apex of second tergite, brown with two clearly defined triangular, cream-colored spots laterally, at base and apex (Fig. 9F).

Female genitalia: Ovipositor shorter than FIII. Copulatory papilla with a large rounded apical part strongly plicate; ventro-anterior end forming a rounded rim (Fig. 10F).

Measurements.—See Table 1.

***Rugabanthus tariku* sp. nov.**

<http://zoobank.org/D6961759-141B-40F6-95ED-524D310B8CE2>
(Figs 3, 4J, 5J, 6J, 7J, 8J, 9G, 10G, 20E, 20F, 22)

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Fawi [Faowi] village in upper part of Tariku River (tributary of Mamberamo River), partly low-lying forest and partly forest on hills; 29

January–17 February 2012; A. Gorochoy leg.; molecular sample L93; ZIN. **Paratypes:** INDONESIA • 1♂, 1♀; same information as holotype; ZIN • 1♂, 1♀; same information as holotype; MNHN-EO-ENSIF11142–ENSIF11143 • 1♂, same information as holotype; MZB.

Type locality.—INDONESIA: West Papua: Faowi.

Etymology.—This species is named after the Tariku River; noun in apposition. This species is named after the tributary river rather than the main Mamberamo River, because it has smaller and stouter male genitalia compared to the sympatric species *R. mamberamo*.

Diagnosis.—This new species differs from all congeners by male FW venation with extremely indented 1A vein, with its transverse part restricted to inner half of FW, and by male genitalia with pseudepiphallus rectangular, its basal margin strongly indented in the middle, slightly widened laterally near base of rami. Posterior part of pseudepiphallus short and trilobate, with two short stout lophi linked by a thin sclerotized plate forming a median lobe; pseudepiphallic parameres very stout, strongly bent 90° in the middle. General shape of male genitalia similar to that of *R. biakis*, from which the new species differs by apex of pseudepiphallus, base of rami, and parameres; the two species also differ in body coloration. From the sympatric species *R. mamberamo*, the new species differs by smaller size and by male and female genitalia.

Description.—Small to average sized among congeners (Fig. 22). Dorsum of head with broad red brown bands barely separated (visible only near posterior margin) (Fig. 4J). Fastigium dark red

