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Revision of the strongly flattened *Megaprosternum* Azevedo (Hymenoptera, Bethylidae)

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Abstract. The flat wasp genus *Megaprosternum* (Scleroderminae) is studied and revised. Fifteen species are recognized, including five previously described ones: *M. cleonarovorum*, *M. longiceps*, *M. neolongiceps*, *M. norfolcensis*, and *M. pentagonal*. Additionally, 10 new species are described and illustrated: *M. aka* sp. nov. and *M. bayaka* sp. nov. (both from the Central African Rep.), *M. chamorro* sp. nov., *M. hmong* sp. nov., *M. kariri* sp. nov., *M. kayin* sp. nov., *M. navatu* sp. nov., *M. nuaulu* sp. nov., *M. samburu* sp. nov., and *M. wakawaka* sp. nov. An emended diagnosis and a detailed discussion regarding the morphological diagnostic characters of this genus and its species, along with comments about the distribution pattern of *Megaprosternum*, are also presented. Additionally, a taxonomic key for males and females of all species is provided.

Keywords. Australia, Madagascar, Oceanian, Chrysidoidea, Scleroderminae.

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Introduction

The genus *Megaprosternum* Azevedo, 2006 currently has five species: *M. cleonavorum* Gupta & Azevedo, 2017 (in Gupta *et al.* 2017), *M. longiceps* (Ashmead, 1900), *M. pentagonal* Azevedo, 2006, *M. neolongiceps* Azevedo, 2018 (in Azevedo *et al.* 2018), and *M. norfolcensis* (Dodd, 1924). The distinguishing features of this genus include a pentagonal and remarkably large probasisternum, as well as a strongly flattened body (Azevedo *et al*. 2018).

The taxonomic history of *Megaprosternum* can be divided into three key publications. The first publication, by Azevedo (2006), described the genus to accommodate two species: *M. longiceps* from Fiji (nec *Ateleopterus longiceps* Ashmead, 1900) and *M. pentagonal* from Australia, with the former designated as the type species, by original designation. The second publication, by Gupta *et al*. (2017), described the third species, *M. cleonavorum*, from India, marking the first record of the genus in the

Oriental Region. Additionally, biological aspects were added (Gupta *et al.* 2017). The third and last publication, the *Global Guide of the Flat Wasps* proposed by Azevedo *et al*. (2018), involved transferring the Australian species *Sclerodermus longiceps* to *Megaprosternum*. Due to the resulting homonymy within the genus, a new name, *M. neolongiceps*, was proposed for *M. longiceps* Azevedo, 2006. In the same study, another species, *Sclerodermus norfolcensis* Dodd, 1924, also from Australia, was transferred to *Megaprosternum* (Azevedo *et al*. 2018).

Lanes & Azevedo (2008) recovered *Megaprosternum* as the sister group to *Solepyris* Azevedo, 2006, another genus of Bethylidae Haliday, 1839 with a large probasisternum, considered a synapomorphic trait for the clade (*Megaprosternum*+*Solepyris*). More recently, Vargas *et al*. (2020) proposed a new phylogeny of the Scleroderminae Kieffer, 1914, with more terminals and morphological characters. However, in this study, *Megaprosternum* was recovered as the sister group to *Platepyris* Lanes & Azevedo, 2008, and *Acephalonomia* Strejček, 1990. Santos *et al*. (2024) conducted the first phylogenomic analysis of flat wasps and recovered *Megaproternum* as the sister group to *Solepyris*, following the previously given proposition by Lanes & Azevedo (2008). Accordingly, their results indicated that the large probasisternum is a synapomorphy for the clade.

The aim of this study is to present a comprehensive revision of *Megaprosternum*, which includes refining the genus description, introducing descriptions for 10 new species, and providing an updated taxonomic key for both sexes. Additionally, a detailed discussion of morphological characters and distributional patterns are offered to enhance the understanding of the genus.

Material and methods

The examined material belongs to the following institutions:

ANIC = Australian National Insect Collection, Canberra, Australia (David Yeates)
BMNH = Natural History Museum, London, United Kingdom (Joseph Monks)
BPBM = Bernice Pauahi Bishop Museum, Hawaii, USA (Jeremy Frank)
CZMA = Coleção Zoológica do Maranhão, Maranhão, Brazil (Francisco Limeira-de-Oliveira)
ICIPE = International Centre of Insect Physiology and Ecology, Nairobi, Kenya (Robert Copeland)
QSBG = Queen Sirikit Botanic Garden, Chaing Mai, Thailand (Wichai Srisuka)
NBAIR = National Bureau of Agricultural Insect Resources, Bengaluru, India (Ankita Gupta)
NMK = National Museum of Kenya, Nairobi, Kenya
RMNH = Naturalis Biodiversity Centre [formerly Rijksmuseum van Natuurlijke Historie], Leiden, Netherlands (Cees van Achterberg)
SAM = South Australian Museum, Adelaide, Australia
SAMC = Iziko South African Museum, Cape Town, South Africa (Simon van Noort)
UFES = Universidade Federal do Espírito Santo, Espírito Santo, Brazil (Marcelo Tavares)
USNM = National Museum of Natural History, Washington D.C., USA (David Furth)

The holotype of ICIPE will be deposited at the National Museum of Kenya, Nairobi, Kenya.

The descriptions were elaborated with DELTA (Descriptive Language for Taxonomy) according to Dallwitz *et al*. (1999). The nomenclature for integumental sculpture follows Harris (1979), while general terminology adheres to Lanes *et al*. (2020), and mesopleural terminology is in line with Brito *et al*. (2021).

Abbreviations used as follows:

AO = diameter of anterior ocellus
HE = height of eye in dorsal view

LFW = length of forewing after tegula
LH = length of head in dorsal view
OOL = ocelli-ocular line
S2aa = anterior area of the second abdominal sternum
S2ap = posterior area of the second abdominal sternum
WF = minimum width of front in dorsal view
WH = maximum width of head including eyes in dorsal view
WOT = width of ocellar triangle in dorsal view

Photography of the new species was carried out using a Leica Z16 APO stereo microscope paired with a Leica Flexacam C3 video camera (Leica Microsystems, Germany). Images were captured using Leica LAS X Life Science by Leica (Switzerland) Limited. Subsequently, the images were merged into a single composite image using the Helicon Focus program (ver. 6.3.6, Helicon Soft, Dominica), employing the C (Pyramid) method. Scientific photography was facilitated by the adjustable LED light dome designed by Kawada *et al*. (2016). All photos of the new species are based on the holotypes, except for the species *M. chamorro* sp. nov. and *M. kayin* sp. nov. which had their paratypes photographed. The photos of the holotype and allotype of *M. cleonarovorum* were consulted in Gupta *et al*. (2017); the photos of the holotype of *M. neolongiceps* and the holotype and allotype of *M. pentagonal* were consulted in Azevedo (2006); the photos of the syntypes of *M. longiceps* were provided by the USNM collection; the photos of non-type specimens identified as *M. neolongiceps* and *M. pentagonal* by Lanes & Azevedo (2008), and as *M. norfolcensis* by Hawkins (1942), were provided by BMNH.

We adopted the operational criterion proposed by Cronquist (1978) to delineate new species, considering a species as the smallest group consistently and persistently morphologically distinct from similar ones. The classification of the biogeographical region proposed by Holt *et al*. (2013) was adopted here. The data presented in the Material examined sections are transcribed verbatim from the labels accompanying each specimen, but additional data are in square brackets.

Results

We recognize a total of 15 species of *Megaprosternum*, with five representing previously described species, while 10 are newly discovered and described for the first time in science.

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Superfamily Chrysidoidea Latreille, 1802
Family Bethylidae Haliday, 1839
Subfamily Scleroderminae Kieffer, 1914

Genus ***Megaprosternum*** Azevedo, 2006
Fig. 1

Type species

Megaprosternum longiceps Azevedo, 2006 [nec *Ateleopterus longiceps* Ashmead, 1900].

Diagnosis

Body small (1.40–5.0 mm) and strongly flattened. Head, mesosoma and metasoma dark castaneous to light castaneous. Gena not visible in dorsal view. Propleuron elongated. Prosternum with probasisternum large and pentagonal. Anteromesoscutum without notaulus. Forewing without closed cells, C vein absent, Sc+R vein present, M+Cu vein absent, A vein absent, prestigmal abscissa of R1 present, 2r-rs&Rs vein

Fig. 1. Genus *Megaprosternum*, paratype, ♀ of *M. navatu* sp. nov. (Viti Levu, BPBM). **A–D**. Head. **A**. Dorsal view. **B**. Ventral view. **C**. Lateral view. **D**. Anterior view. **E–G**. Mesosoma. **E**. Dorsal view. **F**. Ventral view. **G**. Lateral view. **H**. Leg. **I**. Forewing, in dorsal view. **J–K**. Metasoma. **J**. Dorsal view. **K**. Ventral view. Scale bars: A–G, I = 125 µm; H, J–K = 250 µm.

absent. Hind wing with jugum fully fused to remigium. Male genitalia with harpe at least 2.0 × as long as gonostipes; cuspis laminar and very wide, as wide as harpe; aedeagus subtrapezoidal; aedeagal apodeme short, not surpassing genital ring, dilated basally.

