

Review of the Carventinae genus *Zimmermania* USINGER, 1948 (Heteroptera: Aradidae), part I: description of two new genera and four new species from Fiji and New Guinea

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Abstract

Zimmermania USINGER, 1948 and its type species *Zimmermania brachyptera* USINGER, 1948 were described from the Fiji Islands. Eight further species from New Guinea, the New Hebrides and the Solomon Islands were subsequently described, but their generic position remains doubtful. In this first part of the review, *Zimmermania* is redefined by a combination of morphological characters, and a second species, *Z. secunda* sp.n., is described from Fiji (Viti Levu). In addition, we describe two closely related genera as new: *Zimmermaniaptera macronota* gen.n. & sp.n. from Viti Levu, *Macrozimmermania japena* gen.n. & sp.n. from Japen Island, Indonesia, and *Macrozimmermania waigeoana* gen.n. & sp.n. from Waigeo Island, Indonesia.

Key words. Hemiptera, Heteroptera, Aradidae, Carventinae, new genus, new species, New Guinea, Fiji.

Zusammenfassung

Zimmermania USINGER, 1948 und die Typusart *Zimmermania brachyptera* USINGER, 1948 wurden von Fidschi beschrieben. Nachfolgende Beschreibungen von acht Arten behandeln Exemplare von Neuguinea, den Hebriden und den Salomonen, aber ihre Gattungszuordnung bleibt unsicher. In diesem ersten Teil der Revision definieren wir *Zimmermania* durch eine Kombination morphologischer Merkmale neu und beschreiben eine zweite Art, *Z. secunda* sp.n., von Fidschi (Viti Levu). Außerdem beschreiben wir zwei nahe verwandte Gattungen als neu: *Zimmermaniaptera macronota* gen.n. & sp.n. von Viti Levu, *Macrozimmermania japena* gen.n. & sp.n. von Japen, Indonesien und *Macrozimmermania waigeoana* gen.n. & sp.n. von Waigeo, Indonesien.

Introduction

The micropterous female holotype of *Zimmermania brachyptera* USINGER, 1948 was described and depicted by USINGER (1948: fig. 1, p. 262) from Viti Levu, Fiji Islands.

There has been no further record of this taxon from Fiji since. However, the following eight species from New Guinea and some South Pacific islands were later described and assigned to *Zimmermania* by Nicholas A. Kormilev (listed in KORMILEV & FROESCHNER 1987): *Zimmermania angulata* KORMILEV, 1968 (New Guinea), *Zimmermania bicaudata* KORMILEV, 1968 (New Guinea), *Z. breviceps* KORMILEV, 1971 (New Britain in Bismarck Archipelago), *Z. excavata* KORMILEV, 1968 (New Guinea), *Z. gressitti* KORMILEV, 1968 (New Guinea), *Z. magdalenae* KORMILEV 1954 (New Guinea), *Z. solomonensis* KORMILEV,

1968 (Bougainville in Solomon Islands), and *Z. usingeri* KORMILEV, 1967 (Malekula in New Hebrides Islands).

USINGER & MATSUDA (1959) redescribed *Zimmermania* based on *Z. brachyptera*, reported a second species with fully developed wings (*Z. magdalenae* KORMILEV, 1954), and mentioned a second micropterous species from the New Hebrides (later described as *Z. usingeri* KORMILEV, 1967) and a second winged form from New Guinea (later described as *Z. bicaudata* KORMILEV, 1968) from their own material. However, they state that the latter two taxa “might possibly represent a distinct genus”.

Examination of several specimens now available for study proved that the assumption of USINGER & MATSUDA (1959) is correct and *Zimmermania* is not a homogenous genus. We use a combination of characters (spiracle III lateral, micropterygy, structure of pronotum and body surface) that define *Zimmermania*. According to our knowledge, this combination is only known in species from the Fiji Islands. Based on specimens at hand from Fiji and New Guinea, new genera are proposed and new species assigned to them. However, species previously described from New Guinea, New Britain, and the Solomon Islands remain incertae sedis until our comparison and evaluation of their original descriptions and type images is completed in part II.

In this paper (part I), *Zimmermania* is redefined and two new genera and four new species are described and illustrated.

Material and methods

The material upon which this study is based, is deposited in the aradid collection of the first author which is presently housed at the Tiroler Landesmuseum, Innsbruck, Austria (CEHI), but later will be transferred to the Bavarian State Collection of Zoology in Munich, Germany. Some specimens were collected by Alexander Riedel (Karlsruhe) and donated to CEHI.

As apterous and micropterous aradid specimens collected and sifted from litter are usually covered by incrustation obscuring the body structures, they were cleaned and remounted for examination (as described by HEISS & ECKELT 2025).

Measurements were taken with a micrometre eyepiece and are given in millimetres.

When citing the text on the labels of a pin attached to the specimens, / separates the lines and // different labels. Photos were captured with an Olympus OM-5 camera, Helicon Focus 8 and Adobe Photoshop 2025 software were utilized for image composition.

Abbreviations. Deltg = dorsal external laterotergite (connexivum), mtg = mediotergite, ptg = paratergite.

Taxonomy

Key to genera treated in part I

- 1 Spiracles II and III lateral and visible from above, IV–VII ventral. Micropterous species (Fiji Islands). ***Zimmermania* USINGER, 1948**
- Spiracles II lateral and visible from above, III–VII ventral, apterous or brachypterous. 2
- 2 Apterous species (Fiji Islands). ***Zimmermaniaptera* gen.n.**
- Brachypterous species (Papua New Guinea region: Waigeo and Japen Islands). ***Macrozimmermania* gen.n.**

***Zimmermania* USINGER, 1948**

Type species. *Zimmermania brachyptera* USINGER, 1948, by monotypy.

