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The first record of the genus *Olcinia* Stål, 1877 from Cambodia and Vietnam with the description of two new species (Orthoptera: Tettigoniidae: Pseudophyllinae: Cymatomerini)

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Front cover: *Olcinia constanti* sp. nov., holotype ♀, habitus, dorsal view (left) and *Olcinia nuichuana* sp. nov., holotype ♀, habitus, dorsal view (right).

The first record of the genus *Olcinia* Stål, 1877 from Cambodia and Vietnam with the description of two new species (Orthoptera: Tettigoniidae: Pseudophyllinae: Cymatomerini)

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Abstract

Two new species of *Olcinia* Stål, 1877 are described from the female: *O. nuichuana* sp. nov. from Vietnam and *O. constanti* sp. nov. from Cambodia, hereby extending the distribution of the genus to these countries. *Olcinia constanti* sp. nov. also represents the first record for the tribe in Cambodia. Both species are comprehensively illustrated and a distribution map is provided. A generic key is presented for all Asian genera of Cymatomerini as well as a specific key for the genus *Olcinia* Stål, 1877.

Keywords: Mimicry, bark katydid, Nui Chua National Park, Kirirom National Park, Global Taxonomic Initiative.

Introduction

The tribe Cymatomerini Brunner von Wattenwyl, 1895, sometimes called bark katydids, is composed of eleven cryptic genera with all species mimicking moss, lichen, wood or a leaf. All current genera are known to feed on leaves. The tribe is mostly distributed in the Oriental Region and only two genera are distributed in the Afrotropical Region. Currently forty-two species are present in the tribe (CIGLIANO *et al.*, 2017). A key to the genera was provided by BEIER, 1944 and an adapted key is presented below. Cymatomerini are not very good flyers but sometimes still attracted to light; it is presumed that only insects close to the light trap come to the light.

The genus *Olcinia* Stål, 1877 was erected for *O. erosifolia* Stål, 1877 from the Philippines and is distributed in Southeast Asia from Peninsular Malaysia to Borneo and the Philippines. The genus is now shown to be present in Cambodia and Vietnam with a new species from Kirirom N. P. and a new species from Nui Chua N. P. (Fig 7 A–C). *Olcinia constanti* sp. nov. can be distinguished by the costal margin and venation of the tegmina and *O. nuichuana* sp. nov. can be easily distinguished by the shape of the alae.

Nui Chua National Park is an isolated location with several specialised habitats. More research concerning this area will most certainly reveal several new species in many insect orders.

Material and methods

Cymatomerini are mostly nocturnal and therefore mainly collected during the night by visual inspection of the vegetation using a light-weight and water-proof head torch. A Petzl MYO RXP was used during collecting. The specimens were euthanized with ethylacetate (EtOAc) fumes in a killing jar and were then stored in airtight plastic “zip”-bags in wood chips (used in rodent cages) and sprinkled with ethylacetate (EtOAc) to prevent rotting, mould and keeping the specimens flexible. The bags were frozen on arrival and the specimens mounted later on.

Photographs were taken with a Canon EOS 700D DSLR camera mounted with a Sigma AF 50mm f/2.8 EX DG macro lens and two Yongnuo Speedlite YN 460-II off-camera flashes. The photographs were processed in Adobe® Photoshop CS 5.5 to adjust levels and to perform image alignment and stacking. The stacked images were then optimized using Adobe® Photoshop Lightroom 6 to adjust exposure and sharpness. Minor adjustments were also made using the spot removal tool to correct for distracting debris. Observations were done using a Leica MZ8 stereo-microscope. The description of the colouration is based on mounted specimens. All measurements are in millimetres and were taken using an electronic calliper.

The distribution map was produced with SimpleMappr (SHORTHOUSE, 2010).

Measurements for the wings were taken as follows:

Alae width (AW) = measured under a 90° angle from the most anterior margin of the costal region towards the most posterior margin of the ala.

Alae length (AL) = from the proximal margin of the axillary sclerites to the distal tip of the ala.

The nomenclature for the morphological characters follows DE JONG, 1939; 1960, HEMP, 2013 and BRANNOCH *et al.*, 2017

Acronyms used for the collections:

RBINS = Royal Belgian Institute of Natural Sciences, Brussels, Belgium.

RUPP = Royal University of Phnom Penh, Cambodia

VNMN = Vietnam National Museum of Nature, Hanoi, Vietnam.

Abbreviations:

N.P.: National Park

Taxonomy

Family **Tettigoniidae** Krauss, 1902

Subfamily **Pseudophyllinae** Burmeister, 1838

Tribe **Cymatomerini** Brunner von Wattenwyl, 1895

Keys to the Asian genera of the tribe Cymatomerini Brunner Von Wattenwyl, 1895

1. Profemora distinctly undulate to lamellate ventrally..... 2
- Profemora only very slightly undulate ventrally or straight..... 5
2. Alae not fully developed, only area between costa and first branch of the medial vein present..... **Platenia** Dohrn, 1888
- Alae nearly to fully developed 3