Redescription

Head (Fig. 1A–D). Median clypeal lobe surface extending back into frons, polished; antennal rim covering clypeal margin anteriorly; gena not visible in dorsal view; mandible with dorsal margin not denticulate; eye oval; ocellar triangle with anterior ocellus posterior to supraocular line; occipital carina absent; medioccipito-genal suture present.

Mesosoma (Fig. 1E–G). Pronotal neck not visible in dorsal view. Pronotal lobe surface mostly flat. Propleuron elongated. Prosternum with probasisternum large and pentagonal. Anteromesoscutum without notaulus. Mesopleuron without anterior subalar pit; mesepimeral sulcus absent; mesopleural callus not evident; mesopleural epicoxal sulcus absent; lower mesopleural fovea absent; posterior oblique sulcus absent; posterior subalar pit absent; anterior mesofurcal pit oval. Metapectal-propodeal disc without transverse posterior carina; first, second and third metapostnotal carinae absent; metapostnotal-propodeal suture absent; posterior propodeal projection absent; dorsal, median and ventral metapleural pits absent; metasternal plate pentagonal. Legs with coxa longer than wide; trochanter subtriangular; femur shorter than tibia; tibia dilated apically; tarsal claw unidentate (Fig. 1H). Macropterous form with forewing with anterior margin incurved medially; without cells closed; C vein absent, Sc+R vein present, M+Cu vein absent, A vein absent, prestigmal abscissa of R1 present, 2r-rs&Rs vein absent (Fig. 1I). Hind wing with jugum fully fused to remigium.

Metasoma (Fig. 1J–K). Hypopygeal anteromedial apodeme absent. Male genitalia with harpe longer than gonostipes; cuspis laminar and as wide as harpe, aligned to digitus; aedeagus subtrapezoidal; aedeagal apodeme short, not surpassing genital ring, dilated basally; cupula 0.4 × as long as genitalia.

Distribution

Afrotropical, Australian, Neotropical and Oriental regions.

Key for species of *Megaprosternum*

1. Males 2
– Females 5

2. Antenna with 10 flagellomeres (Fig. 13A–B) ..... ***M. wakawaka*** sp. nov.
– Antenna with 11 flagellomeres (Gupta *et al.* 2017: fig. 2b) 3

3. Median clypeal lobe with lateral carinae converging posteriorly (Gupta *et al.* 2017: fig. 2b); postocellar line almost longer than or as long as DAO (Gupta *et al.* 2017: fig. 2b); propodeal spiracle on dorsal surface of the metapectal-propodeal complex (Gupta *et al.* 2017: fig. 2d); hypopygium with spiculum evenly wide (Gupta *et al.* 2017: fig. 3a); aedeagal apex anterior to cuspis apex (Gupta *et al.* 2017: fig. 3c) ..... ***M. cleonarovorum*** Gupta & Azevedo, 2017
– Median clypeal lobe with lateral carinae parallel or subparallel posteriorly (Azevedo 2006: fig. 1); postocellar line almost shorter than DAO (Azevedo 2006: fig. 1); propodeal spiracle on lateral surface of the metapectal-propodeal complex (Azevedo 2006: fig. 3); hypopygium with spiculum narrowing apicad (Azevedo 2006: fig. 12); aedeagal apex aligned to cuspis apex (Azevedo 2006: fig. 10) 4

4. Head about 1.6 × as long as wide, rectangular, sides subparallel, in dorsal view (Azevedo 2006: fig. 1); ocelli nearly touching one another (Azevedo 2006: fig. 1) ..... ***M. neolongiceps*** Azevedo, 2018

– Head about 1.2× as long as wide, sides convergent posteriorly, in dorsal view (Azevedo 2006: fig. 6); posterior ocelli distant each other about 0.5× DAO (Azevedo 2006: fig. 6) ..... ***M. pentagonal*** Azevedo, 2006

5. Antenna with 10 flagellomeres (Fig. 3B) 6
– Antenna with 11 flagellomeres (Fig. 7A) 9

6. Mandible with two apical teeth ..... ***M. bayaka*** sp. nov.
– Mandible with three or four apical teeth 7

7. Median clypeal lobe without lateral carinae (Fig. 6C) ..... ***M. kariri*** sp. nov.
– Median clypeal lobe with lateral carinae (Figs 4C, 8D) 8

8. Postocellar line almost as long as DAO (Fig. 4C); transscutal fissure conspicuous (Fig. 4D) ..... ***M. chamorro*** sp. nov.
– Postocellar line longer than DAO (Fig. 8D); transscutal fissure inconspicuous (Fig. 8E) ..... ***M. longiceps*** (Ashmead, 1900)

9. Apterous or micropterous forms (Azevedo 2006: fig. 18) 10
– Macropterous form (Fig. 12A) 11

10. Apterous form ..... ***M. norfolcensis*** (Dodd, 1924)
– Micropterous form (Azevedo 2006: fig. 18) ..... ***M. pentagonal*** Azevedo, 2006

11. Head at most 1.20× as long as wide, in dorsal view (Fig. 2C) 12
– Head at least 1.25× as long as wide, in dorsal view (Figs 9C, 12B) 14

12. Mesoscuto-scutellar foveae present (Fig. 2D) ..... ***M. aka*** sp. nov.
– Mesoscuto-scutellar foveae absent (Gupta *et al.* 2017: fig. 5f) 13

13. Median clypeal lobe straight (Fig. 10B) ..... ***M. norfolcensis*** (Dodd, 1924)
– Median clypeal lobe incurved (Gupta *et al.* 2017: fig. 5B) ..... ***M. cleonarovorum*** Gupta & Azevedo, 2017

14. Probasisternum large with anterior margin weakly angulated (Fig. 12D) ..... ***M. samburu*** sp. nov.
– Probasisternum strongly large with anterior margin strongly angulated (Fig. 9E) 15

15. Head at least 1.50× as long as wide with sides diverging posterad, in dorsal view (Fig. 9C); probasisternum with posterior margin straight (Fig. 9E) ..... ***M. navatu*** sp. nov.
– Head at most 1.40× as long as wide with sides parallel or converging posterad, in dorsal view (Fig. 11C); probasisternum with posterior margin curved (Fig. 11E) 16

16. Propodeal spiracle on lateral surface of the metapectal-propodeal complex (Fig. 11A) ..... ***M. nuaulu*** sp. nov.
– Propodeal spiracle on dorsal surface of the metapectal-propodeal complex (Figs 5D, 7D) 17

17. Malar space 0.1× HE (Fig. 5C); epicnemium with anterior margin outcurved (Fig. 5E); equidistant distal hamuli; S2pa widening posterad ..... ***M. hmong*** sp. nov.
– Malar space absent (Fig. 7A); epicnemium with anterior margin straight (Fig. 7E); non-equidistant distal hamuli; S2pa evenly wide ..... ***M. kayin*** sp. nov.

Megaprosternum aka sp. nov.
urn:lsid:zoobank.org:act:0A988782-ABA8-4534-B791-0DE1595F9D90
Fig. 2

Differential diagnosis

The females of this species are morphologically similar to those of *M. norfolcensis* and *M. cleonarovorum* by having the head at most 1.20× as long as wide, the antennae with 11 flagellomeres, and the wings fully developed. However, *M. aka* sp. nov. has the mesoscutum almost as long as mesoscutellum, and the mesoscuto-scutellar foveae present, whereas *M. norfolcensis* and *M. cleonarovorum* have the mesoscutum distinctly longer than mesoscutellum, and the mesoscuto-scutellar foveae absent.

Etymology

The epithet *aka* is derived from the Aka, a nomadic Mbenga Pygmy people who live in the southwestern Central African Republic.

Material examined

Holotype

CENTRAL AFRICAN REPUBLIC – **Prefecture Sangha-Mbaéré** • ♀; "Prefecture Sangha-Mbaéré, Parc National de Dzanga-Ndoki, Mabéa Bai, 21.4 km, 53° NE [of] Bayanga, 3°02.01'N 16°24.57'E, 510m, 7.v.2001, S. van Noort, Sweep, CAR01-S87, lowland rainforest, marsh clearing"; SAMC, SAM-HYM P103665.

Description

Female

Measurements (mm). Body length 1.90; LH 0.40; WH 0.40; WF 0.36; WOT 0.13; surface of median clypeal lobe 0.06; HE 0.23; OOL 0.20; LFW 1.04

Color (Fig. 2A–B). Head and mesosoma dark castaneous, metasoma castaneous.

Head (Fig. 2C). Rectangular, in lateral view; sides converging posterad, in dorsal view; malar space 0.3 × HE; median clypeal lobe outcurved, longer than lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation distinct; mandible with three apical teeth; hypostoma almost straight medially; antenna with 11 flagellomeres, pedicel longer than flagellomere I; eye glabrous, contour protruding; frons coriaceous; ocellar triangle with anterior angle obtuse, postocellar line almost as long as DAO.