Redescription. Micropterous; body length 5–6.15 mm. Body elongate, attenuated anteriorly. Antennae long, with short bristles obscured by incrustation, segment III longest, I thickest, II and IV shorter; colouration greyish. Dorsal side of body flat, with calciform incrustation.

Head longer than wide. Antenniferous lobes subparallel. Clypeus and genae short, the latter with acute apices. Antennae more than twice as long as width of head.

Thorax. Pronotum wider than long; lateral margins converging anteriorly; disk with a pattern of linear grooves on anterior lobe, rugose on posterior lobe. Mesonotum: oval wing-pads distinct; scutellum twice as wide as long with rounded posterior and lateral margins; disk with a longitudinal sulcus; small remnants of mesonotum exposed lateral of scutellum. Metanotum wider than long; surface with distinct apodemal impressions.

Abdomen flattened; deltg I+II fused into a triangular sclerite lateral of metanotum; pattern of apodemal impressions 2 : 2 : 1; posterolateral margins of deltg II–VI slightly, those of deltg VII triangularly produced: Spiracles II+III lateral and visible from above.

Distribution. Assumed to be endemic to Fiji Islands.

Species composition. The type species was described from Viti Levu, the largest and main island of the Fiji archipelago. Although two specimens at hands were collected from the smaller island of Taveuni, their small size and body structure ratios resemble *Z. brachyptera* as depicted by USINGER (1948: fig. 11); they are tentatively assigned to the latter. A larger male specimen from Viti Levu differing in size and proportions from *Z. brachyptera* is considered to represent a new second taxon. Species later described and assigned to *Zimmermania* by Nicholas A. Kormilev are at present considered incertae sedis.

***Zimmermania brachyptera* USINGER, 1948 (Figs 1–6, 10)**

Material examined: 1 male, 1 female, Fiji / Taveuni Rainforest / VI 1993 G.Bruno // (CEHI).

Description. As the generic description is also valid for the species, it is not repeated here. The examined specimens are tentatively considered conspecific with *Z. brachyptera* unless comparison with its types is possible to confirm their species identity.

Measurements. Male (female in brackets). Body length 4.6 (5.3); length / width of head 0.80 : 0.65 (0.80 : 0.70); ratio length of antennae / width of head 3.15 (3.50); length of antennal segments I : II : III : IV = 0.60 : 0.40 : 0.70 : 0.35 (0.75 : 0.45 : 0.85 : 0.40); length / width of pronotum 0.95 : 1.15 (1.10 : 1.20); length / width of scutellum 0.35 : 0.80 (0.35 : 0.90); width of abdomen across tergite IV 1.70 (2.05), ratio length of body / width of abdomen 2.70 (2.58).

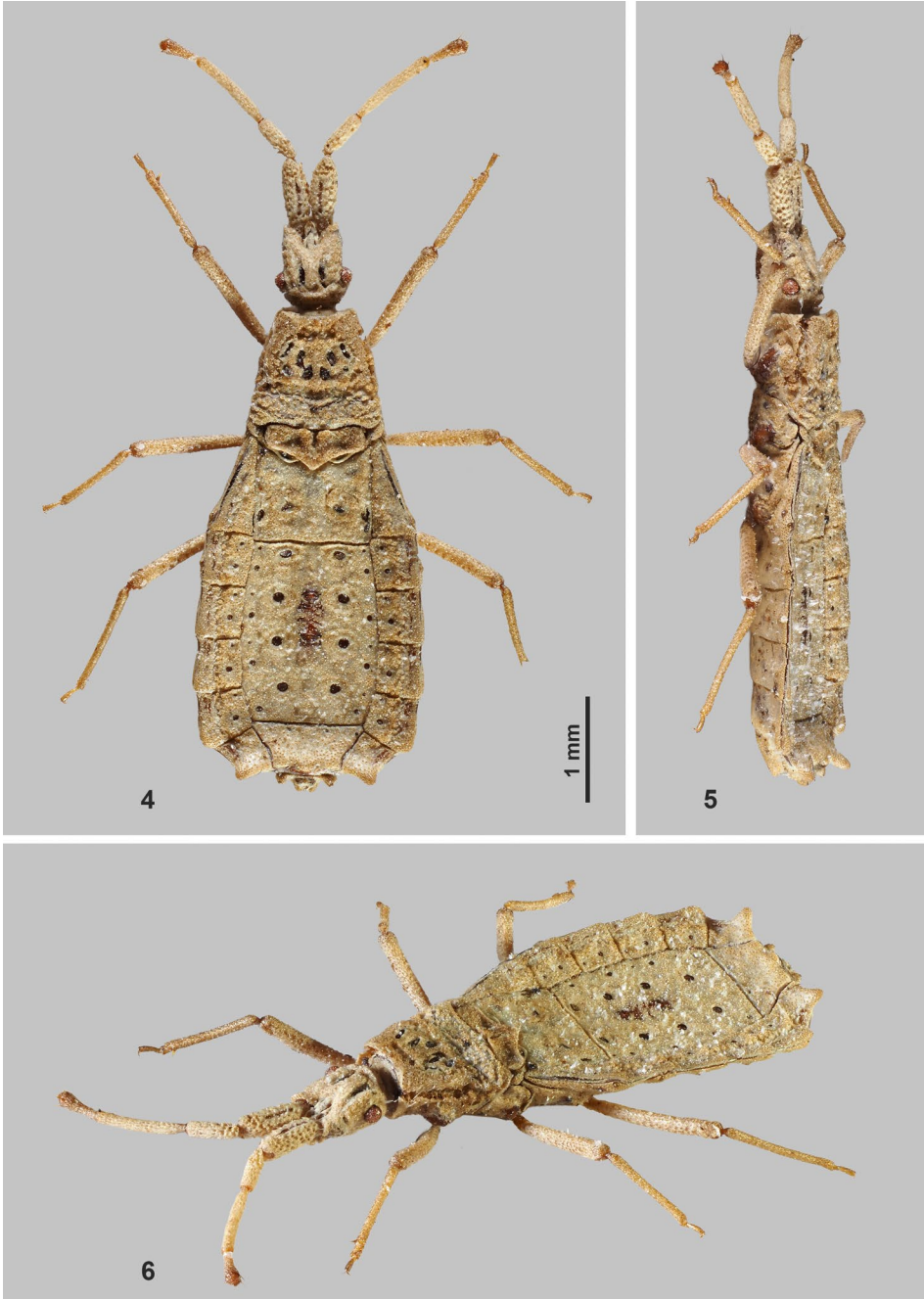
***Zimmermania secunda* sp.n. (Figs 7–9)**