3. Fore margin of tegmina distinctly crenulated, apex of tegmina broadly rounded..... *Olcinia* Stål, 1877
 - Fore margin of the tegmina not or very faintly undulate, tegmina tapering towards apex ... 4
4. Ovipositor straight..... *Sathrophyllia* Stål, 1874
 - Ovipositor upcurved *Tegrolcinia* De Jong, 1939*
5. Alae black with paler cross-veins..... *Sanaa* Walker, 1870
 - Alae transparent to brown, often with darker cross-veins 6
6. Tegmina with broad yellow band bearing large black dots, almost over the complete length; area around hind- and fore margin and apex coloured brown; Pronotum bright yellow *Parasanaa* Donovan, 1834
 - Tegmina without broad yellow marking; Pronotum brown to green 7
7. Posterior margin of pronotum distinctly notched medially, outer angles rounded *Typhoptera* Kirby, 1906
 - Posterior margin of pronotum not notched but rounded 8
8. Tegmina with parallel borders and bluntly rounded apex; alae sometimes only slightly surpassing tegmina; ovipositor upcurved *Tegra* Walker, 1870
 - Tegmina without parallel borders; alae distinctly surpassing tegminae; ovipositor straight .. *Sathrophylliopsis* De Jong, 1939**

* Currently only females of *Tegrolcinia* are known.

** Primarily based on the type species as the genus might contain two distinct genera or shows a conspicuous sexual dimorphism.

Genus *Olcinia* Stål, 1877

Type species: *Olcinia erosifolia* Stål, 1877.

DIFFERENTIATION

Differing from all other known genera of Cymatomerini by the following combination of characters (DE JONG, 1939; 1960):

- 1) Costal margin of tegmina distinctly crenulated.
- 2) Tegmina broadest before the middle.
- 3) Tegminal apex broadly rounded to broadly truncate.
- 4) Preradial area of tegmina broadly rounded.
- 5) Ovipositor straight.

DISTRIBUTION. Currently known from Vietnam, Cambodia, Thailand, Peninsular Malaysia, Sumatra, Java, Borneo and the Philippines.

Species included

<i>constanti</i> sp. nov.	[Cambodia, Kirirom National Park]
<i>crenifolia</i> (Haan, 1843)	[Borneo, Loeroentoer]
<i>dentata</i> de Jong, 1939	[Borneo, Bloe-oe, Kalao; Sumatra, Tandjong Merah Estate near Medan]
<i>erosifolia</i> Stål, 1877	[Philippines]

<i>excisa</i> Karny, 1923	[Borneo]
<i>grandis</i> de Jong, 1939	[Borneo, Bloe-oe, Mahakam]
<i>mahakamensis</i> de Jong, 1939	[Borneo, Mahakam; Mahakam River; Long Bloe-oe]
<i>nuichuana</i> sp. nov.	[Vietnam, Nui Chua National Park]
<i>pallidifrons</i> Karny, 1926	[Perak, Batang Padang; Sumatra, Benkoelen, Boekit Itam]
= <i>tuberculata</i> de Jong, 1939	[Borneo, Sugut, Pandakan Bay]

Key to the species of *Olcinia* (adapted from DE JONG, 1960)

1. Head with 2 small thorns on dorsal surface, one on each side close to the eye 2
 - Dorsal surface of the head without such thorns 4
2. Forehead dark brown *O. mahakamensis* De Jong, 1939
 - Forehead pale 3
3. Pronotum of normal shape *O. dentata* De Jong, 1939
 - Pronotum deeply and broadly incised on posterior margin *O. excisa* Karny, 1923
4. Middle tibiae with small thorn on dorsal surface below knee 5
 - No thorn on dorsal surface of middle tibiae near knee 6
5. Pronotum crenulated but without a crenulated median crest or distinct median row of tubercles in the basal half *O. grandis* De Jong, 1939
 - Pronotum with a strongly crenulated crest or a distinct indication of such in the posterior half of the disc *O. pallidifrons* Karny, 1926
6. Alae with transparent part distinctly shorter than the coloured part. Alae with AL/AW ratio about 2.5 (Fig. 5) *O. nuichuana* sp. nov.
 - Alae with transparent part more or less continuous with the coloured part. Alae with AL/AW ratio less than 2 7
7. Apex of the coloured part of the alae crenulated (Fig. 2 C) *O. constanti* sp. nov.
 - Apex of the coloured part of the alae obtusely rounded 8
8. Tegmina with the first cell formed by radius and first radial vein distinctly shorter than the following; the subcostal and radial veins run together to about the middle of the tegmina, then they diverge slightly and touch again at short distance *O. erosifolia* Stål, 1877
 - Tegmina with the first cell formed by radius and first radial vein distinctly longer than the following; the subcostal and radial veins run together to about the middle of the tegmina, then they diverge and continue diverged to just before the apex, when diverged there are transverse connecting branches *O. crenifolia* (Haan, 1843)