Mesosoma (Fig. 2D–E). Pronotal flange coriaceous, with posterior margin at least 1.6× as wide as anterior one; dorsal pronotal area mostly polished, posterior margin almost straight; probasisternum with anterior margin weakly angulated, posterior margin curved; epicnemium with anterior margin weakly incurved. mesoscutum almost as long as mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture present, not sulcate; mesepimeral lobe not evident; mesopleuron with anterior mesopleural fovea present, mesopleural epicoxal lobe not evident, mesopleural pit present, upper mesopleural fovea present; metapectal-propodeal disc longer than wide medially, without evident constriction at propodeal spiracle; transverse anterior carina present; lateral marginal carina present; paraspiracular sulcus present; paraspiracular carina present; metapostnotal median carina present, incomplete posteriorly, straight; propodeal spiracle circular, on lateral surface of metapectal-propodeal complex; metadiscrimen absent; metafurcal pit absent; forewing with prestigmal abscissa of radial 1 subrectangular, 3.0× as long as pterostigma, 3.0× as wide as than Sc+R vein; prestigmal flexion line present; pterostigma small and circular; hind wing slender with three equidistant distal hamuli.

Metasoma. S2aa with anterior margin straight; S2pa wider than long medially, widening posterad; second abdominal spiracle oval; third abdominal sternum with anterior margin straight; abdominal tergum narrowing apicad.

Male

Unknown.

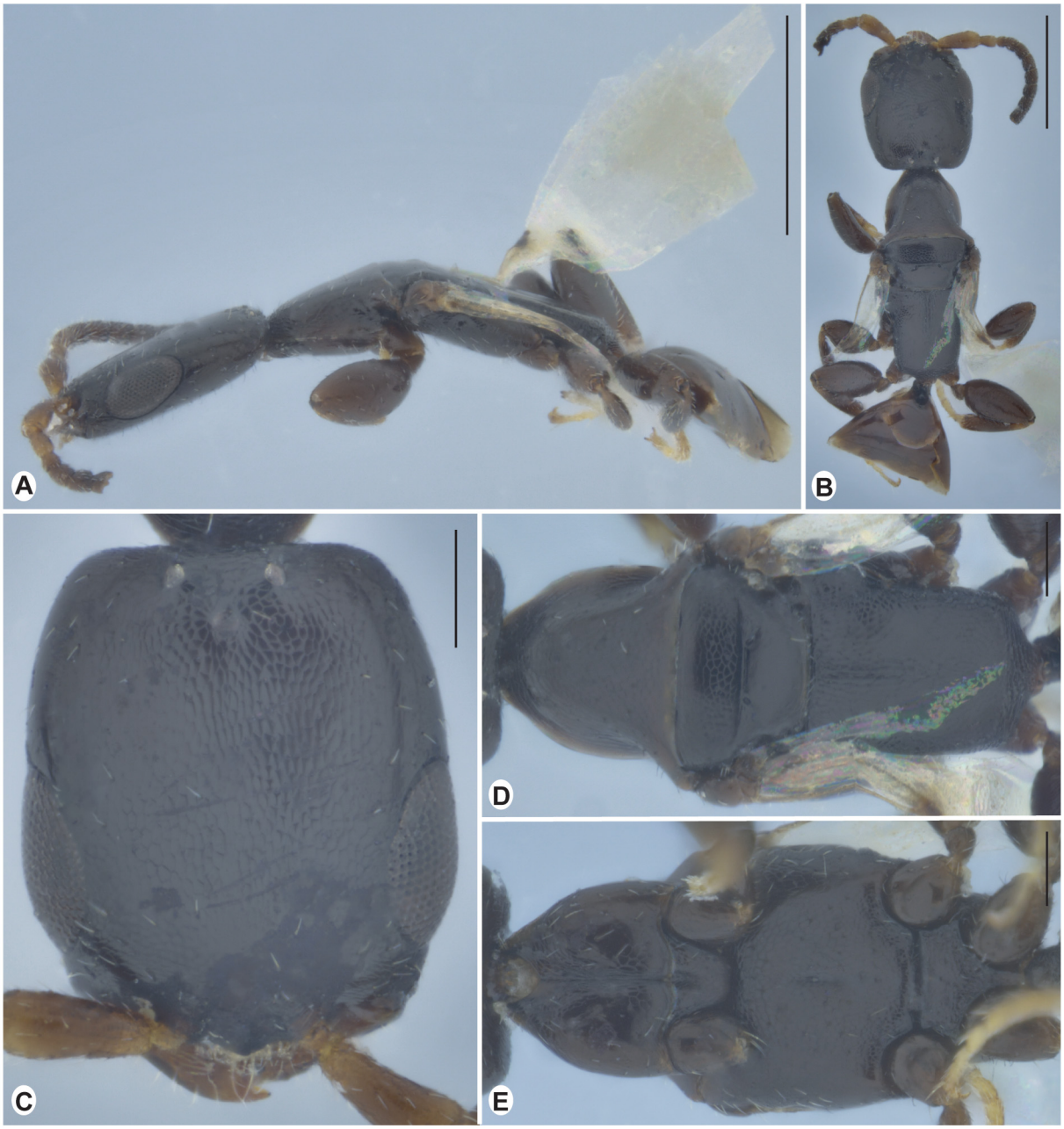

Fig. 2. *Megaprosternum aka* sp. nov., holotype, ♀ (SAMC, SAM-HYM P103665). **A–B**. Habitus. **A**. Lateral view. **B**. Dorsal view. **C**. Head, dorsal view. **D–E**. Mesosoma. **D**. Dorsal view. **E**. Ventral view. Scale bars: A–B = 500 μm; C–E = 125 μm.

Host

Unknown.

Distribution

Central African Republic (Prefecture Sangha-Mbaéré).

Megaprosternum bayaka sp. nov.
urn:lsid:zoobank.org:act:B94DB4F2-C69D-4F8B-B32F-8B8F7E27BDD1
Fig. 3

Differential diagnosis

The females of this species are morphologically similar to those of *M. kariri* sp. nov., by having the malar space 0.3× HE, antenna with 10 flagellomeres, and the mesoscutum longer than mesoscutellum medially. However, *M. bayaka* sp. nov. has the mandibles with two apical teeth, and the probasisternum very large, with anterior margin strongly angulated, whereas *M. kariri* has the mandibles with four apical teeth, and the probasisternum large, with anterior margin weakly angulated.

Etymology

The epithet *bayaka* is derived from the Bayaka, an ethnic group inhabiting the southwestern Central African Republic.

Material examined

Holotype

CENTRAL AFRICAN REPUBLIC – **Prefecture Sangha-Mbaéré** • ♀; "Prefecture Sangha-Mbaéré, Parc. National de Dzanga-Ndoki, Mabéa Bai, 21.4km, 53°NE Bayanga, 3°02.01'N 16°24.57'E, 510m, 7.v.2001, S. van Noort, Sweep, CAR01-S96, lowland rainforest, marsh clearing"; SAMC, SAM-HYM P103670.

Description

Female

Measurements (mm). Body length 1.40; LH 0.33; WH 0.24; WF 0.20; WOT 0.06; surface of median clypeal lobe 0.09; HE 0.13; OOL 0.13; LFW 0.66.

Color (Fig. 3A–B). Head, mesosoma and metasoma light castaneous.

Head (Fig. 3C). Oval, in lateral view; sides almost parallel, in dorsal view; malar space 0.3 × HE; median clypeal lobe incurved, shorter than lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation distinct; mandible with two apical teeth; hypostoma rounded medially; antenna with 10 flagellomeres, pedicel longer than flagellomere I; eye glabrous, contour not protruding; frons weakly coriaceous; ocellar triangle with anterior angle obtuse, postocellar line shorter than DAO.

Mesosoma (Fig. 3D–E). Pronotal flange polished, with posterior margin at most 1.5× as wide as anterior one; dorsal pronotal area polished, posterior margin almost straight; probasisternum with anterior margin strongly angulated, posterior margin angled; epicnemium with anterior margin weakly incurved; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe not evident, mesopleural pit present, upper mesopleural fovea absent; metapectal-propodeal disc longer than wide medially, with evident constriction at propodeal spiracle; transverse anterior carina present; lateral marginal carina

absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of metapectal-propodeal complex; metadiscrimen absent; metafurcal pit absent; forewing with prestigmal abscissa of radial 1 oval, 2.0× as long as pterostigma, 3.0× as wide as Sc+R vein; prestigmal flexion line present; pterostigma small and oval; hind wing slender with three equidistant distal hamuli.

Metasoma. S2aa with anterior margin straight; S2pa wider than long medially, widening posterad; second abdominal spiracle circular; third abdominal sternum with anterior margin outcurved; abdominal tergum narrowing apicad.

Male

Unknown.

Host

Unknown.

Fig. 3. *Megaprosternum bayaka* sp. nov., holotype, ♀ (SAMC, SAM-HYM P103670). **A–B**. Habitus. **A**. Lateral view. **B**. Dorsal view. **C**. Head, dorsal view. **D–E**. Mesosoma. **D**. Dorsal view. **E**. Ventral view. Scale bars: A = 250 μm; B–E = 125 μm.

Distribution

Central African Republic (Prefecture Sangha-Mbaéré).