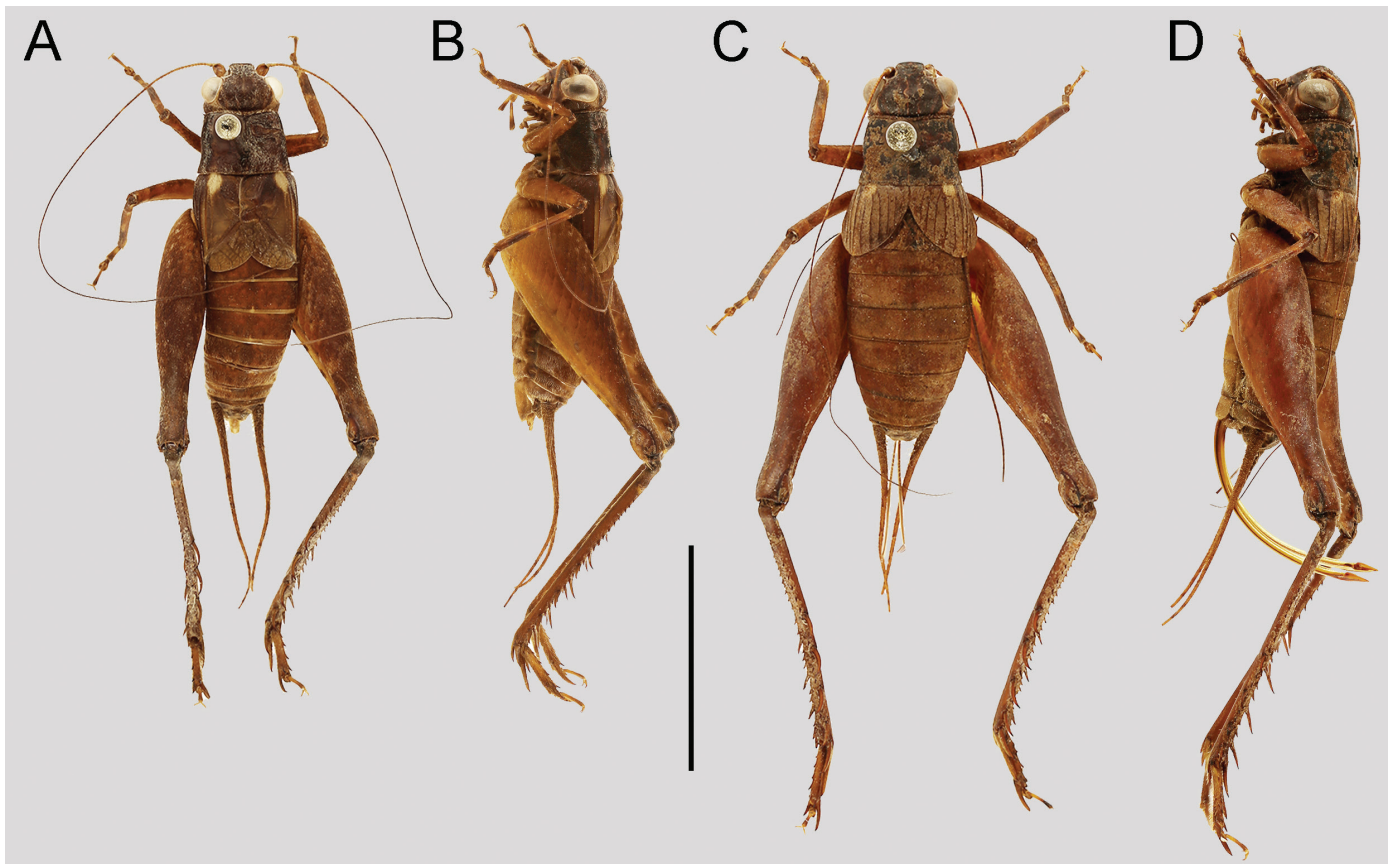


Fig. 22. *R. tariku* sp. nov. male (A, B) and female (C, D) habitus in dorsal (A, C) and lateral (B, D) views. Scale bar: 10 mm.

brown (Fig. 4J). Scapes red brown. Fastigium verticis and frons dark brown, frons with faint yellow brown spots; clypeus and mouthparts dark brown, labrum yellow brown (Fig. 5J). Pronotal disk dark brown with anterior margin yellow brown and posterior margin with some faint irregular yellow brown spots (Fig. 4J). Lateral lobes not darker than disk (Fig. 6J). Legs pale brown with few dark brown spots and patterns. FIIIs brown, knees dark brown to black. Tergites brown, with posterior margin darker.

Male. FWs reaching middle of third abdominal tergite. FW coloration (Fig. 7J): Dorsal field cells and veins mostly brown; with area between M and R infumate cream-colored; basal area with a cream-colored spot on lateral corner. Lateral field dark brown, more gray-brown near ventral margin. FW venation typical of genus, with 1A vein strongly bisinuate, forming a big notch restricting transverse part of 1A to inner half of FWs. Oblique vein posterior branch almost straight; anterior branch simple. Apex of dorsal field rounded.

Male genitalia: (Figs 8J, 20E, 20F) Pseudepiphallus short and rectangular, its basal margin strongly indented in the middle, slightly raised dorsally, widened laterally at base of rami. Lateral margins parallel; posterior part of pseudepiphallus short, apex truncated, forming three lobules, including two stout lophi linked by a thin sclerotized plate forming the median lobe. Rami short, shorter than half of pseudepiphallus length. Pseudepiphallic parameres very stout, strongly bent 90° in the middle, apex strongly enlarged and sclerotized and forming two stout lobules. Ectophallic fold forming a wide plate apically, with thin parallel sclerites. Ectophallic apodemes surpassing anterior margin of pseudepiphallic sclerite, with lateral arms elongated. Endophallic sclerite very elongated anteriorly, forming a wide triangular plate carrying a narrow crest dorsally; its posterior apex with thin lateral arms but without median expansion.

Female. FW slightly surpassing second tergite, with a distinct cream-colored rounded spot at base (Fig. 9G).

Female genitalia: Ovipositor distinctly shorter than FIII. Copulatory papilla globular, its basal part with an irregular sclerotization forming a basal rim with a short basal plate curved dorsally; apex rounded, folded ventrally and slightly sclerotized (Fig. 10G).

Measurements.—See Table 1.

***Rugabinthus albatros* sp. nov.**

<http://zoobank.org/520A61FC-E62E-4AD0-99E3-238E844FAFA7>
(Figs 3, 4K, 5K, 6K, 7K, 8K, 9H, 10H, 10I, 23, 24A, 24B)

Material examined.—**Holotype:** INDONESIA • ♂; West Papua, Albatros Bivak V. Mamberamo [Mamberamo River, Albatros Bivouac]; 1926; v. Leeuwen leg.; molecular sample L177; MZB-ORTH1974. **Paratypes:** INDONESIA • 1♂; same information as holotype; MZB-ORTH8968 • 1♂; same information as holotype; (MZB-ORTH8957); molecular sample L211; MNHN-EO-EN-SIF11141 • 1♀; West Papua, Kasonaweja Village on Mamberamo River near Van Rees range, forest on not-high hills; 25–27 January 2012; A. Gorochoy leg.; molecular sample L95; ZIN.

Other material.—INDONESIA • 1 juvenile; same information as holotype; ZIN.

Type locality.—INDONESIA: West Papua: Mamberamo River, Albatros Bivouac.

Etymology.—The species is named after the type locality: Albatros; noun in apposition.