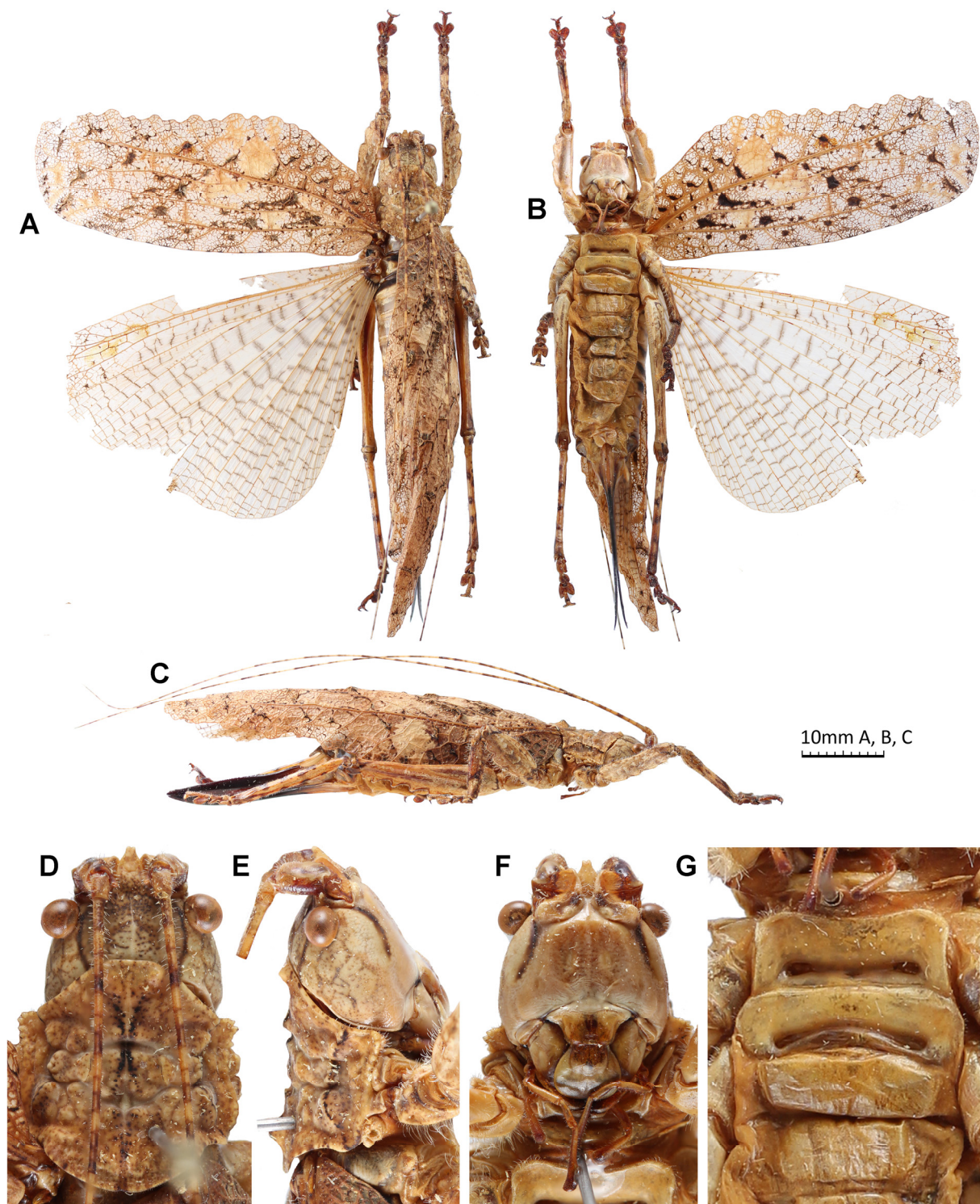


Fig. 1. *Olcinia constanti* sp. nov., holotype ♀. A, habitus, dorsal view. B, habitus, ventral view. C, habitus, lateral view. D, head and thorax, dorsal view. E, head and thorax, lateral view. F, forehead. G, meso- and metasternum, ventral view. D–G not to scale.

***Olcinia constanti* sp. nov.**

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Figs 1–3; 7 A–B.

ETYMOLOGY. The species is dedicated to Jérôme Constant (RBINS) for supporting both authors in their taxonomic studies.

TYPE MATERIAL. Holotype ♀ (Figs 1–3): Cambodia, Kampong Speu, Kirirom N.P., 11°18'37''N 104°03'04''E, night collecting/light trap, 9-12.V.2015, leg. J. Constant & V. Sougnez, I.G.: 33.022 (RBINS).

DIAGNOSIS

Olcinia constanti sp. nov. has a distinctly crenulated fore margin of the tegmina. It can be distinguished from most species in the genus by the almost parallel radius and subcosta, only diverging slightly distally. The combination of previous characters with the crenulated apex of the alae (Fig. 2) differentiate this species from all other members of the genus.

DESCRIPTION

FEMALE (Figs 1–3)

Measurements: see Table 1.

Body: General colour ochreous brown speckled with darker markings. Tegmina with some larger pale spots.

Head. (Fig. 1 D–F) Head as seen from above roundish. Frons and mouthparts pale. Frons with a dark line on anterolateral margins; strongly flattened and slightly concave centrally. Fastigium verticis elongated, not reaching apex of scapi, sulcate, tapering towards apex; apex notched. Eyes strongly rounded and projecting almost spherically. Antennae more than 2 times longer than body length, brownish with irregular paler markings along whole length. Vertex and occiput with numerous black dots and behind the antennae with a bent black longitudinal line passing above eye and reaching occiput.

Thorax. (Fig. 1 D–E, G) Pronotum rugulose, disc relatively flat. Anterior margin rounded with two blunt spines near middle. Posteriorly on prozona a pair of tubercles. Lateral margin of prozona incised medially; prozona narrowing towards mesozona. Mesozona constricted and distinctly narrower than pro- and metazona, sulcate posteriorly. Anterior margin of metazona concave and with two blunt spines near middle. Metazona with blunt cone medially and rounded anteriorly. Lateral lobes of pronotum shallow, about twice as long as deep and borders with disc raised; ventral margin tuberculose and slightly concave. Prosternum unarmed. Fore border of mesosternum slightly concave with rounded angles. Metasternum broader than mesosternum, with posterior edge slightly concave. Sterna wider than long.