Type material. Holotype (male). Fiji/ Viti Levu Rainforest / VI 1993 G.Bruno // (CEHI).

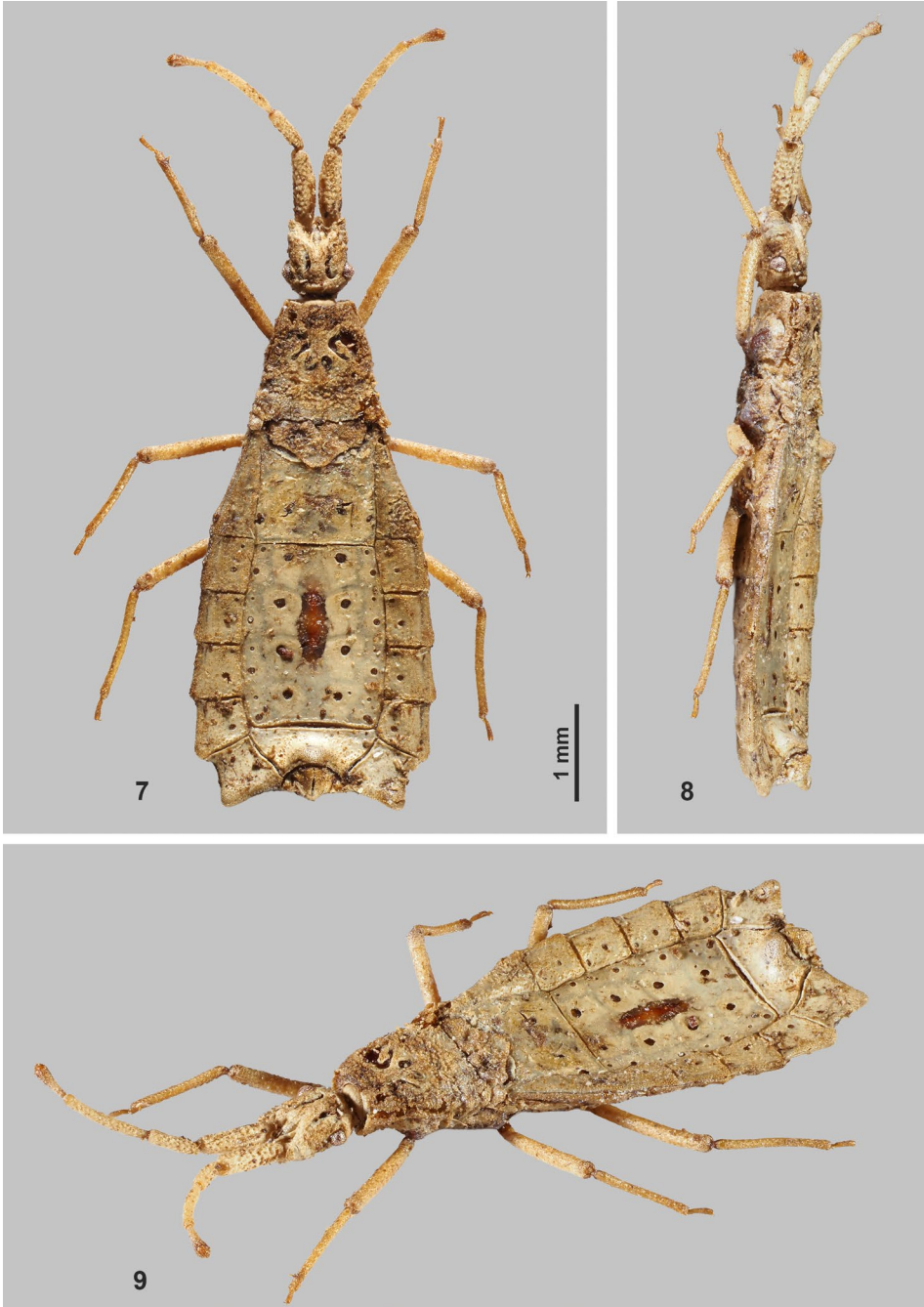
Description. As the generic description is also valid for the species, it not repeated here. Habitus outline more slender, basic body structures as in *Z. brachyptera*, but differs by several proportions and ratios.