Megaprosternum chamorro sp. nov.
urn:lsid:zoobank.org:act:93A5F5C5-D78A-40F6-A853-CC6A7E334E72
Fig. 4

Differential diagnosis

The females of this species are morphologically similar to those of *M. longiceps*, by having the antennae with 10 flagellomeres, the median clypeal lobe with lateral carinae, and the mandible with three apical teeth. However, *M. chamorro* sp. nov. has the median clypeal lobe with lateral carinae converging posteriorly, the postocellar line almost as long as DAO, and the transscutal fissure conspicuous, whereas *M. longiceps* has the median clypeal lobe with lateral carinae parallel, the postocellar line longer than DAO, and the transscutal fissure inconspicuous.

Etymology

The epithet *chamorro* is derived from the Chamorro, the indigenous people of the Mariana Islands, including the Northern Mariana Islands.

Material examined

Holotype

USA – **Saipan Island, Northern Mariana Islands** • ♀; "Saipan I[sland, [Northern] Mariana [Islands] As Mahetog area, 19.I.45, col. & pres. by Henry S. Dybas, Lot 544, under bark of introduced *Acacia*-like tree"; BPBM.

Paratypes

USA – **Saipan Island, Northern Mariana Islands** • 2 ♀♀; same data as for holotype; BPBM • 1 ♀; "Mt. Tagpochau, alt. 1250 ft., 15.II.45, col. & pres. by Henry S. Dybas, Lot 715, under bark"; BPBM. – **Tinian Island** • 1 ♀; "Tinian I[sland], [Northern] Mariana [Islands], Mt.Lasso, NW slope, 17.III.45, col. & pres. by Henry S. Dybas, lot 864"; BPBM • 1 ♀; "ridge, SE section, 27.III.45, col. & pres. by Henry S. Dybas, lot 891"; BPBM.

Description

Female

Measurements (mm). Body length 1.5–1.9; LH 0.35; WH 0.25; WF 0.18; WOT 0.08; surface of median clypeal lobe 0.13; HE 0.06; OOL 0.14; LFW 0.85.

Color (Fig. 4A–B). Head, mesosoma and metasoma castaneous.

Head (Fig. 4C). Oval, in lateral view; sides almost parallel, in dorsal view; malar space 0.5× HE; median clypeal lobe straight, as long as lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation indistinct; mandible with three apical teeth; hypostoma rounded medially; antenna with 10 flagellomeres, pedicel longer than flagellomere I; eye glabrous, contour not protruding; frons polished coriaceous; ocellar triangle with anterior angle obtuse, postocellar line almost as long as DAO.

Mesosoma (Fig. 4D–E). Pronotal flange mostly polished, with posterior margin at most 1.5× as wide as anterior one; dorsal pronotal area coriaceous, posterior margin almost straight; probasisternum with anterior margin strongly angulated, posterior margin angled; epicnemium with anterior margin weakly incurved; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not

evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe not evident, mesopleural pit present, upper mesopleural fovea absent; metapectal-propodeal disc longer than wide medially, without evident constriction at propodeal spiracle; transverse anterior carina present; lateral marginal carina

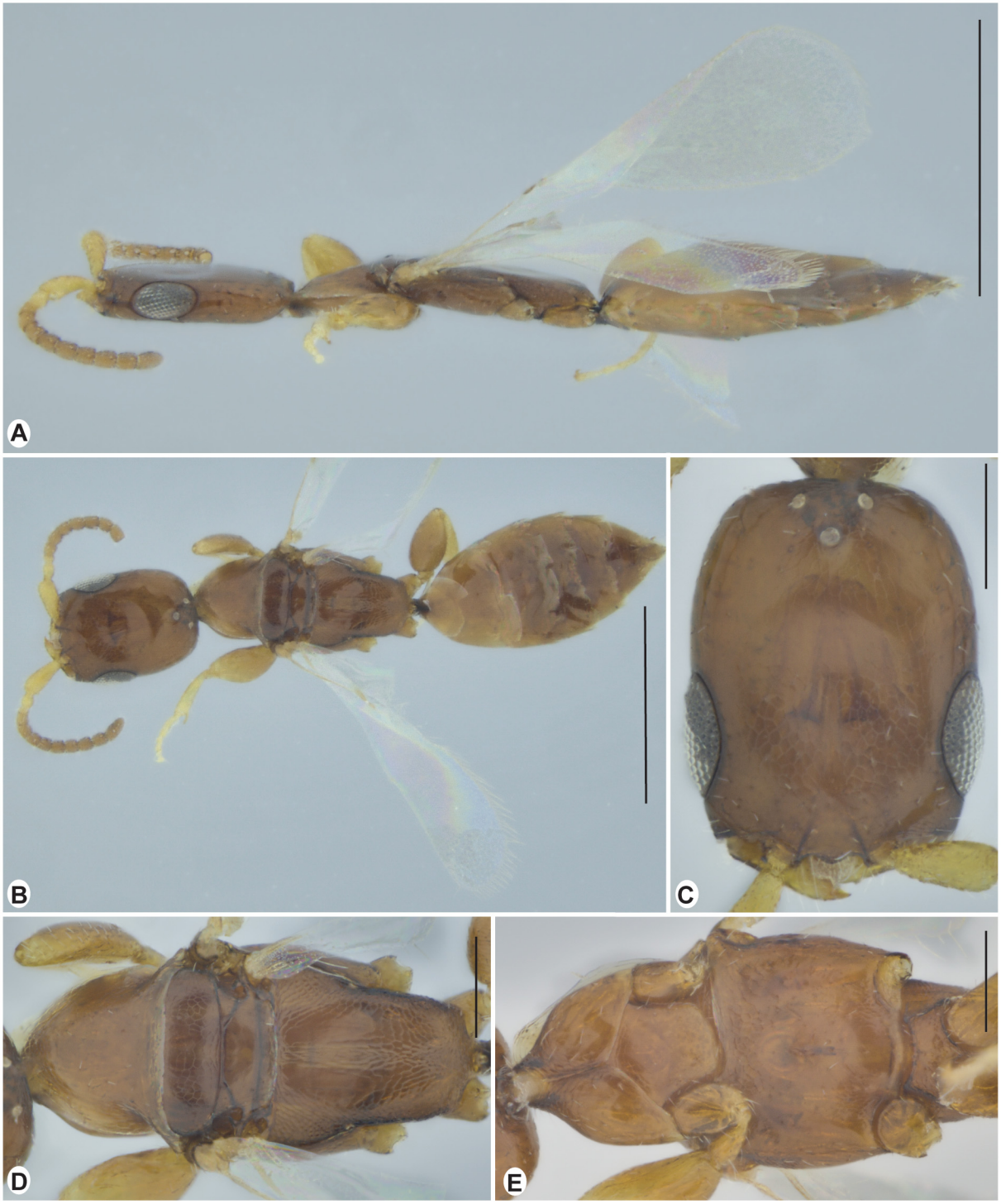

Fig. 4. *Megaprosternum chamorro* sp. nov., paratype, ♀ (lot 891, BPBM). **A–B**. Habitus. **A**. Lateral view. **B**. Dorsal view. **C**. Head, dorsal view. **D–E**. Mesosoma. **D**. Dorsal view. **E**. Ventral view. Scale bars: A–B = 500 μm; C–E = 125 μm.

absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; metadiscrimen absent; metafurcal pit absent; forewing with prestigmal abscissa of radial 1 oval, 2.0× as long as pterostigma, 3.0× as wide as Sc+R vein; prestigmal flexion line present; pterostigma small and circular; hind wing slender with three equidistant distal hamuli.

Metasoma. S2aa with anterior margin straight; S2pa longer than wide medially, widening posterad; second abdominal spiracle circular; third abdominal sternum with anterior margin outcurved; abdominal tergum narrowing apicad.

Male

Unknown.

Variations

There are no morphological variations worthy of mention.

Host

Unknown.

Distribution

USA (Northern Mariana Islands).

Megaprosternum cleonarovorum Gupta & Azevedo, 2017

Megaprosternum cleonarovorum Gupta & Azevedo in Gupta *et al.*, 2017: 79–89.

Megaprosternum cleonarovorum – Azevedo & van Noort 2018: 9–11. — Azevedo *et al*. 2018: 235. — Vargas *et al*. 2020: 237. — Colombo *et al*. 2022a: 61.

Differential diagnosis

The males of this species differ from those of the other species by having the surface of the median clypeal lobe measuring 0.02 mm, the hypopygium with the spiculum evenly wide, the hypopygeal anterolateral apodemes absent, the male genitalia with harpe 2.0× as long as gonostipes, and the aedeagal apex anterior to the cuspis apex. The females of this species differ from those of the other species by having the head at most 1.20× as long as wide in dorsal view, the median clypeal lobe incurved, and the mesoscuto-scutellar foveae absent.

Material examined

Holotype

INDIA – **Karnataka** • ♂; "Karnataka, Bangalore, Hebbal, 13.03°N 77.59°E, 23.viii.2016, ex: *Cleonaria bicolor* Thomson (Coleoptera, Cerambycidae) on the host plant *Ixora coccinea* L., coll. S.K. Rajeshwari, code - NBAIR/Beth/Mega/23816A"; NBAIR.

Allotype

INDIA – **Karnataka** • ♀; same data as for holotype; NBAIR.

Redescription

Male

Measurements (mm). Body length 2.37–2.48; LH 0.39; WH 0.32; WF 0.18; WOT 0.10; surface of median clypeal lobe 0.02; HE 0.15; OOL 0.33; LFW 1.32–1.40.