Legs. (Fig. 3 A–C) Legs brown with black markings; mid- and fore legs setose. Femora laterally flattened. Profemora short, about as long as head; anterodorsal carina raised and strongly developed. Outer ventral carina quadrilobate. Mesofemora with strong, smooth dorsal carina, about as long as pronotum and trilobate ventrally. Metafemora about as long as corresponding tibiae with five teeth ventrally.

Protibiae flat dorsally and slightly widening towards apex, laterally near base with conchiform auditory tympana. Auditory tympanum almost completely covered by lobe-like processes. Outer ventral carinae with some minute spines. Mesotibiae laterally flattened and with a well developed carina dorsally and ventrally. Ventral carina with few minute spines. Metatibiae dorsally rounded, carinate near apex with few evenly spaced granules. Outer ventral carinae developed with some minute spines. Spines more numerous and slightly bigger near apex.

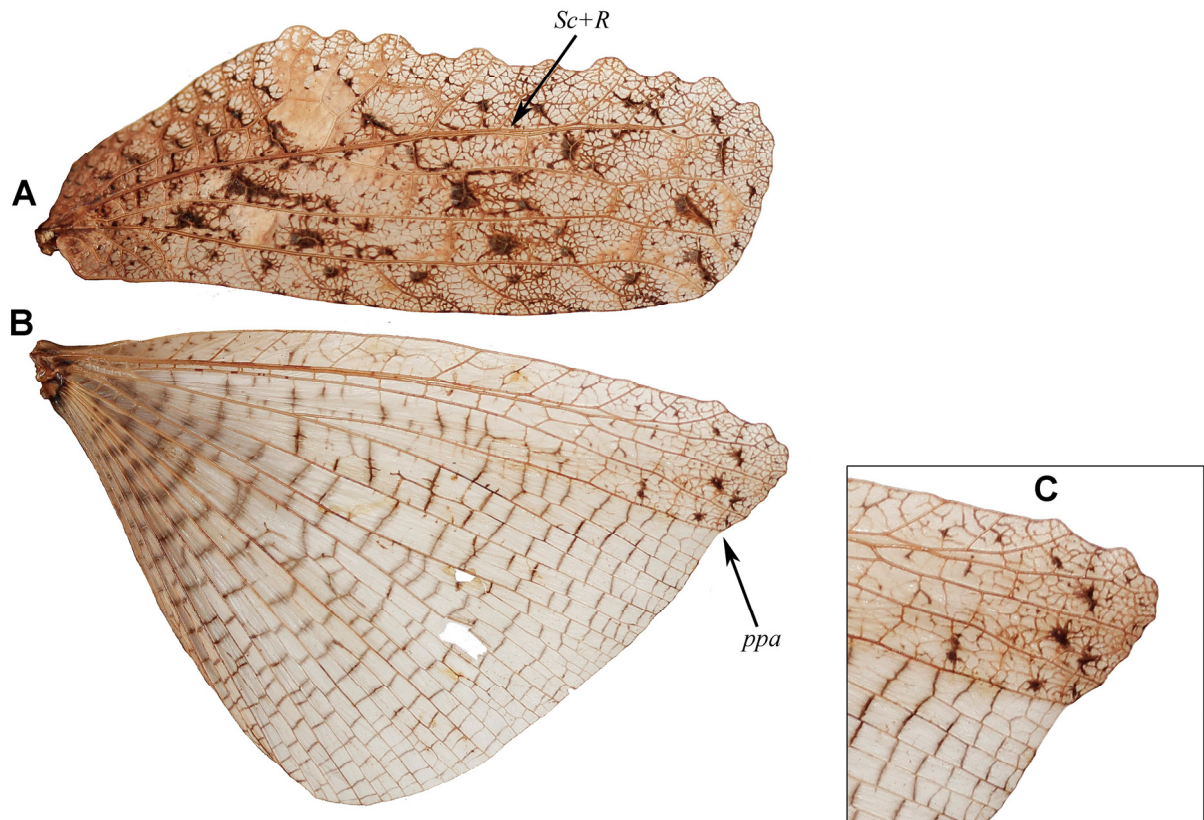


Fig. 2. *Olcinia constanti* sp. nov., holotype ♀. right tegmen and corresponding alae. A, tegmen. B, ala. C, ala distal part. *ppa*, plica prima anterior. *Sc+R*, subcosta and radius.