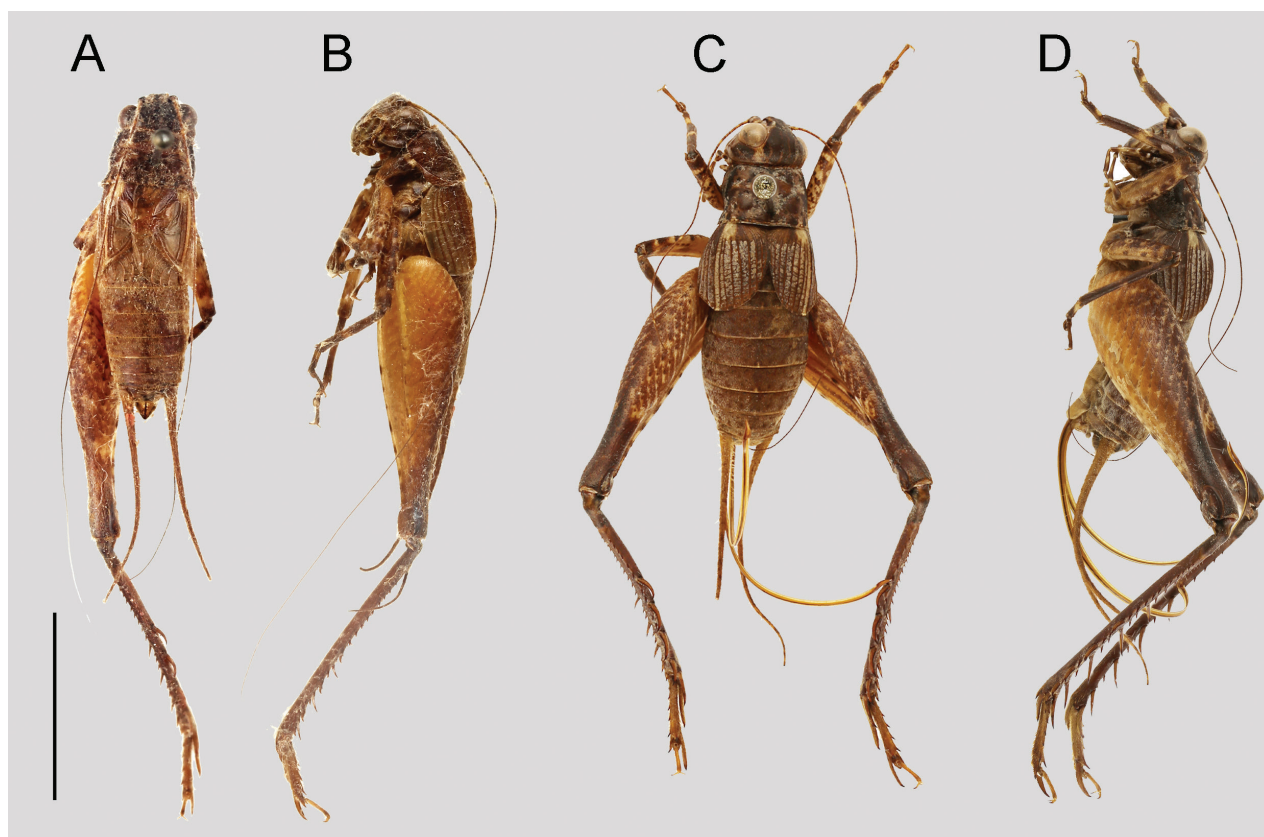


Fig. 23. *R. albatros* sp. nov. male (A, B) and female (C, D) habitus in dorsal (A, C) and lateral (B, D) views. Scale bar: 10 mm.