Color. Head, mesosoma and metasoma black.

Head. Rectangular, in lateral view; sides converging posterad, in dorsal view. Malar space 0.2 × HE; median clypeal lobe incurved, as long as lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation distinct; mandible with three apical teeth; hypostoma rounded medially; antenna with 11 flagellomeres, pedicel longer than flagellomere I; eye weakly setose, contour not protruding; frons coriaceous; ocellar triangle with anterior angle acute, postocellar line almost as long as DAO.

Mesosoma. Pronotal flange coriaceous, with posterior margin at least 1.6 × as wide as anterior one; dorsal pronotal area coriaceous, posterior margin almost straight; probasisternum with anterior margin strongly angulated, posterior margin almost straight; epicnemium with anterior margin outcurved; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe not evident, mesopleural pit present, upper mesopleural fovea absent; metapectal-propodeal disc longer than wide medially, without evident constriction at propodeal spiracle; transverse anterior carina absent; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on dorsal surface of the metapectal-propodeal complex; forewing with prestigmal abscissa of radial 1 subrectangular, 2.0 × as long as pterostigma, as wide as Sc+R vein, prestigmal flexion line present, pterostigma small and oval; hind wing slender with three equidistant distal hamuli.

Metasoma. Second abdominal spiracle oval; abdominal tergum narrowing apicad; hypopygium with spiculum evenly wide, hypopygeal anterolateral apodeme absent, hypopygeal posterior margin straight. Genitalia with harpe 2.0 × as long as gonostipes, digitus with posterior margin denticulate, aedeagal apex anterior to cuspis apex.

Female

Measurements (mm). Body length 2.99–3.19; LH 0.44; WH 0.38; WF 0.33; WOT 0.06; surface of median clypeal lobe 0.06; HE 0.15; OOL 0.23; LFW 1.56.

Color. Head, mesosoma and metasoma black.

Head. Rectangular, in lateral view; sides almost parallel, in dorsal view; malar space 0.1 × HE; median clypeal lobe incurved, as long as lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation distinct; mandible with three apical teeth; antenna with 11 flagellomeres, pedicel longer than flagellomere I; eye weakly setose, contour not protruding; frons coriaceous; ocellar triangle with anterior angle acute, postocellar line almost as long as DAO.

Mesosoma. Pronotal flange polished, with posterior margin at most 1.5 × as wide as anterior one; dorsal pronotal area coriaceous, posterior margin almost straight; probasisternum with anterior margin strongly angulated, posterior margin almost straight; epicnemium with anterior margin outcurved; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe not evident, mesopleural pit present, upper mesopleural fovea absent; metapectal-propodeal disc almost as long as wide medially, without evident constriction at propodeal spiracle; transverse anterior carina absent; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; forewing with prestigmal abscissa of radial 1 subrectangular, 2.0 × as long as pterostigma, as wide as Sc+R vein, prestigmal flexion line present, pterostigma small and oval; hind wing slender with three equidistant distal hamuli.

Metasoma. Second abdominal spiracle oval; abdominal tergum narrowing apicad.

Variations

This species has an accentuated polymorphism in the shape of the head in both males and females (Gupta *et al*. 2017).

Remarks

This species was described from 13 specimens (three males and ten females) collected in Hebbal, India. Subsequently, Azevedo & van Noort (2018) recorded an additional five females collected on Cousine Island in the Seychelles Archipelago. Except for the head polymorphism, no other morphological variations were recorded.

Host

Cleonaria bicolor Thomson, 1864 (Coleoptera, Cerambycidae).

Distribution

India (Karnataka) and the Seychelles Archipelago (Cousine Island).

Megaprosternum hmong sp. nov.
urn:lsid:zoobank.org:act:5DF08B7D-78EA-410D-AAFB-81D5CD5CA1FF
Fig. 5

Differential diagnosis

The females of this species are morphologically similar to those of *M. kayin* sp. nov., by having the head at least 1.25 × and at most 1.40 × as long as wide, the antennae with 11 flagellomeres, the probasisternum strongly large with anterior margin strongly angulated and posterior margin curved, the wings fully developed, and the propodeal spiracle on dorsal surface of the metapectal-propodeal complex. However, *M. hmong* sp. nov. has the malar space 0.1 × HE, the epicnemium with anterior margin outcurved, the equidistant distal hamuli, and the S2pa widening posterad, whereas the *M. kayin* has the malar space absent, the epicnemium with anterior margin straight, the non-equidistant distal hamuli, and the S2pa evenly wide.

Etymology

The epithet *hmong* is derived from the Hmong, an Asian ethnic group that inhabits various provinces of Laos, including Sayaboury.

Material examined

Holotype

LAOS – **Sayaboury Prov.** • ♀; "Sayaboury Prov.[ince], Sayaboury, 12.XII.1965, native collector"; BPBM.

Paratype

CAMBODIA • "Central Cardamom, Osom Com. Veal Veng. Pursat, N12º03'41.6" E103º14'40.8", Alt. 588m, 17-22.viii.2010, Malaise trap. J.O. Lim leg.; SNU.

Description

Female

Measurements (mm). Body length 2.98; LH 0.55; WH 0.40; WF 0.25; WOT 0.09; surface of median clypeal lobe 0.09; HE 0.22; OOL 0.29; LFW 1.59.

Color (Fig. 5A–B). Head, mesosoma and metasoma castaneous.

Head (Fig. 5C). Oval, in lateral view; sides almost parallel, in dorsal view; malar space 0.1× HE; median clypeal lobe straight, as long as lateral ones, with pair of lateral carinae, parallel posteriorly, lobe delimitation indistinct; mandible with three apical teeth; hypostoma almost straight medially; antenna

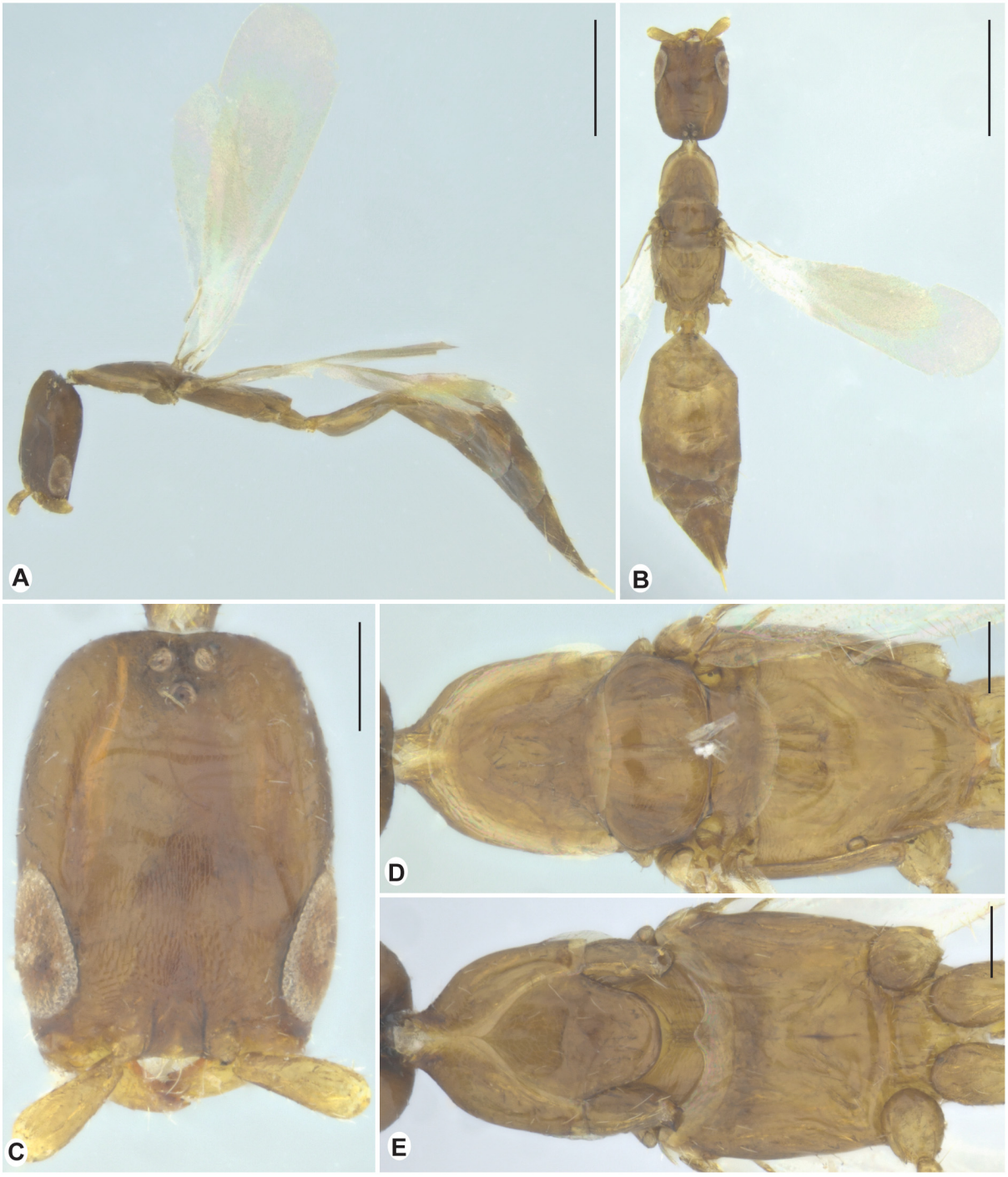

Fig. 5. *Megaprosternum hmong* sp. nov., holotype, ♀ (BPBM). **A–B**. Habitus. **A**. Lateral view. **B**. Dorsal view. **C**. Head, dorsal view. **D–E**. Mesosoma. **D**. Dorsal view. **E**. Ventral view. Scale bars: A–B = 500 µm; C–E = 125 µm.

with 11 flagellomeres, pedicel longer than flagellomere I; eye glabrous, contour not protruding; frons coriaceous; ocellar triangle with anterior angle acute, postocellar line shorter than DAO.