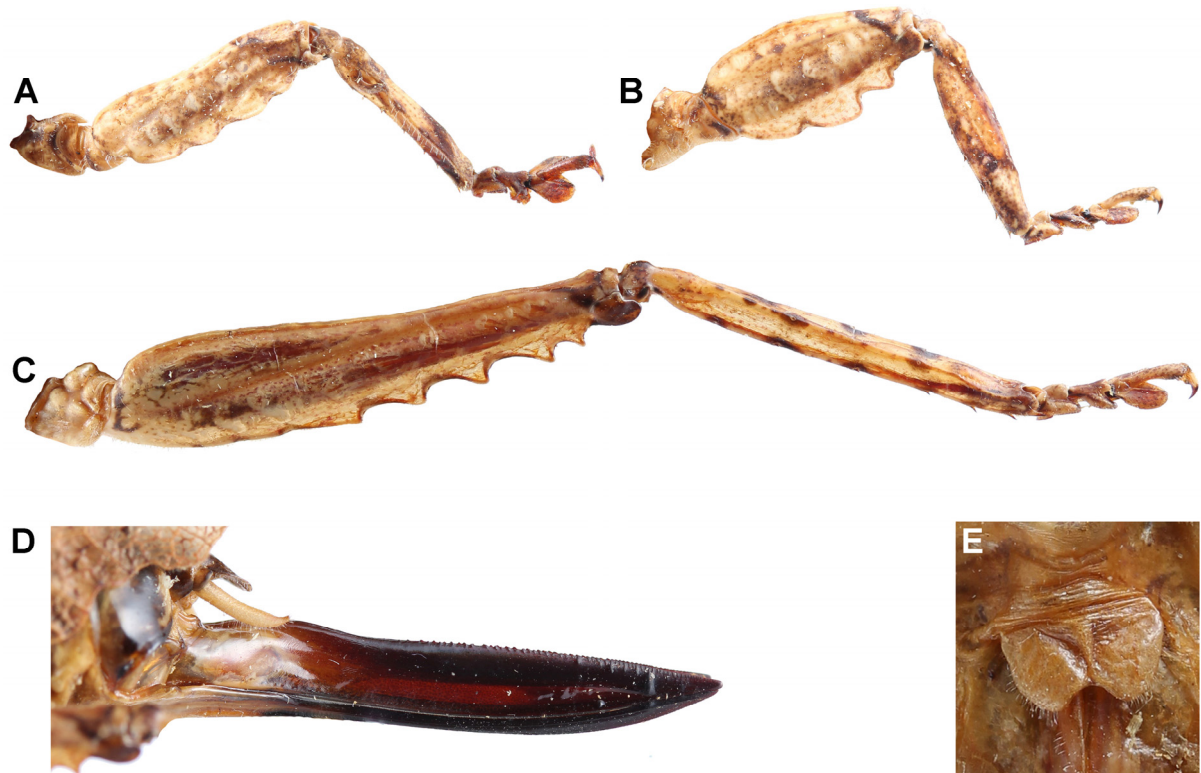


Fig. 3. *Olcinia constanti* sp. nov., holotype ♀. A, fore leg, lateral view. B, mid leg, lateral view. C, hind leg, lateral view. D, ovipositor, lateral view. E, subgenital plate, ventral view.

Wings. (Fig. 2) Tegmina rugose, ochreous brown with pale and darker markings; strongly crenulated at fore margin; crenulations consisting of larger semicircular lobes alternating with smaller ones. Hind margin nearly straight, only faintly sinuate. Broadest part before middle. Preradial area rather broad. Subcostal and radial veins run parallel for almost complete length, connected by numerous crossveins. Subcosta ending in fore margin before apex; radius ends in the apex. Basal part of preradial area with a number of closed cells, formed by branches of costa and subcosta but more apically the cells are open to the fore margin. Most cells show a central dark patch. Postradial area divided by the large veins into four longitudinal fields not strongly differing in size, slightly narrower between medial veins. Branch of radial vein slightly angular. Anterior and posterior branch of medial vein sinuate. Apex broadly rounded, slightly undulate.

Alae with area between costa and Cu1 coloured much like tegmina but paler and semi-transparent, apex of coloured part rounded and crenulated. Other portion of alae almost completely continuous with coloured part, plica prima anterior (ppa) shallow, more transparent and with transverse veins thickened and infusate. Infumation more distinct in basal part. Alae length/width ratio about 1.65.

Abdomen. All abdominal segments yellowish brown with black markings dorsally and laterally. Supra-anal plate dark brown, rectangular with a rounded apex and apical rim slightly thickened. Cerci yellowish brown, slightly curved and strongly curved upwards at top, with apex pointed and darkened. Ovipositor (Fig. 3 D) inflated and yellowish brown basally; strongly darkening towards apex. Borders darker than centre, apex almost black. Dorsally smooth at base, later with small serrations. Serrations becoming smaller near apex; apex unarmed. Ventral margin slightly curved upwards; dorsal margin straight and reaching apex of alae. Subgenital plate broad, slightly setose with mediolongitudinal carina and apically deeply incised; posterior angles rounded (Fig. 3 E).

Table 1. Measurements [lengths in mm] of *Olcinia constanti* sp. nov.

	HT ♀
Body	41
Head	10
Pronotum	8,3
Profemur	9,8
Mesofemur	8,2
Metafemur	14,5
Protibia	9,2
Mesotibia	6,7
Metatibia	13,9
Tegmina	42
Alae	45,3
Ovipositor	17,1

DISTRIBUTION. Fig. 7 A.