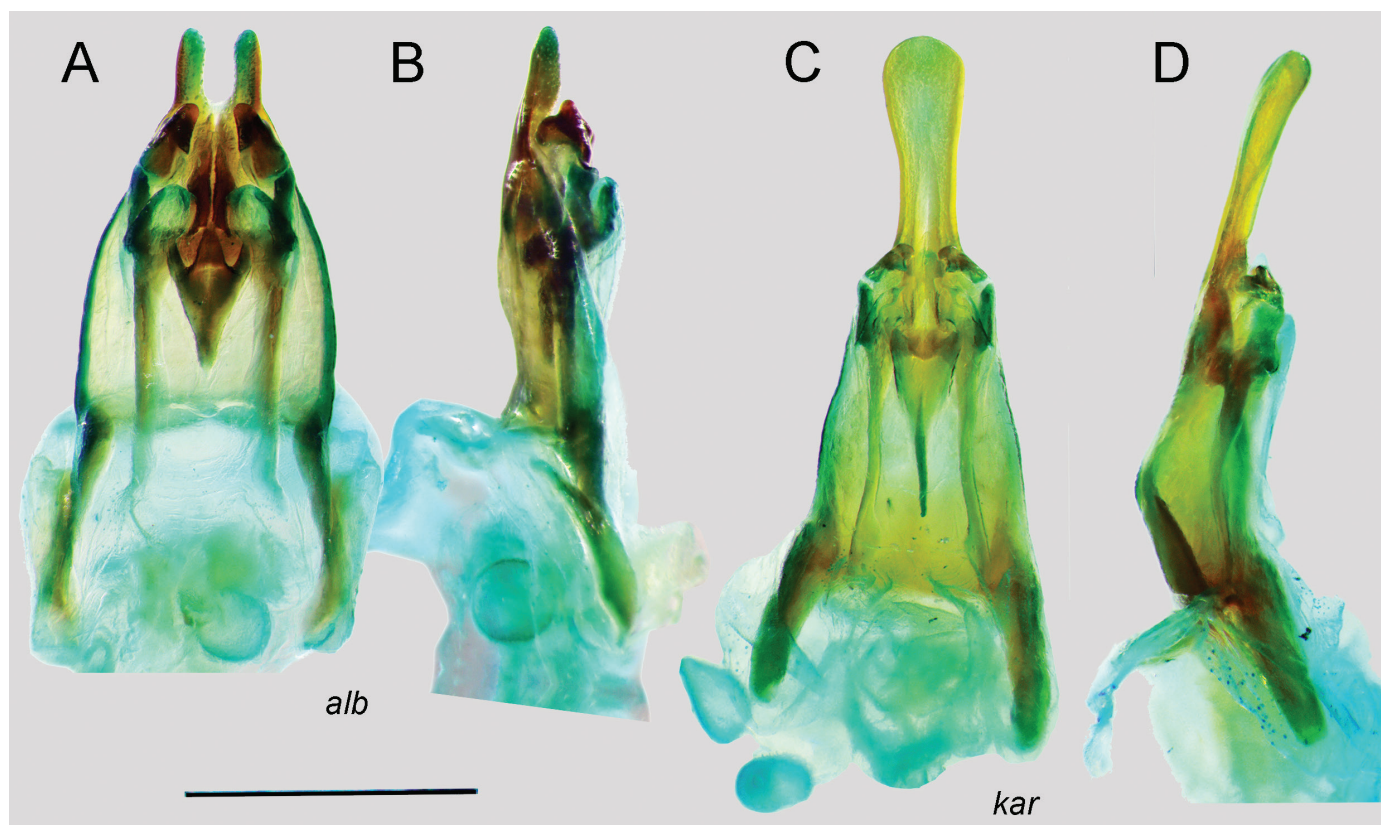


Fig. 24. Male genitalia ventral (A, C) and lateral (B, D) views: A, B. *R. albatros* sp. nov.; C, D. *R. karimui* sp. nov. Scale bar: 1 mm.

Diagnosis.—This new species differs from all congeners by male genitalia with pseudepiphallus forming at the posterior end two long straight lophi with subacute apices and by female copulatory papilla with a very thin elongate apex.

Description.—Average to large sized among congeners (Fig. 23). Dorsum of head with broad red brown bands narrowly separated (Fig. 4K). Fastigium red brown (Fig. 4K). Scares yellow brown with red brown bands. Fastigium verticis brown with faint yellow vertical stripes, frons light brown without spots in the middle, dark brown ventral of scares; clypeus and mouthparts red brown (Fig. 5K). Pronotal disk red brown with some irregular yellow brown patterns, lighter lateral ovular spots near anterior half and with a yellow brown stripe near latero-posterior margin (Fig. 4K). Lateral lobe of pronotum unicolorous dark red brown, not distinctly darker than disk (Fig. 6K). Fls, FIIs, TIs, and TIIs dark brown with yellow brown spots and rings. FIIs brown, knees and posterior third of FIIs dark brown. Tergites brown with posterior margin darker.

Male. FWs reaching middle of fourth abdominal tergite. FW coloration (Fig. 7K): Dorsal field cells and veins mostly brown with area between M and R infumate cream-colored; basal area with a small cream-colored spot on external corner. Lateral field hyalinous brown. FW venation typical of genus; 1A notch anteriorly to angle strong, making anterior part of harp wider; harp elongate, almost twice as long as wide. Oblique vein bifurcated, posterior branch slightly bisinuate, anterior branch bifurcated near 1A angle. Apical field with one cell alignment posterior to mirror. Apex of dorsal field rounded.

Male genitalia: (Figs 8K, 24A, 24B) Pseudepiphallus triangular, stouter, not convex dorsally in lateral view, its basal margin

slightly indented in the middle, lateral margin generally parallel, not widened basally at base of rami, gently tapering into apex; apex forming two long straight lophi with subacute apices. Rami very short, about half the pseudepiphallus length. Pseudepiphallic parameres stout. Endophallic sclerite with a main Y shape; anterior region short and not reaching anterior margin of pseudepiphallic sclerite; posterior apex trilobate, with stick-like lateral arms and with a large median posterior expansion.

Female. FWs slightly surpassing second tergite. Dorsal field with a distinct cream-colored rounded spot at base and a tiny apical spot (Fig. 9H).

Female genitalia: Ovipositor distinctly longer than FIII. Copulatory papilla cupular basally, circled by a narrow sclerite expanded in apical region as parallel sclerotization; apex elongate and folded ventrally, terminated by a rounded area (Figs 10H, 10I).

Measurements.—See Table 1.

***Rugabanthus baduri* sp. nov.**

<http://zoobank.org/0FD67CC5-65D2-4831-82BF-81BE5102408E>
(Figs 3, 4L, 5L, 6L, 9I, 10J, 25)

Material examined.—**Holotype:** INDONESIA • ♀; West Papua: Yapen Island, Aiam Range, Mount Baduri, Japen Seroei Camp 1, 1000 ft. a.s.l.; September 1938; B.M. 1938-593; molecular sample L172; L. E. Cheesman leg; NHMUK.

Type locality.—INDONESIA: West Papua: Yapen Island, Mount Baduri.

Etymology.—This species is named after the type locality, Mount Baduri; noun in apposition.