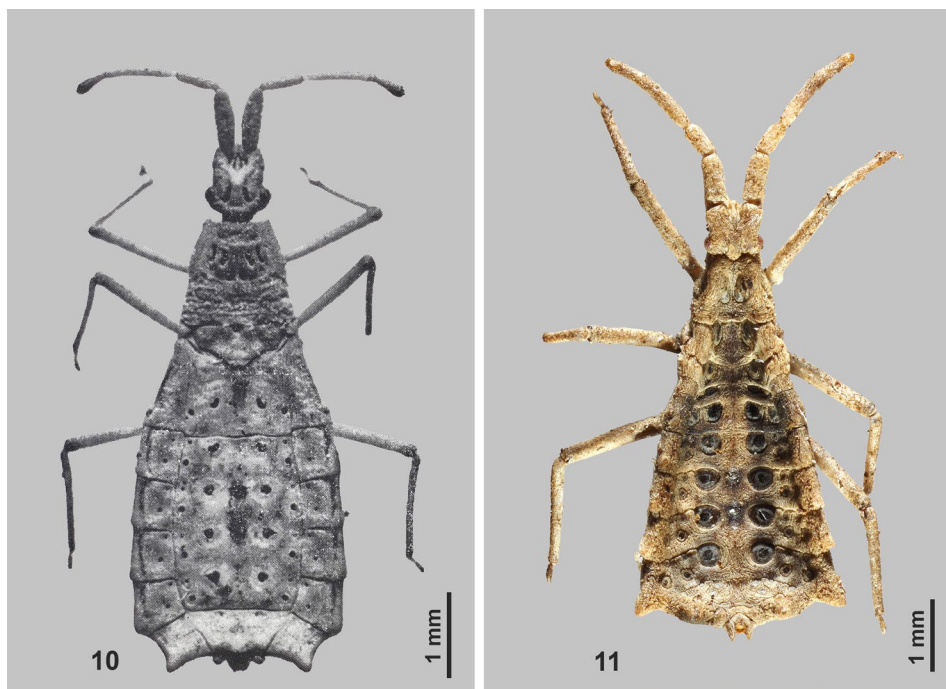
Figs 1–3. *Zimmermania brachyptera*, male from Tavenui: habitus, dorsal (1), lateral (2), and semidorsal (3). © A. Eckelt.



Figs 4–6. *Zimmermania brachyptera*, female from Tavenui: habitus, dorsal (4), lateral (5), and semidorsal (6). © A. Eckelt.



Figs 7–9. *Zimmermania secunda* sp.n., holotype (male): habitus, dorsal (7), lateral (8), and semidorsal (9). © A. Eckelt.



Figs 10–11. (10) *Zimmermania brachyptera* sp.n., holotype (female): habitus, dorsal (after USINGER 1948: fig. 1). (11) *Macrozimmermania japena* sp.n. larval stage V, habitus, dorsal. © A. Eckelt.

Measurements. Male. body length 6.0; length / width of head 0.85 : 0.75; ratio width of antennae / width of head 3.40; length of antennal segments I : II : III : IV = 0.75 : 0.50 : 0.90 : 0.40; length / width of pronotum 1.20 : 1.35; length / width of scutellum 0.45 : 1.00; width of abdomen across tergite IV 2.40, ratio length of body / width of abdomen 2.50.

Etymology. The species epithet refers to the fact that it is the second taxon from Fiji.

***Zimmermaniptera* gen.n.**

Type species. *Zimmermaniptera macronota* sp.n.

Description. Apterous; body length 5 mm. Body elongate, about three times as long as wide across abdomen, attenuated anteriorly. Colouration whitish-greyish. Surface flat, with calciform incrustation throughout, beset with small scale-like tubercles and fine punctures. Antennae long and setigerous.

Head longer than wide. Clypeus and genae short, the latter with acute apices. Antenniferous lobes triangular, with pointed apices, as long a clypeus. Antennae more than three times as long as width of head, robust, segment I longest, II–IV shorter, I–III beset with stiff, erect bristles. Rostrum arising from an open atrium, shorter than head. Eyes oval, not pedunculate. Postocular lobes converging posteriorly; vertex with two longitudinal hook-shaped deep impressions.

Thorax. Pronotum wider than long; lateral margins straight, attenuated anteriorly, beset with a fringe of stiff setae; surface with a pattern of deep linear grooves; posterior margin medially produced posteriad.

Mesonotum: no traces of winglets recognizable; median part strongly produced posteriorly into a tongue-like sclerite with triangular apex which is then fused to the fused plate of metanotum and mtg I+II. Metanotum with a deep median and four (2+2) basal grooves; fused sclerite longer than wide, separated from mesonotum and lateral deltg I+II by deep sutures; its surface with apodemal markings.

Legs long and slender; femora and tibiae cylindrical; protibia with distinct anteapical basal spine.

Abdomen. Deltg I+II fused, triangular anteriorly reaching pronotum; deltg II–VI with subparallel margins, raised laterally, deltg VI produced posteriorly, VII truncate. Tergal disk at a lower level than connexivum, with a longitudinal ridge bearing dorsal abdominal scent glands of mtg III and IV, laterally with the same distinct pattern of apodemal impressions (2 : 2 : 1) as usually observed in Carventinae; mtg VII raised medially for the reception of the posteriorly conical pygophore. Spiracles II lateral, placed on the reflexed vltg II and visible from above, III–VII ventral, VIII terminal on ptg VIII.