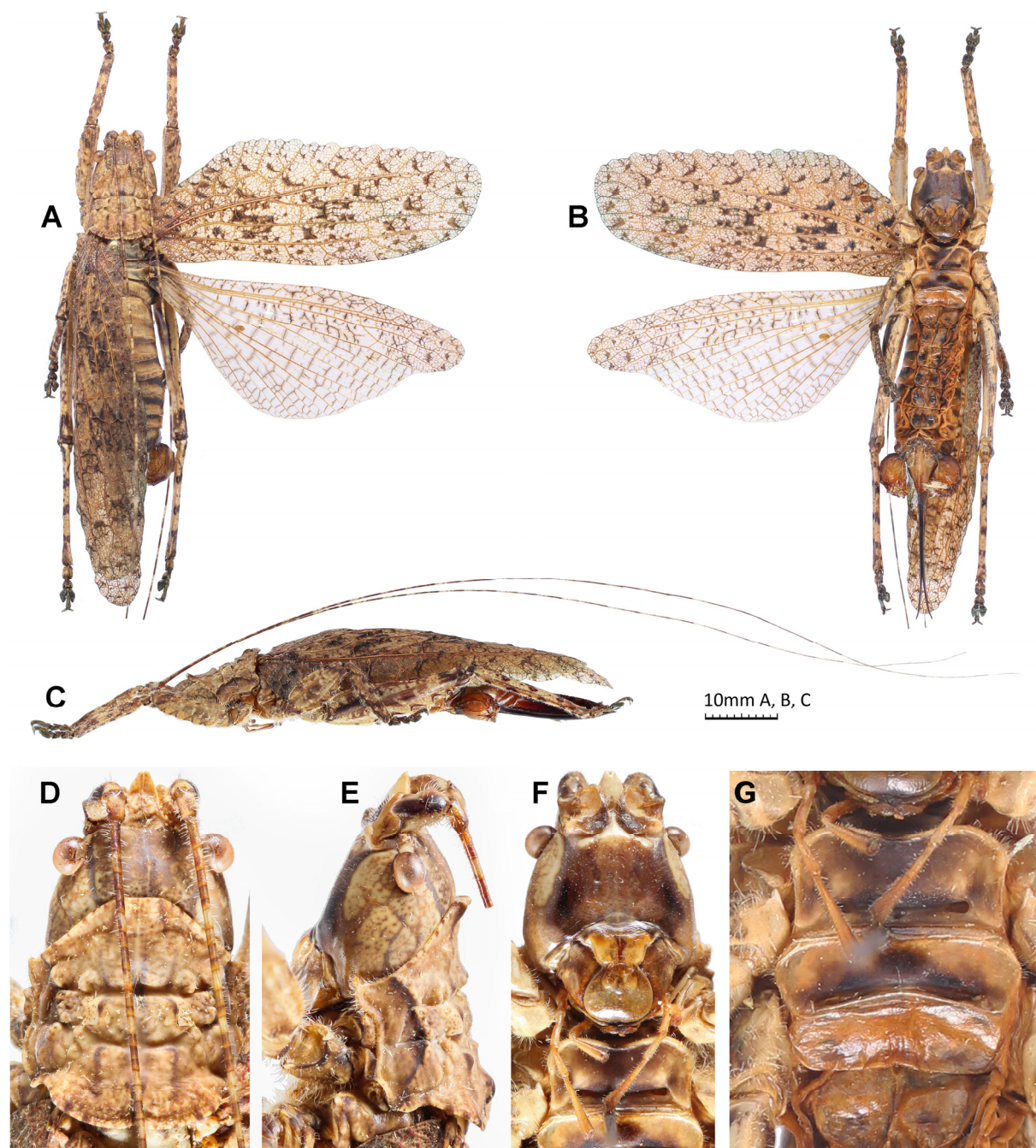


Fig. 4. *Olcinia nuichuana* sp. nov., holotype ♀. A, habitus, dorsal view. B, habitus, ventral view. C, habitus, lateral view. D, head and thorax, dorsal view. E, head and thorax, lateral view. F, forehead. G, meso- and metasternum ventral view. D–G not to scale.

***Olcinia nuichuana* sp. nov.**

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Figs 4–6; 7 A, C.

ETYMOLOGY. The species name refers to Nui Chua N.P. in Southeast Vietnam.

TYPE MATERIAL. Holotype ♀ (Figs 4–6): Vietnam, Ninh Thuan Prov., Nui Chua N. P., 11°42'N 109°09'E, 3-9.VII.2014, night coll., leg. J. Constant & J. Bresseel, G.T.I. Project, I.G.: 33.092 (RBINS).

Paratype ♀: Vietnam, Ninh Thuan Prov., Nui Chua N. P., 11°42'N 109°09'E, 3-9.VII.2014, night coll., leg. J. Constant & J. Bresseel, G.T.I. Project, I.G.: 33.092 (VNMN).

DIAGNOSIS

O. nuichuana sp. nov. has relatively small crenulations on the fore margin of the tegmina and small lobes on the profemora compared to other members of the genus. It can be distinguished from all other species of Cymatomerini by the distinct plica prima anterior and the shape of the underdeveloped hind wing (Fig. 5).

DESCRIPTION

FEMALE (Figs 4–6; 7 A, C).

Measurements: see table 2.

Body: General colour brown-grey with green, speckled with darker markings.

Head. (Fig. 4 D–F) Head as seen from above roundish. Frons dark brown centrally, darkening towards lateral margins. Mouthparts slightly paler. Frons strongly flattened and slightly concave centrally. Fastigium verticis elongated, not reaching apex of scapi; base swollen, later flattened with longitudinal groove; tapering towards apex, apex notched. Eyes strongly rounded and projecting almost spherically. Antennae more than 2 times longer than body length, brownish with irregular paler markings along whole length. Vertex and occiput with numerous dark spots and behind antennae a black longitudinal line passing above eye and reaching occiput.

Thorax. (Fig. 4 D–E, G) Pronotum rugulose with median line, relatively flat on disc. Anterior margin trapezoidal with two blunt, conical spines near centre. Prozona anteriorly sulcate and with pair of tubercles. Lateral margin of prozona medially incised, prozona narrowing towards mesozona. Mesozona constricted and distinctly narrower than pro- and metazona. Mesozona posteriorly sulcate and rounded. Anterior portion of metazona concave, with two raised areas. Metazona with blunt cone posteromedially and slightly notched anteriorly. Lateral lobes of pronotum shallow, about twice as long as deep and along borders with disc raised; ventral margin carinate. Prosternum unarmed. Fore margin of mesosternum slightly raised, concave with rounded angles. Metasternum broader than mesosternum, with posterior edge concave. Sterna wider than long.