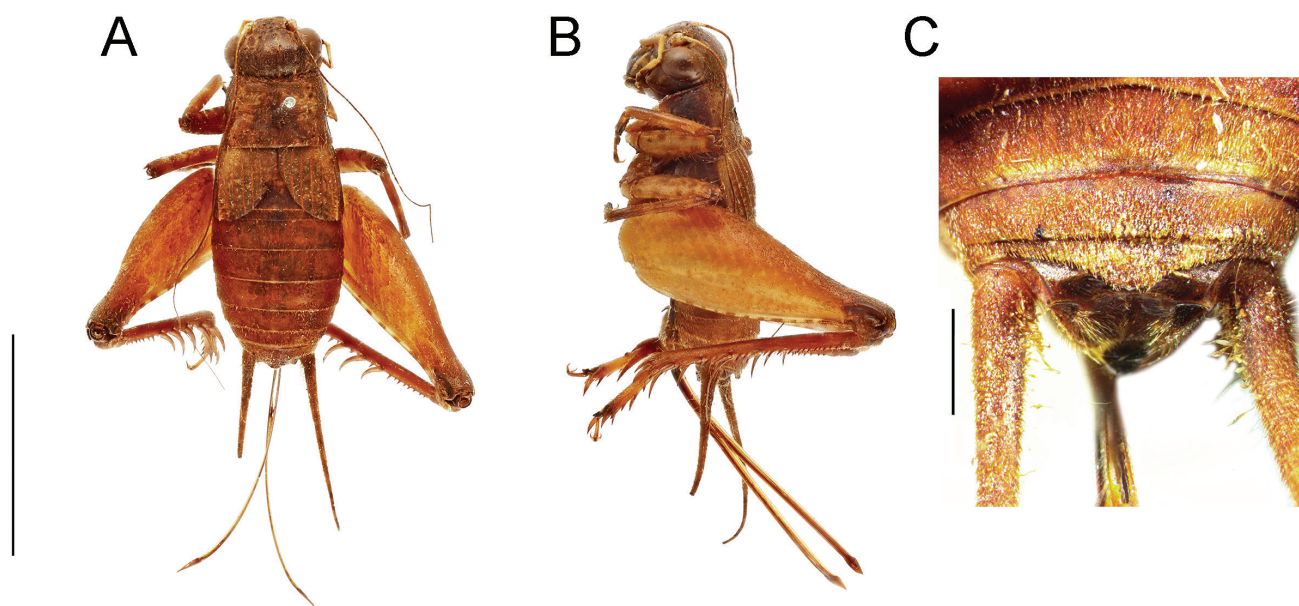


Fig. 25. *R. baduri* sp. nov. female habitus in dorsal (A) and lateral (B) views; and female abdominal apex in dorsal view (C). Scale bars: 10 mm (A, B), 1 mm (C).

Diagnosis.—This new species differs from all congeners by its stocky shape, frons mostly cream-colored with some dark patterns, scapes whitish, and by last abdominal tergite forming a median sinuate expansion above suranal plate.

Description.—Average sized among congeners, but stocky (Fig. 25). Dorsum of head with broad red brown bands narrowly separated (Fig. 4L). Fastigium yellow-brown mottled with brown (Fig. 4L). Scapes whitish with some faint brown patterns. Fastigium verticis cream-colored with two lateral rectangular dark spots beside scapes; two median oval brown spots expanded ventrad to frons as band. Frons yellow brown with brown bands widening and diverging from each other; slightly brownish beneath scapes. Clypeus yellow-brown and brown in middle, mouthparts brown to dark; maxillary palpi mostly yellow (Fig. 5L). Pronotal disk brown with faint light-colored patterns laterally (Fig. 4L). Lateral lobes distinctly darker than pronotal disk, dark brown except red brown near ventral margin (Fig. 6L). FIs and FIIs yellow brown with large dark spots and patterns, knees dark-brown; TIs and TIIs brown with very faint pale bands. FIIIs brown, knees dark brown to black.

Male. Unknown.

Female. Last abdominal tergite forming a median sinuate expansion partly covering suranal plate (Fig. 25C). FW slightly surpassing second tergite, not clearly overlapping. Dorsal field with a very faint cream-colored rounded spot at base (Fig. 9I).

Female genitalia. Ovipositor about as long as FIIIs. Copulatory papilla globular, its base with two hemi-circular ring-like sclerites; apex short, rounded with tip slightly pointed, folded ventrally, and slightly sclerotized dorsally (Fig. 10J).

Measurements.—See Table 1.

Remark.—This new species is known only by the female type specimen, which makes it difficult to place it in a particular genus among the Lebinthina. Its stocky shape first suggested it could belong to *Gnomanthus*, but a molecular phylogenetic study in preparation revealed that this species belongs to the clade corresponding to *Rugabanthus* without ambiguity.

***Rugabanthus karimui* sp. nov.**

<http://zoobank.org/D299D902-F486-4B1B-8E75-D3E52967B681>
(Figs 3, 4M, 5M, 6M, 7L, 8L, 9J, 10K, 10L, 24C, 24D, 26)

Material examined.—**Holotype:** PAPUA NEW GUINEA • ♂; Karimui, 1000 m; 2–3 June 1961; J. L. Gressitt leg.; BPBM. **Paratypes:** PAPUA NEW GUINEA • 1♀; Karimui, South of Goroka, 1000 m; 3 June 1961; G. L. and M. Gressitt leg.; molecular sample L210; BPBM • 1♂; Karimui; 4 June 1961; J. L. Gressitt leg.; malaise trap; molecular sample L49; (BPBM); MNHN-EO-ENSIF11333.

Type locality.—PAPUA NEW GUINEA: Karimui.

Etymology.—The species is named after the type locality: Karimui; noun in apposition.