Mesosoma (Fig. 5D–E). Pronotal flange polished, with posterior margin at most 1.5 × as wide as anterior one; dorsal pronotal area coriaceous, posterior margin outcurved medially, overlapping anterior area of mesoscutum; probasisternum with anterior margin strongly angulated, posterior margin curved; epicnemium with anterior margin outcurved; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe not evident, mesopleural pit absent, upper mesopleural fovea absent; metapectal-propodeal disc almost as long as wide medially, without evident constriction at propodeal spiracle; transverse anterior carina absent; lateral marginal carina present; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on dorsal surface of the metapectal-propodeal complex; metadiscrimen absent; metafurcal pit absent; forewing with prestigmal abscissa of radial 1 subrectangular, as wide as Sc+R vein, prestigmal flexion line present, pterostigma small and circular; hind wing slender with three equidistant distal hamuli.

Metasoma. S2aa with anterior margin straight; S2pa wider than long medially, widening posterad; second abdominal spiracle circular; third abdominal sternum with anterior margin outcurved; abdominal tergum narrowing apicad.

Male

Unknown.

Host

Unknown.

Distribution

Laos (Sayaboury Province).

Megaprosternum kariri sp. nov.

urn:lsid:zoobank.org:act:FA0E9696-2136-4328-AD56-2714EB9623DE

Fig. 6

Differential diagnosis

The females of this species are morphologically similar to those of *M. bayaka* sp. nov. as aforementioned in its section of the differential diagnosis.

Etymology

The epithet *kariri* is derived from the Kariri, the main family of indigenous languages in the hinterlands of Northeast Brazil, including the first indigenous settlement with officially demarcated territory in Piauí.

Material examined

Holotype

BRAZIL – **Piauí** • ♀; "Pi[auí], Guaribas, 515m, PAR[que] NA[cional] Serra das Confusões, Andorinha, 09°08'27.8''S 43°33'42.1'W, suspensa dupla (20m), 01–10.ix.2013, J.A. Rafael, F. Limeira-de-Oliveira & T.T.A. Silva, cols."; CZMA.

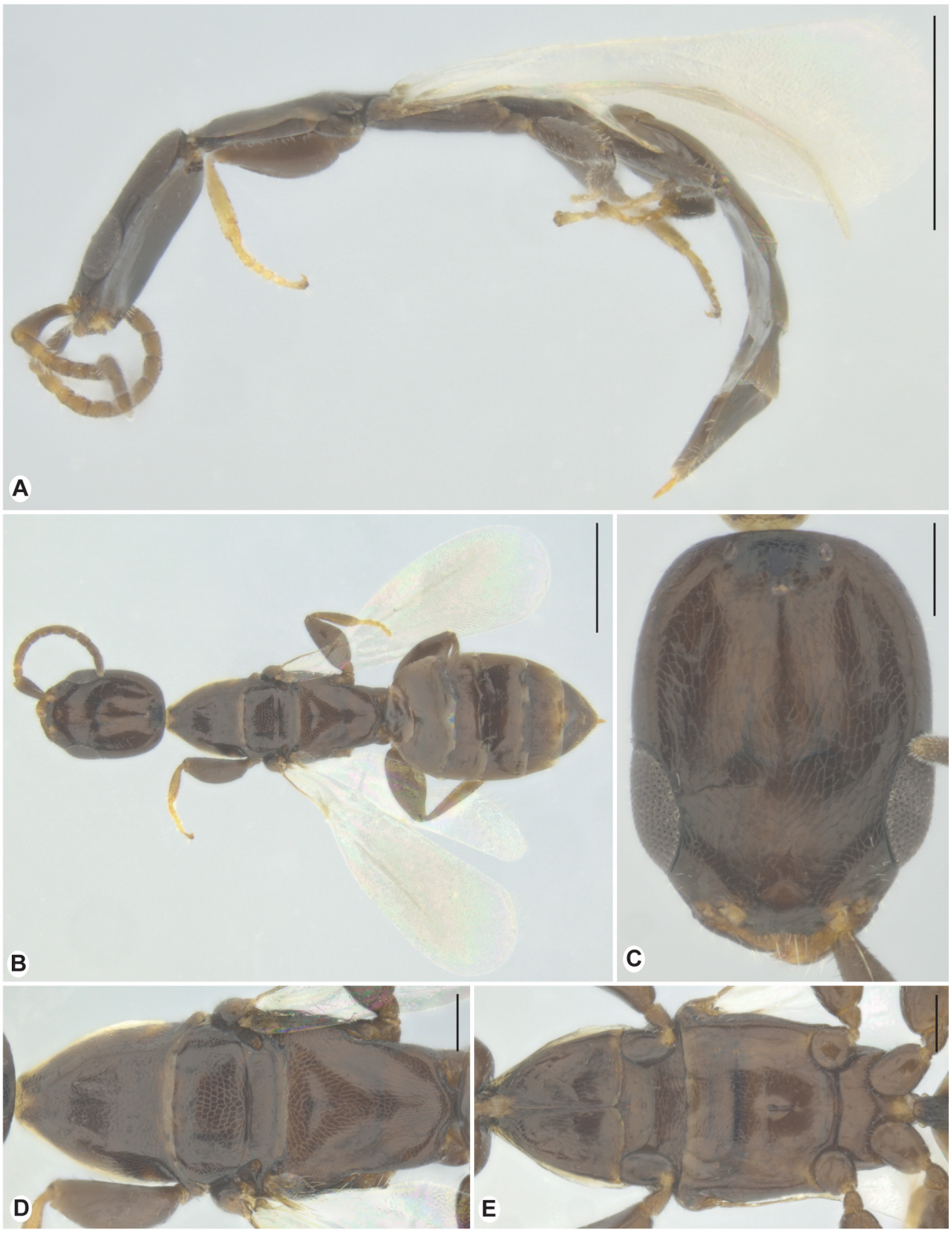

Fig. 6. *Megaprosternum kariri* sp. nov., holotype, ♀ (CZMA). **A–B**. Habitus. **A**. Lateral view. **B**. Dorsal view. **C**. Head, dorsal view. **D–E**. Mesosoma. **D**. Dorsal view. **E**. Ventral view. Scale bars: A–B = 500 µm; C–E = 125 µm.

Description

Female

Measurements (mm). Body length 2.50; LH 0.57; WH 0.40; WF 0.26; WOT 0.16; surface of median clypeal lobe 0.05; HE 0.20; OOL 0.25; LFW 1.33.

Color (Fig. 6A–B). Head, mesosoma and metasoma dark castaneous.

Head (Fig. 6C). Rectangular, in lateral view; sides almost parallel, in dorsal view; malar space 0.3 × HE; median clypeal lobe straight, longer than lateral ones, without pair of lateral carinae, lobe delimitation indistinct; mandible with four apical teeth; hypostoma almost straight medially; antenna with 10 flagellomeres, pedicel longer than flagellomere I; eye glabrous, contour protruding; frons coriaceous; ocellar triangle with anterior angle obtuse, postocellar line shorter than DAO.

Mesosoma (Fig. 6D–E). Pronotal flange polished, with posterior margin at least 1.6× as wide as anterior one; dorsal pronotal area coriaceous, posterior margin almost straight; probasisternum large, anterior margin weakly angulated, posterior margin curved; epicnemium with anterior margin almost straight; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe evident, mesopleural pit absent, upper mesopleural fovea absent; metapectal-propodeal disc longer than wide medially, without evident constriction at propodeal spiracle; transverse anterior carina present; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; metadiscrimen absent; metafurcal pit absent; forewing with prestigmal abscissa of radial 1 oval, 3.0 × as long as pterostigma, 3.0 × as wide as Sc+R vein, prestigmal flexion line absent, pterostigma small and circular; hind wing slender with three equidistant distal hamuli.

Metasoma. S2aa with anterior margin straight; S2pa longer than wide medially, widening posterad; second abdominal spiracle circular; third abdominal sternum with anterior margin incurved; abdominal tergum narrowing apicad.

Male

Unknown.

Host

Unknown.

Distribution

Brazil (Piauí).

Megaprosternum kayin sp. nov.

urn:lsid:zoobank.org:act:9D4AB98D-E77D-4334-AF74-8DFFAA7BDA9F

Fig. 7

Differential diagnosis

The females of this species are morphologically similar to those of *M. hmong* sp. nov., as aforementioned in its section of the differential diagnosis.

Etymology

The epithet *kayin* is derived from the Kayin, an ethnolinguistic group of Sino-Tibetan language-speaking peoples who live in western Thailand.