Comparative notes. The new genus resembles the type species of *Zimmermania*, *Z. brachyptera* USINGER, 1948 described from Fiji, sharing the elongate habitus, incrustation and colour but it is apterous and only spiracle II is lateral and the posteriorly produced scutellum is specific (vs. spiracle II+III lateral, micropterous wing-pads and bisinuate scutellum in *Zimmermania*). The fused thoracic sclerite is unique among species of genus *Zimmermania* and apterous Oriental-Pacific Carventinae genera.

Distribution. So far only the holotype of the type species is known from the Fiji Islands.

Etymology. The genus name refers to the closely related genus *Zimmermania* and its apterous condition.

***Zimmermaniaptera macronota* sp.n. (Figs 12–14)**

Material examined. Holotype (male): Fiji / Viti Levu, rainforest / VI 1993 G. Bruno // (CEHI). The holotype is labelled accordingly.

Description. As the type species *Zimmermaniaptera macronota* is the only taxon of this genus to date, the generic description is also valid for this species and is not repeated here.

Measurements. Body length 5.0; length / width of head 0.75 : 0.67; ratio length of antennae / width of head 3.40; length of antennal segments I : II : III : IV = 0.75 : 0.50 : 0.65 : 0.40; length / width of pronotum 0.90 : 0.95 (0.65 anterior border); length / width mesonotum 0.85 : 0.95; width of abdomen across tergite IV 1.55.

Etymology. The species name refers to the large posteriorly expanded mesonotal plate.

***Macrozimmermania* gen.n.**

Type species. *Macrozimmermania japena* sp.n.

Description. Brachypterous; body length 6.4–7.6 mm. Body attenuated anteriorly, triangularly enlarged and raised posteriorly; apex truncate. Colouration yellowish brown, with lighter and darker parts. Surface finely granulate, partly covered by incrustation.



Figs 12–14. *Zimmermaniaptera macronota* sp.n., holotype (male): habitus, dorsal (12), semidorsal (13), and semilateral (14). © A. Eckelt.

Head longer than wide. Clypeus and genae short, apices acute. Antenniferous lobes subparallel. Eyes oval, not pedunculate; postocular lobes nearly straight, converging posteriorly. Vertex with two longitudinal, slit-like grooves. Antennae long, about three times as long as width of head; segment I longer than II and IV, III twice as long as II.

Thorax. Pronotum longer than wide, lateral margins converging anteriorly, anterior lobe depressed at middle with deep linear grooves, posterior lobe marked by a transverse suture depressed at middle; mesonotum with small wing-pads and flap-like remnants of hemelytra. Scutellum cordate, its anterior margin bisinuate; lateral margins carinate anteriorly, disk longitudinally carinate, with a deep median sulcus; narrow remnants of mesonotum not covered by the scutellum, exposed lateral of scutellum. Metanotal plate flat, with apodemal markings partly covered by incrustation.

Legs long and slender; femora and tibiae cylindrical; protibia with anteapical basal spine.

Abdomen. Deltg II+III fused to a triangular sclerite, anteriorly with a large tubercle-like, stiff tuft of bristles; dorsum reflexed posteriorly; posterolateral angles of deltg II–VII progressively laterally produced and acute. Tergal plate with a longitudinal ridge, lateral apodemal markings roundly depressed; tergite VII medially raised for the reception of the large pygophore.

Comparative notes. The new genus differs from other genera of the *Zimmermania* complex by its posteriorly expanded triangular habitus and a combination of characters (e.g., only spiracle II lateral, brachypterous state with a flap-like or crescent shaped remnant of membrane, large cordate or triangular scutellum).

Species composition. So far only two species are known from Japen and Waigeo Islands in Western Papua (Indonesia), both located northwest of the main island of New Guinea.

Etymology. The genus name refers to its large size (from Greek macros) and to the relationship to *Zimmermania*.

***Macrozimmermania japena* sp.n.** (Figs 11, 15–17)

Material examined. Holotype (male): Irian Jaya / leg. A.Riedel / 26 XII 2000 // Japen Isl., Serui / Kontinuai road to / Ambaidiru, 600 m / sifted // (CEHI). The holotype is labelled accordingly.