Diagnosis.—This new species differs from all congeners by smaller size, short male FWs without apical field, and shape of male and female genitalia. Male subgenital plate more elongate than in congeners, with a short apical expansion. Male genitalia very different from all congeners, characterized by elongate apical part of pseudepiphallus forming a long spoon-like finger.

Description.—Small sized among congeners (Fig. 26). Dorsum of head yellow brown with 6 narrow red brown irregular longitudinal bands (Fig. 4M). Fastigium unicolorous red brown (Fig. 4M). Scapes yellow brown. Antennae basally yellow brown, distally dark brown with some light rings. Fastigium verticis brown with a pale yellow-brown n-shaped pattern; frons brown in middle with 2 small yellow spots, black beneath scapes; clypeus and mouthparts dark brown dorsally, labrum and ventral part of mouthparts yellow (Fig. 5M). Pronotal disk yellow brown with some irregular red-brown patterns most prominent near anterior and posterior margins (Fig. 4M). Lateral lobe of pronotum red brown, distinctly darker than disk, with 2 light spots in antero-ventral corner (Fig. 6M). Legs yellow brown with dark brown spots. FIIIs brown, knees dark brown. Tergites brown, with posterior margin darker.

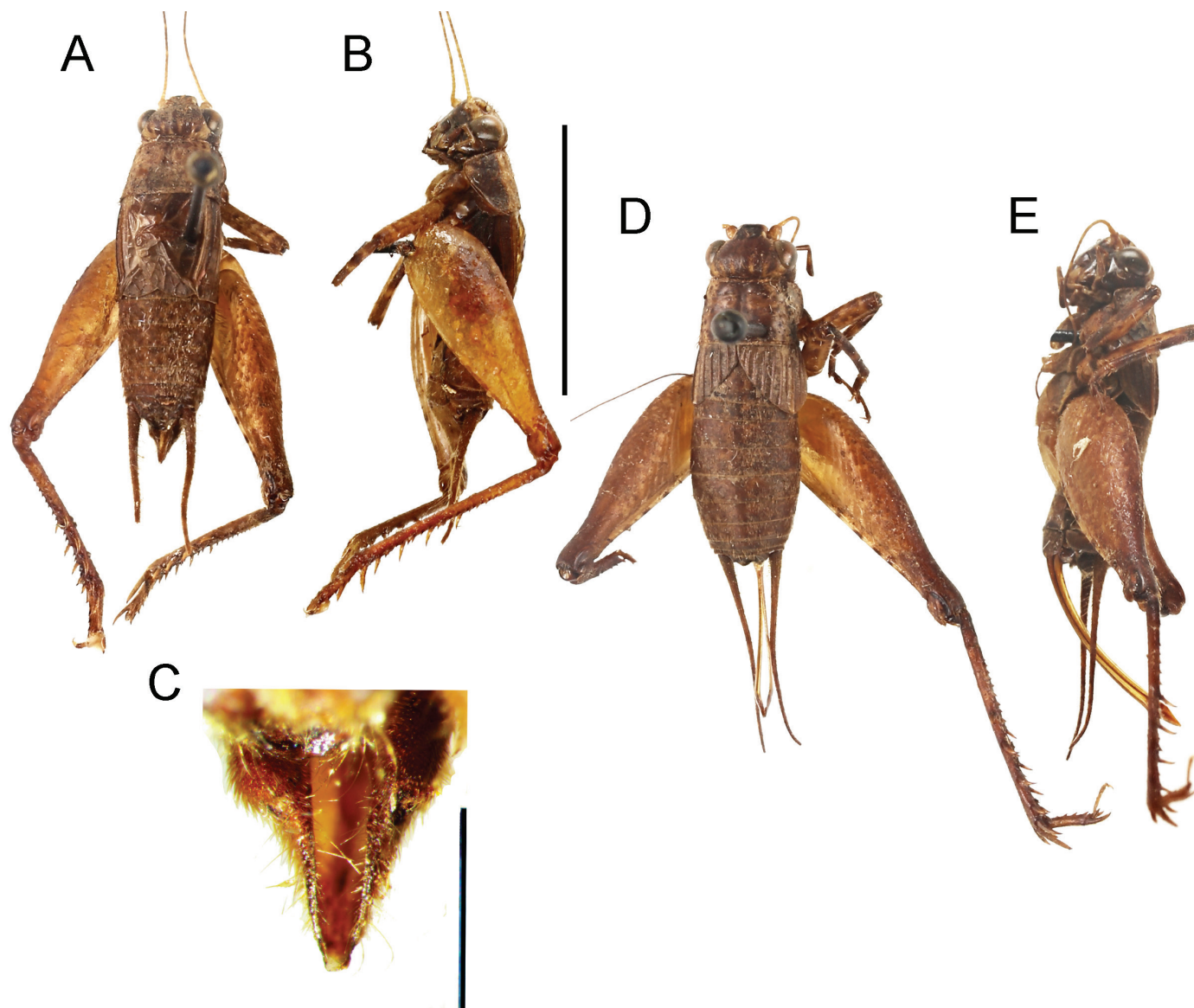


Fig. 26. *R. karimui* sp. nov. male (A, B) and female (D, E) habitus in dorsal (A, D) and lateral (B, E) views; and male subgenital plate in ventral view (C). Scale bars: 10 mm (all except C); 1 mm (C).