Material examined

Holotype

THAILAND – **Prachuap Khiri Khan** • ♀; "Prachua[p] Khiri Khan Khao Sam Roi Yot N[ational] P[ark], Nature education center, 12°14.48'N 99°56.023'E, Malaise trap, 10–17.viii.2008, Yai & Sorat leg. T3024"; QSBG.

Paratype

THAILAND – **Phetchaburi** • 1 ♀; "P[h]etchaburi, Kaeng Krachan N[ational] P[ark], Panernthung/ km27, 12°49.302'N 99°22.263'E, Malaise trap, 11–18.xii.2008, Sirichai leg. T4398"; QSBG.

Description

Female

Measurements (mm). Body length 2.2–2.4; LH 0.53; WH 0.40; WF 0.24; WOT 0.05; surface of median clypeal lobe 0.06; HE 0.20; OOL 0.26; LFW 1.40.

Color (Fig. 7A–B). Head, mesosoma and metasoma light castaneous.

Head (Fig. 7C). Oval, in lateral view; sides almost parallel, in dorsal view; malar space absent; median clypeal lobe incurved, as long as lateral ones, with pair of lateral carinae, parallel posteriorly, lobe delimitation indistinct; mandible with three apical teeth; hypostoma rounded medially; antenna with 11 flagellomeres, pedicel longer than flagellomere I; eye glabrous, contour not protruding; frons coriaceous; ocellar triangle with anterior angle acute, postocellar line almost as long as DAO.

Mesosoma (Fig. 7D–E). Pronotal flange polished and coriaceous, with posterior margin at least 1.6 × as wide as anterior one; dorsal pronotal area coriaceous, posterior margin outcurved medially, overlapping anterior area of mesoscutum; probasisternum with anterior margin strongly angulated, posterior margin curved; epicnemium with anterior margin almost straight; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe not evident, mesopleural pit absent, upper mesopleural fovea absent; metapectal-propodeal disc almost as long as wide medially, without evident constriction at propodeal spiracle; transverse anterior carina present; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on dorsal surface of the metapectal-propodeal complex; metadiscrimen present; metafurcal pit circular; forewing with prestigmal abscissa of radial 1 subrectangular, as wide as Sc+R vein; prestigmal flexion line absent, pterostigma small and circular; hind wing slender with three non-equidistant distal hamuli.

Metasoma. S2aa with anterior margin straight; S2pa as long as wide medially, evenly wide; second abdominal spiracle circular; third abdominal sternum with anterior margin incurved; abdominal tergum narrowing apicad.

Male

Unknown.

Variations

There are no morphological variations worthy of mention.

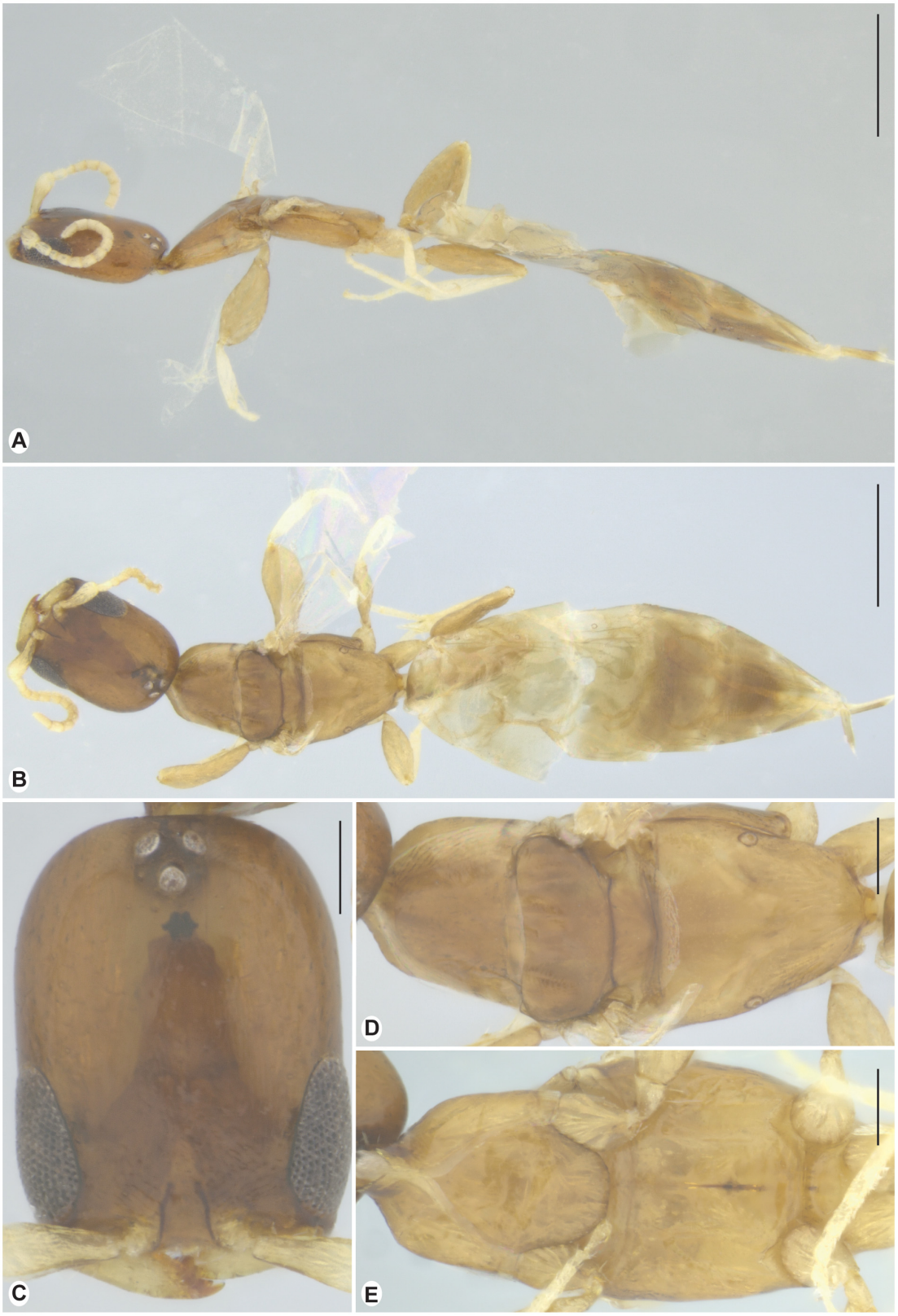

Fig. 7. *Megaprosternum kayin* sp. nov., paratype, ♀ (T4398, QSBG). **A–B**. Habitus. **A**. Lateral view. **B**. Dorsal view. **C**. Head, dorsal view. **D–E**. Mesosoma. **D**. Dorsal view. **E**. Ventral view. Scale bars: A–B = 250 μm; C–E = 125 μm.

Host

Unknown.

Distribution

Thailand (Prachua Khiri Khan).

Megaprosternum longiceps (Ashmead, 1900)
Fig. 8

Ateleopterus longiceps Ashmead, 1900: 327–328.

Sclerodermus longiceps – Gordh & Móczár 1900: 162.
Neoscleroderma longiceps – Kieffer 1908: 40; 1914: 270–271.
Megaprosternum longiceps – Azevedo *et al.* 2018: 235. — Vargas *et al.* 2020: 219.

Megaprosternum longiceps – Lanes & Azevedo 2008: 81 [nec *A. longiceps* Ashmead, 1900].

Differential diagnosis

The females of this species differ from those of the other species by having the body length ranging from 4.4 to 4.6 mm, antennae with 10 flagellomeres, the median clypeal lobe with parallel lateral carinae, and the postocellar line longer than DAO, and the inconspicuous transscutal fissure.

Material examined

Syntypes

AUSTRALIA – **New South Wales** • 4 ♀♀; "N[ew] S[outh] W[ales], Rose Bay, near Sydney, 6.III.1892, bred by Mr. Froggatt from hollow stem of *Acacia discolor*, type 4870"; USNMENT 01583000.

Non-types

AUSTRALIA – **New South Wales** • 2 ♀♀; "Rose Bay, "Hollow stem of *Acacia discolor*", 3.vi.[19]92, (Froggatti coll., 92.164)"; NHMUK 015663885, 015663886. [The latter was previously identified as *M. longiceps* Azevedo, 2006 by Lanes *et al.* 2008.]

Redescription

Female

Measurements (mm). Body length 4.4–4.6; LH 0.85; WH 0.49; WF 0.26; WOT 0.11; surface of median clypeal lobe 0.11; HE 0.25; OOL 0.38; LFW 1.9–2.4.

Color (Fig. 8A–C). Head, mesosoma and metasoma castaneous.

Head (Fig. 8D). Oval, in lateral view; sides almost parallel, in dorsal view; malar space 0.1 × HE; median clypeal lobe straight, as long as lateral ones, with pair of lateral carinae, parallel posteriorly, lobe delimitation distinct; mandible with three apical teeth; hypostoma rounded medially; antenna with 10 flagellomeres, pedicel as long as flagellomere I; eye weakly setose, contour not protruding; frons coriaceous; ocellar triangle with anterior angle acute, postocellar line longer than DAO.