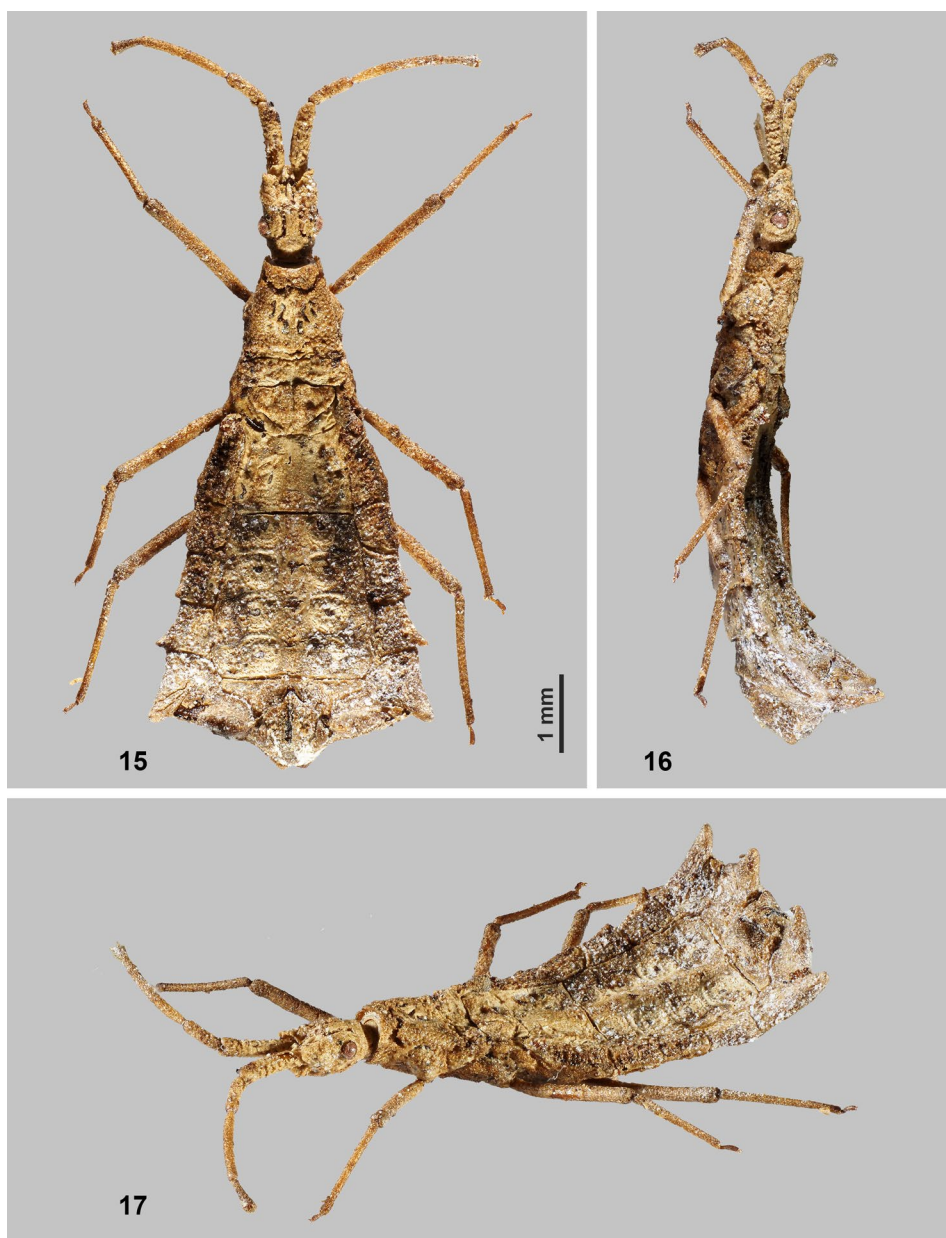
Description. The generic description is also valid for this species and is not repeated here.

Measurements. Body length 7.60; length / width of head 1.25 : 0.825; ratio length of antennae / width of head 3.36; length of antennal segments I : II : III : IV = 1.00 : 0.60 : 1.20 : 0.475; length / width of pronotum 1.50 : 1.40; length / width of scutellum 0.60 : 1.05; width of abdomen across tergite III 2.65, IV 2.90, V 3.40, VI 3.55.

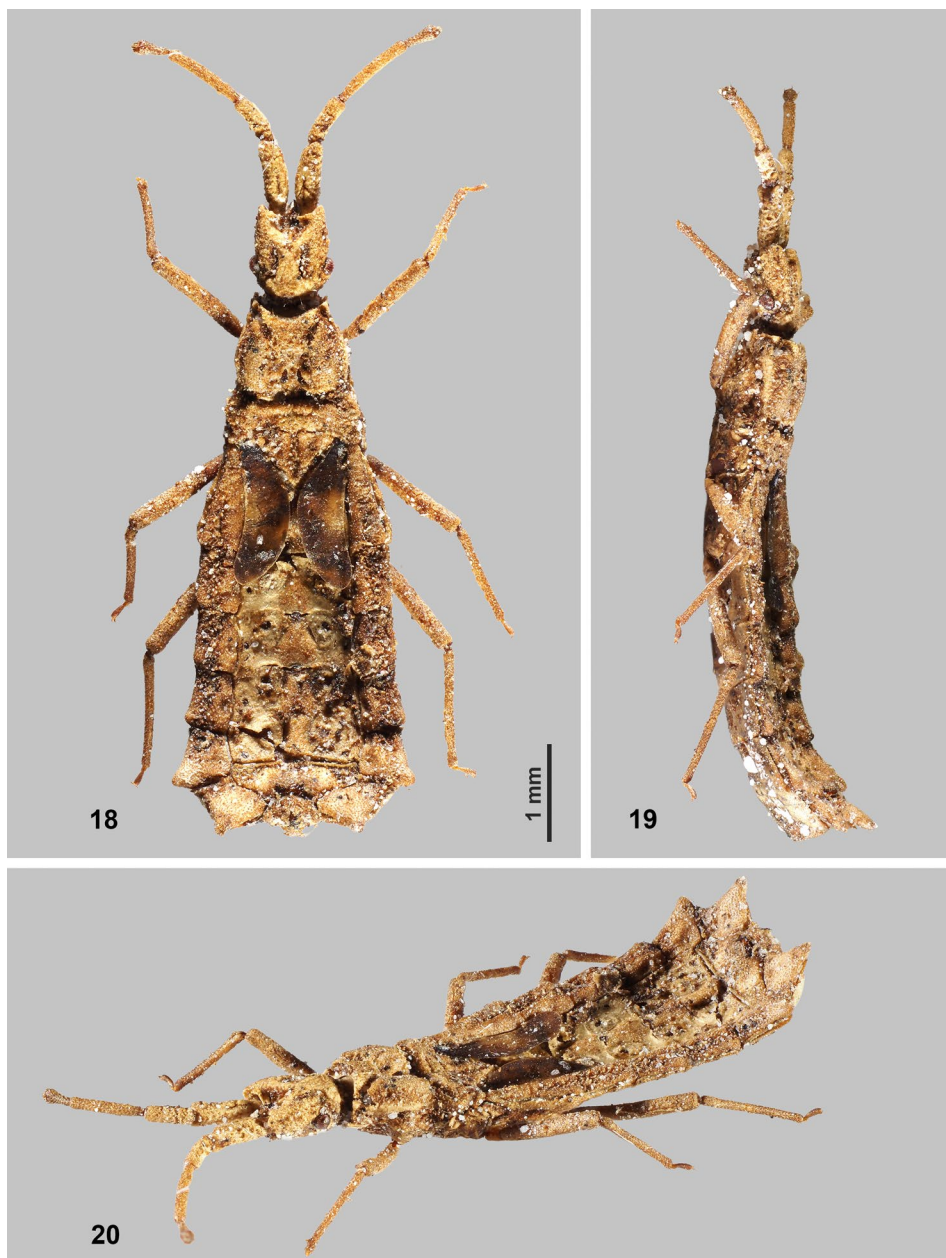
Note. A larval stage V (Fig. 11) was collected with the holotype showing the basic characters and habitus of this species. Length of body 6.00; length of antennal segments I : II : III+IV = 0.65 : 0.45 : 1.45; width of abdomen across deltg VII 2.85.