Male. FW very short, reaching apex of third abdominal tergite. FW coloration (Fig. 7L): Dorsal field cells and veins mostly brown; some veins near basal area cream-colored; with area between M and R infumate cream-colored; basal FW area with a large cream-colored spot including base of CuA, 1A and 2A. Lateral field brown, with ventral margin cream-colored. FW venation typical of genus; 1A notch anteriorly to angle strong; oblique vein bifurcated, posterior and anterior branches slightly bisinuate and almost parallel. Apex of dorsal field very short and rounded; D alignment limited to 2 cells; apical field absent. Subgenital plate very elongate, pointed, with a short apical expansion (Fig. 26C).

Male genitalia: (Figs 8L, 24C, 24D) Pseudepiphallus elongate, slightly convex dorsally, its basal margin slightly convex, prolonged anteriorly by a sclerotized plate; lateral margin tapering into apical third, most narrow at apical third; posterior of apical third elongated spoon shaped, its apex rounded. Rami very short, way shorter than half the pseudepiphallus length. Pseudepiphallic parameres small, posterior half broadly bulbous and

stout. Ectophallic apodemes parallel and long, usually reaching anterior margin of pseudepiphallic sclerite. Endophallic sclerite elongate, with anterior region long but barely reaching anterior margin of pseudepiphallic sclerite; with lateral arms of sclerite narrowly triangular.

Female. FW reaching middle of second tergite; brown, without basal spot (Fig. 9J).

Female genitalia: Ovipositor slightly longer than FIII. Copulatory papilla conical, smaller and stout; apex folded ventrally, short, pointed; dorsal face with a sclerotized area; ventro-anterior end forming an oval to pyriform rim (Figs 10K, 10L).

Measurements.—See Table 1.

***Rugabanthus newguineae* (Bhowmik, 1981) comb. nov.**
(Figs 3, 4N, 5N, 6N, 9K, 10M, 27)

Larandopsis newguineae Bhowmik, 1981[1979]: 39 - Desutter-Grandcolas and Jaiswara 2012: 31, according to Bhowmik's

descriptions and illustrations belonging to *Lebinthus* [but not moved to *Lebinthus*] - Cigliano et al. 2021 (Orthoptera Species Files Online).

Macrobinthus newguineae - Robillard et al. 2016: 178.

Material examined.—**Holotype:** INDONESIA • ♀; Dutch New Guinea: Cyclops Mts, Sabron Camp 2; 2000 ft; July 1936; identified *Larandopsis newguineae* Bhowmik by H. K. Bhowmik, 1973; L. E. Cheesman leg; BMNH-1936-271.

Other material.—INDONESIA • 1♀; N. New Guinea, “Boven-Jemomaissin” ca. 400 m; 4 April 1911; molecular sample L199; Dr P. N. v. Kampen, Ned. Nw. Guinea Exp leg; RMNH • 1♀; N. New Guinea; 1911; Dr P. N. v. Kampen, Ned. Nw. Guinea Exp leg; RMNH • 1♀; N. New Guinea; April–May 1911; Dr P. N. v. Kampen, Ned. Nw. Guinea Exp leg; RMNH.

Type locality.—INDONESIA: Cyclops Mts.

Emended diagnosis.—Among congeners, *R. newguineae* **comb. nov.** is characterized by its large size, FWs not reaching abdomen mid-length but well developed, coloration homogeneously dark brown, and very long ovipositor.

Description.—See Robillard et al. (2016).

Remark.—This species is known only by female specimens until now, which makes it difficult to place it in a genus among the Lebinthina because several genera share the same general shape, such as *Rugabinthus* and *Macrobinthus*, while being mostly characterized by male characters (FW venation and genitalia). A molecular phylogenetic study in preparation revealed that this species belongs to the clade corresponding to *Rugabinthus*, justifying the new combination proposed here.

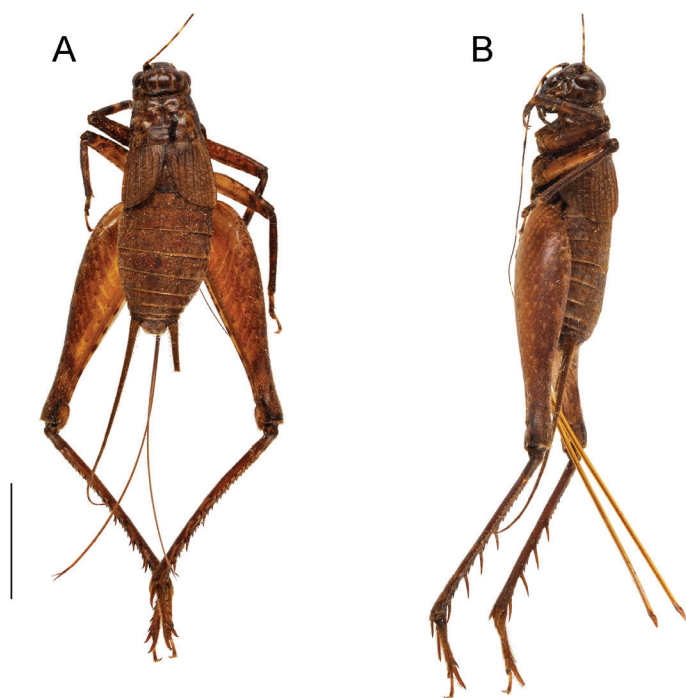


Fig. 27. *R. newguineae* (Bhowmik, 1981) **comb. nov.** female habitus in dorsal (A) and lateral (B) views. Scale bar: 10 mm. Modified from Robillard et al. (2016)