Legs. (Fig. 6 A–C) Legs brown-green with black markings and slightly setose. Femora laterally flattened. Profemora short, about as long as pronotum, anterodorsal carina raised and strongly developed. Outer ventral carina quadrilobate; between lobes, pale triangular markings. Mesofemora with strong, smooth dorsal carina, slightly shorter than profemora and quadrilobate ventrally. Metafemora about as long as ovipositor, with three teeth ventrally in posterior half; anterior half undulate. Protibiae flat dorsally and slightly widening towards apex, laterally near base with chonchiform tympana, almost completely covered by lobe-like process; outer ventral carinae with some minute spines. Mesotibiae laterally flattened; ventral carina with few minute spines. Metatibiae with dorsal carinae developed with few evenly spaced granules; outer ventral carinae developed with some minute spines; spines more numerous and slightly bigger near apex.

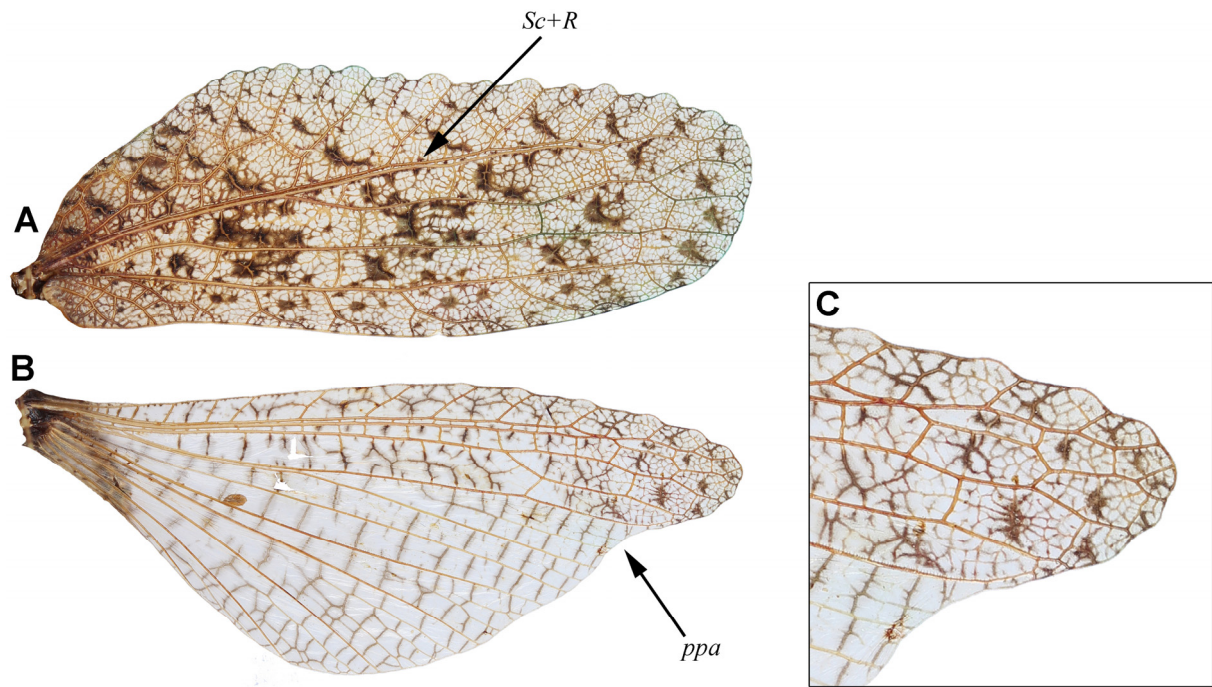


Fig. 5. *Olcinia nuichuana* sp. nov., holotype ♀. A, tegmen. B, hind wing. C, hind wing distal part. *ppa*, plica prima anterior. *Sc+R*, subcosta and radius.