Distribution. So far only known from the type locality on Japen Island.

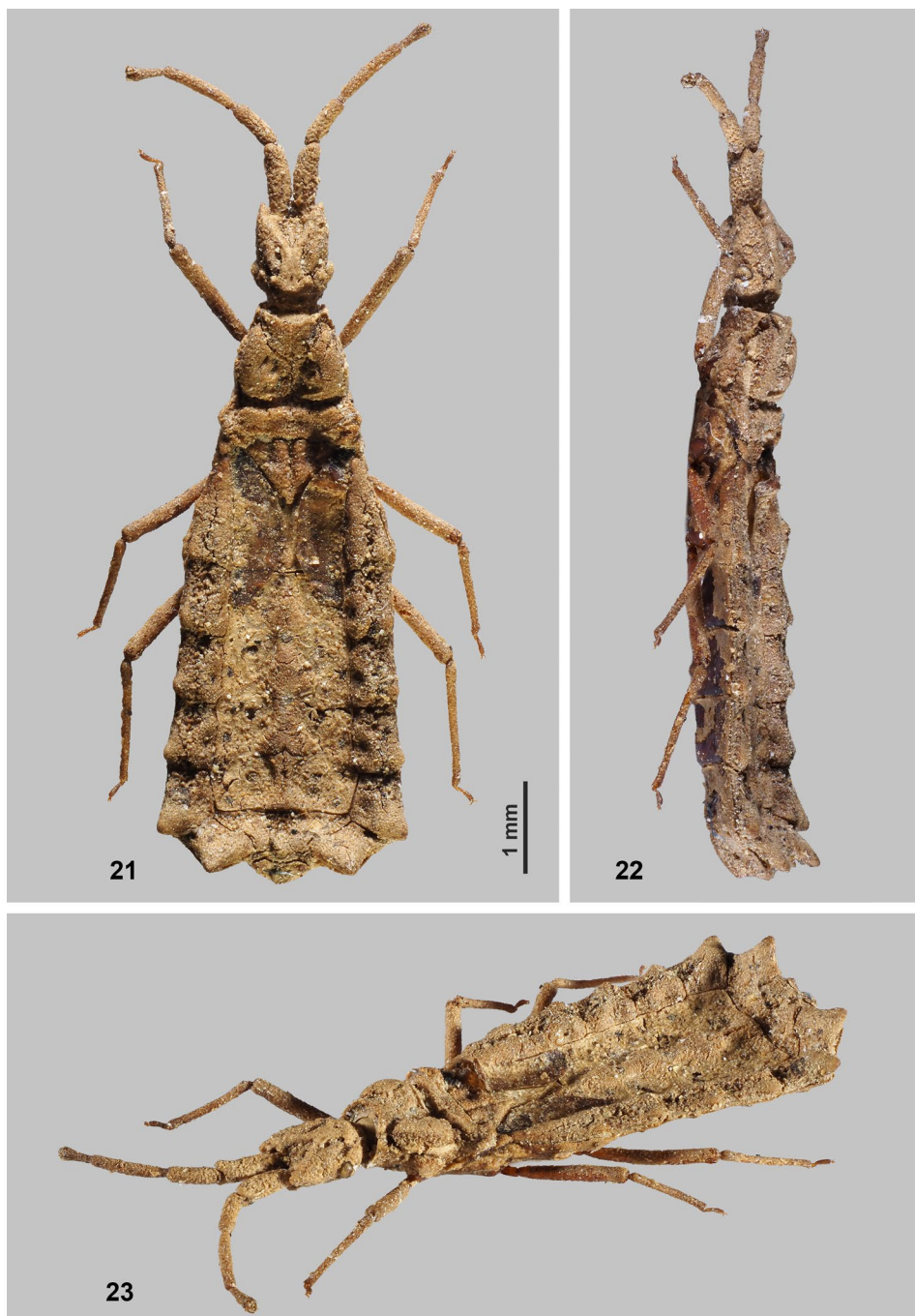
Etymology. The species epithet refers to the island of Japen in Western Papua (Indonesia) northwest of the New Guinea main island where it was discovered. The species is most probably endemic on this island.