Key to species of *Rugabinthus*

- 1 Frons mostly whitish/cream-colored with some dark patterns; scapes whitish..... *R. baduri*
- Frons mostly dark colored; scapes dark colored..... 2
- 2 Distinctly larger, PronL > 4.5 mm *R. newguineae*
- Smaller, PronL < 4.0 mm 3
- 3 Dorsum of head with broad red brown bands narrowly separated. Pronotum dorsal disk generally red brown, sometimes with few lighter patterns..... 4
- Dorsum of head yellow brown with five well-separated red brown longitudinal bands. Pronotum dorsal disk yellow brown with dark patterns..... 12
- 4 From Faowi 5
- From other parts of New Guinea and not in Faowi 7
- 5 Pronotum dorsal disk with lateral parts entirely yellow brown or cream-colored, appearing like a lateral bands (even with brown spots within this band)..... 6
- Pronotum dorsal disk unicolorous brown or only with sparse yellow brown patterns..... *R. tariku*
- 6 Face black. Labrum yellow brown. Male FWs longer, FWL > 5.5 mm, reaching middle of third abdominal tergite *R. mamberamo*
- Face brown. Labrum cream-colored. Male FWs shorter, FWL < 4.5 mm reaching middle of fourth abdominal tergite *R. faowi*
- 7 Pseudepiphallus with apex forming two long straight lophi with subacute apices *R. albatros*
- Pseudepiphallus with apex truncated or tapering, not producing into two long lophi 8
- 8 Pseudepiphallus with apex truncated..... 9
- Pseudepiphallus with apex tapered..... 10
- 9 Male FWs shorter, < 5.0 mm. Fastigium verticis brown with two vertical yellow brown stripes diverging ventrad. Pseudepiphallic parameres strongly bent in basal half (~90°), with posterior apex enlarged, bean-shaped *R. leopoldi* (Chopard, 1931)
- Male FWs longer, > 5.0 mm. Fastigium verticis red brown with a faint yellow brown T-shaped pattern. Pseudepiphallic parameres with inner process in middle with apical half triangular..... *R. yayukae*
- 10 Male FWs longer, > 6.0 mm. Pseudepiphallus elongated, slenderer... 11
- Male FWs shorter, < 5.0 mm. Pseudepiphallus triangular, stouter *R. nabire*
- 11 Smaller in size, male FIIL < 17.0 mm. Male genitalia distinctly smaller, endophallic apodeme with lateral lamellas pointing posteriorly. Distribution: Kuala Kencana *R. kencana*
- Larger in size, male FIIL > 17.0 mm. Male genitalia distinctly larger, endophallic apodeme with lateral lamellae pointing diagonally more externally. Distribution: Star Range *R. maoke*
- 12 Fastigium verticis and frons black. Labrum cream-colored *R. biakis*
- Fastigium verticis black but with some yellow patterns. Labrum darker colored... 13
- 13 Smaller in size, FIIL < 10 mm. Fastigium verticis with a pale yellow-brown n-shaped pattern..... *R. karimui*
- Larger in size, FIIL > 11 mm. Fastigium verticis with a (+) cross-shaped yellow brown pattern..... *R. manokwari*

Discussion

The new genus *Rugabinthus* presented in this study includes 14 species in total, from different parts of the New Guinea Island (mostly in the western part) and from closely related islands (Japen I., Biak I.). Except for two new combinations, most species belonging to the genus are new and are currently known only from a single locality. Given the low numbers of specimens

for most of these species, and given that Lebinthini are usually abundant when specifically collected, it would appear that the material studied here originated primarily from anecdotal side collections. Thus, this suggests that a large diversity of crickets from New Guinea remains undocumented; we postulate that the restricted distributions may be due to largely incomplete sampling on the island and that the true distribution of each species is still unknown.

Because close-by localities host very different species, with one locality (Faowi) hosting up to three sympatric species, we hypothesize that the diversity of the genus is underestimated. Evidence also suggests that *Rugabanthus* may show a high level of endemism across New Guinea, similar to or higher than the endemism documented in New Caledonia for *Agnoteccous*, another genus of Lebinthina (Desutter-Grandcolas and Robillard 2005, Nattier et al. 2012). Adding *Rugabanthus* to the already high number of Lebinthini reported from New Guinea, in tandem with their morphological and acoustic diversity (Robillard et al. 2016, Tan et al. 2021, Tan and Robillard 2021c), suggests that this large island may have played a major role in the diversification of these crickets, as found at the scale of the genus *Cardiodactylus* (Dong et al. 2018).

Furthermore, there is little biological data existing for species of *Rugabanthus*. The calls and natural history for this genus are completely unknown, since most of the materials examined here were based on old museum collections. This highlights the importance of continued survey of the vast areas of New Guinea, some parts of which remain unexplored. Emphasis should also be placed on collecting natural history data, including the recording of calls and behaviors, given the importance of Lebinthina species in the study of communication systems.

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