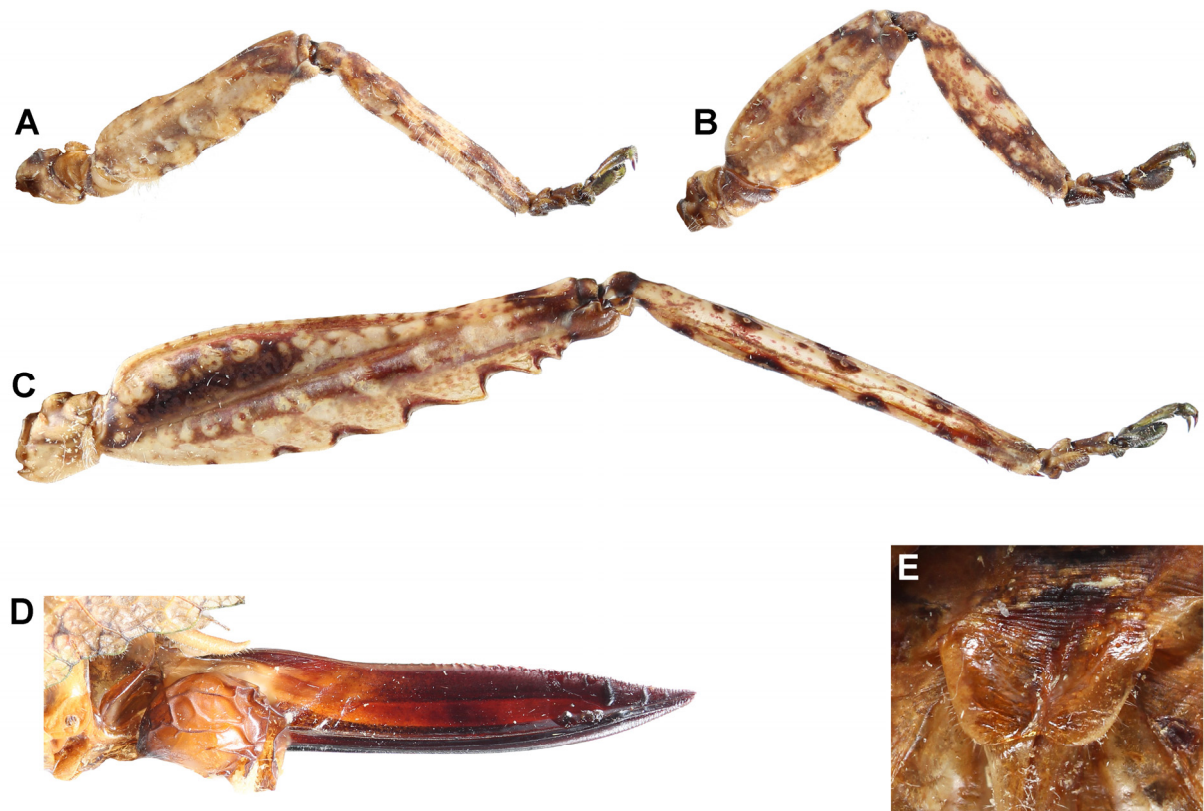


Fig. 6. *Olcinia nuichuana* sp. nov., holotype ♀. A, fore leg, lateral view. B, mid leg, lateral view. C, hind leg, lateral view. D, ovipositor, lateral view. E, subgenital plate (paratype), ventral view.

Wings. (Fig. 5) Tegmina coloured as body; crenulated at fore margin, crenulations consisting of larger semicircular lobes alternating with smaller ones. Hind margin slightly sinuate. Broadest part before middle. Preradial area rather broad. Subcostal and radial veins run parallel for more than halfway their length, connected by numerous crossveins; then slightly diverging and later joining again, creating few narrow closed cells. Subcosta ending in fore margin before apex; radius ends in apex. Basal part of preradial area with a number of closed cells, formed by branches of costa and subcosta but more apically cells are open to the fore margin. Most cells show a dark patch. Postradial area divided by the main veins into four longitudinal fields not strongly differing in size; slightly narrower between medial veins. Branch of radial vein slightly angular. Anterior branch of medial vein sinuate and posterior branch of medial vein almost straight. Apex broadly rounded, slightly undulate. Alae with area between costa and Cu1 coloured much like tegmina but paler and semi-transparent, apex of coloured part rounded and slightly undulate. Other portion of alae more transparent and distinctly shorter than coloured part, transverse veins infuscate. Plica prima anterior (ppa) very distinct. Infumation more distinct in basal part. Alae length/width ratio about 2.64.

Abdomen. All abdominal segments yellowish brown with black markings dorsally and laterally. Sterna yellowish brown with two black markings. Supra-anal plate dark brown, slightly tapering with broadly rounded apex. Cerci pale, setose and slightly curved, with apex rounded. Ovipositor (Fig. 6 D) slightly inflated at base, yellowish to red-brown basally, strongly darkening towards apex. Apex blackish. Dorsally smooth at base, later with small serrations. Serrations becoming smaller near apex, apex unarmed. Ventral margin slightly curved upwards; dorsal margin straight and reaching apex of alae. Subgenital plate broad at base, slightly tapering and apically deeply incised; posterior angles rounded (Fig. 6 E).

Table 2. Measurements [lengths in mm] of *Olcinia nuichuana* sp. nov.

	HT ♀	PT ♀
Body:	37,0	36,6
Head:	10,4	10,7
Pronotum:	8,0	8,3
Profemur:	8,2	8,9
Mesofemur:	7,6	7,6
Metafemur:	17,2	16,6
Protibia:	8,5	8,3
Mesotibia:	7,0	7,4
Metatibia:	13,5	13,4
Tegmina	36,7	36,2
Alae	37,7	37,0
Ovipositor	17,8	18,1

DISTRIBUTION. Fig. 7 A.

Discussion

New species of the tribe Cymatomerini are rarely described and not much work has been done since the revision of BEIER (1954). The most recent ones are three species from Africa by HEMP (2013) and NASKRECKI (2008) and three more from Pakistan by SULTANA *et al.* (2014).



Fig. 7. A. Distribution map of *Olcinia nuichuana* sp. nov. and *O. constanti* sp. nov. B, *O. constanti* sp. nov. habitat in Kirirom N. P. (Photograph J. Constant May 2015). C, *O. nuichuana* sp. nov. habitat in Nui Chua N. P. (Photograph J. Constant July 2014).

This reflects the lack of specialists working on the group and therefore information on their variation and biology is almost completely unknown. The two new species of *Olcinia* described above, extend the distribution of the genus considerably with first country records for Vietnam and Cambodia and with a first record for the tribe in Cambodia. Currently nine species of the genus are known, but males are only known for two species, with only one species where both male and female originate from the type locality. Six species are described on a single specimen. The collecting of more material is necessary to discover the unknown sexes and gaining more information about variation and biology.

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