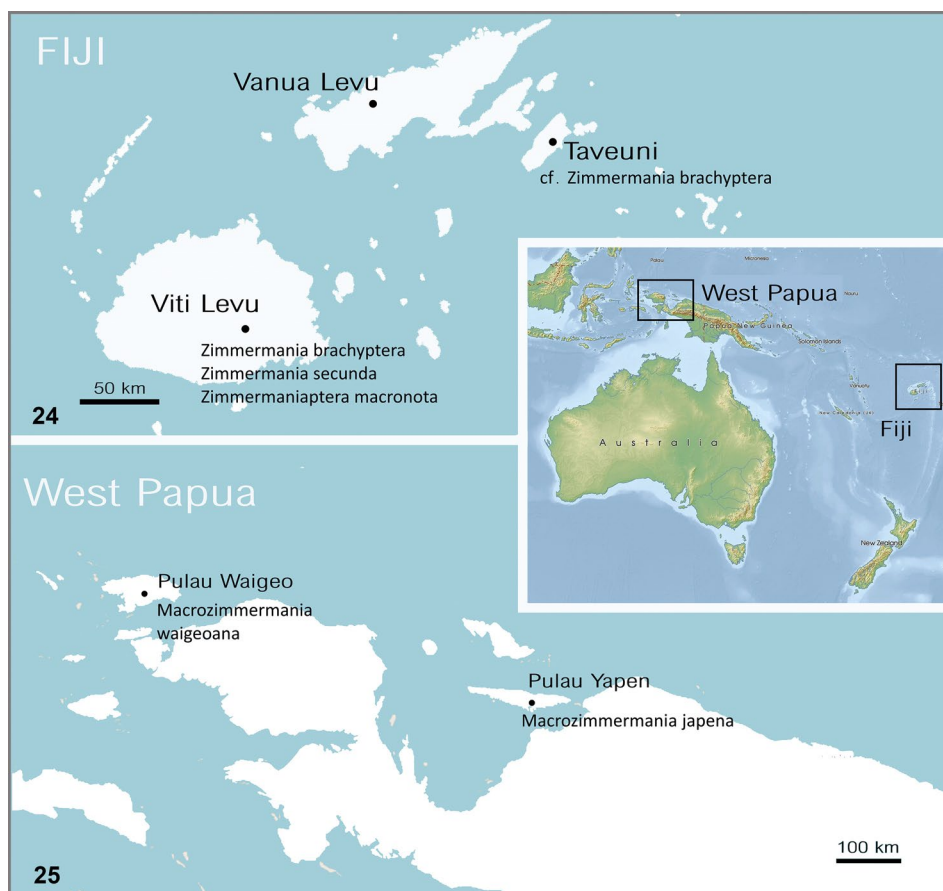
Figs 15–17. *Macrozimmermania japena* sp.n., holotype (male): habitus, dorsal (15), lateral (16), and semidorsal (17). © A. Eckelt.



Figs 18–20. *Macrozimmermania waigeoana* sp.n., holotype (male), habitus dorsal (18), lateral (19), and semidorsal (20). © A. Eckelt.



Figs 21–23. *Macrozimmermania waigeoana* sp.n., paratype (female), habitus dorsal (21), lateral (22), and semidorsal (23). © A. Eckelt.



Figs 24–25. (24) Map of Fiji Islands with records of *Zimmermania* and *Zimmermaniaptera* gen.n. (25) Map of Western New Guinea with records of *Macrozimmermania* gen.n. (map base from Wikipedia).

***Macrozimmermania waigeoana* sp.n. (Figs 18–23)**

Material examined. Holotype (male): Irian Jaya / Sorong Province / 25 I 2001 A. Riedel // Waigeo Is. Urbinasopen Gn. Susu / 350–400 m sifted // (CEHI). The holotype is labelled accordingly. Paratype (1 female): Irian Jaya / Sorong Province / 21–22 I 2001 A. Riedel // Waigeo Isl. / Yambekati 80–180 m / sifted // (CEHI).

Description. The generic description is also valid for this species and is not repeated here.

Measurements. Holotype male (paratype female in brackets): body length 6.40 (7.30); length / width of head 1.05 : 0.90 (1.05 : 0.90); ratio length of antennae : width of head 2.83 (2.88); length of antennal segments I : II : III : IV = 0.75 : 0.55 : 0.85 : 0.40 (0.75 : 0.55 : 0.90 : 0.40); length / width of pronotum 1.30 : 1.40 (1.30 : 1.50); length / width of scutellum 0.60 : 1.25 (0.70 : 0.90); width of abdomen across tergite III 2.05, IV 2.10, V 2.30, VI 2.55, VII 1.50 (III 2.25, IV 2.35, V 2.50, VI 2.65, VII 1.50).

Comparative notes. *Macrozimmermania waigeoana* sp.n. differs from *M. japena* sp.n. by the following set of characters: Habitus more slender and less enlarged posteriorly; lateral parts of pronotum thickened and raised; scutellum triangular, with straight lateral margins; larger crescent-shaped membrane reaching half of tergite III; cluster of stiff setae apically of fused deltg I+II not developed.

Future studies based on molecular data will show whether the differences between *M. japena* sp.n. and *M. waigeoana* sp.n. are significant enough to place them in different genera. This would be supported by biogeographical considerations, as the oceanic islands Japan and Waigeo are about 500 km distant from each other.

Distribution. So far only the types from Waigeo Island are known.

Etymology. The species epithet refers to the Island of Waigeo in Western Papua, where the species is most probably endemic.

Acknowledgements

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