Mesosoma. Pronotal flange coriaceous, with posterior margin at least 1.6 × as wide as anterior one; dorsal pronotal area coriaceous, posterior margin outcurved medially, overlapping anterior area of mesoscutum; probasisternum with anterior margin strongly angulated, posterior margin almost straight; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure inconspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesopleural pit present; metapectal-propodeal

Fig. 8. *Megaprosternum longiceps* (Ashmead, 1900), syntypes, ♀♀ (USNMENT 01583000). **A–C**. Habitus. **A**. Dorsal view. **B**. Lateral view. **C**. Dorsal view of right specimen on figure A. **D**. Head, dorsal view. **E**. Labels. Scale bars: A–C = 500 μm; D = 125 μm.

disc longer than wide medially, without evident constriction at propodeal spiracle; transverse anterior carina absent; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; forewing with prestigmal abscissa of radial 1 oval, 3.0× as long as pterostigma, 2.0× as wide as Sc+R vein, prestigmal flexion line present, pterostigma small and circular; hind wing with three non-equidistant distal hamuli.

Metasoma. Second abdominal spiracle circular; abdominal tergum widening apicad.

Male

Unknown.

Variations

There are no morphological variations worthy of mention.

Remarks

This species was described based on four female specimens collected in New South Wales, Australia. In the original description, Ashmead (1900: 328) mentioned that the holotype is the specimen labeled "type-Nº. 4870". However, all four specimens were mounted on the same card and share identical labels, including the one with the mentioned type number (Fig. 8E). As a result, it is not possible to identify the holotype, and for this reason, we conclude that these specimens are all syntypes.

Host

Unknown.

Distribution

Australia (New South Wales).

Megaprosternum navatu sp. nov.

urn:lsid:zoobank.org:act:6547C706-45BD-435D-B99C-483063CE2731

Fig. 9

Differential diagnosis

The females of this species are morphologically similar to those of *M. nuaulu* sp. nov., by having the antennae with 11 flagellomeres, the probasisternum strongly large with anterior margin strongly angulated, and the wings fully developed. However, *M. navatu* sp. nov. has the head at least 1.50× as long as wide with the sides diverging posterad, in dorsal view, and the probasisternum with posterior margin straight, whereas the *M. nuaulu* has the head at most 1.40× as long as wide with the sides parallel, in dorsal view, and the probasisternum with posterior margin curved.

Etymology

The epithet *navatu* is derived from the Navatu, a Fijian tribe that migrated and currently resides in Cakaudrove.

Material examined

Holotype

FIJI – **Taveuni Cakaudrove Prov.** • ♀; "Taveuni Cakaudrove Prov[ince], 5.3 km SE Tavuki Vlg., Mt. Devo, 1064m, 2–10.X.2002, Malaise 3, coll. E.I. Schlinger, M. Tokota A., 16.841°S 179.968°W, FBA 164695"; UFES.

Paratype

FIJI – **Viti Levu** • 1 ♀; "Viti Levu, Navai-Nasonga, Trail IX/12/[19]38, Tholo North, summit 3400', In dead *Cyathea* fronds, EC Zimmerman collection"; BPBM.

Description

Female

Measurements (mm). Body length 5.0–5.1; LH 0.92; WH 0.60; WF 0.30; WOT 0.05; surface of median clypeal lobe 0.26; HE 0.26; OOL 0.48; LFW 2.88.

Color (Fig. 9A–B). Head, mesosoma and metasoma castaneous.

Head (Fig. 9C). Rectangular, in lateral view; sides diverging posterad, in dorsal view; malar space 0.2 × HE; median clypeal lobe straight, as long as lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation distinct; mandible with three apical teeth; hypostoma rounded medially; antenna with 11 flagellomeres, pedicel as long as flagellomere I; eye glabrous, contour protruding; frons coriaceous; ocellar triangle with anterior angle obtuse, postocellar line shorter than DAO.

Mesosoma (Fig. 9D–E). Pronotal flange polished, with posterior margin at least 1.6 × as wide as anterior one; dorsal pronotal area coriaceous, posterior margin strongly outcurved medially, overlapping anterior area of mesoscutum; probasisternum with anterior margin strongly angulated, posterior margin almost straight; epicnemium with anterior margin almost straight; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe not evident, mesopleural pit absent, upper mesopleural fovea absent; metapectal-propodeal disc longer than wide medially, with evident constriction at propodeal spiracle; transverse anterior carina present; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; metadiscrimen absent; metafurcal pit absent; forewing with prestigmal abscissa of radial 1 subrectangular, 1.5 × as long as pterostigma, 2.0 × as wide as Sc+R vein, prestigmal flexion line present, pterostigma small and circular; hind wing slender with four equidistant distal hamuli.

Metasoma. S2aa with anterior margin incurved; S2pa longer than wide medially, evenly wide; second abdominal spiracle oval; third abdominal sternum with anterior margin outcurved; abdominal tergum widening apicad.

Male

Unknown.

Variations

There are no morphological variations worthy of mention.

Host

Unknown.

Distribution

Fiji (Taveuni Cakaudrove Province and Viti Levu).

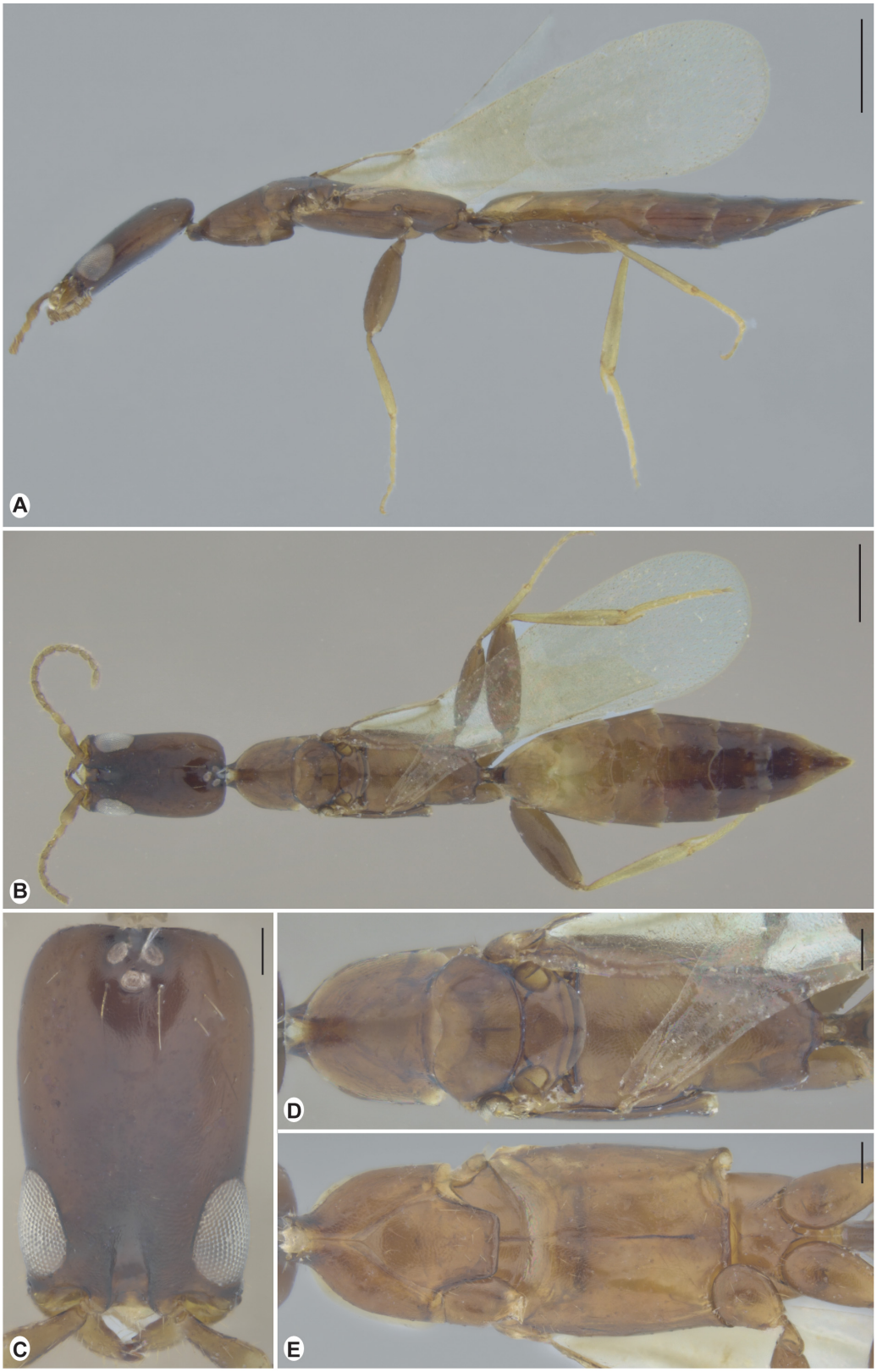

Fig. 9. *Megaprosternum navatu* sp. nov., holotype, ♀ (QSBG). **A–B**. Habitus. **A**. Lateral view. **B**. Dorsal view. **C**. Head, dorsal view. **D–E**. Mesosoma. **D**. Dorsal view. **E**. Ventral view. Scale bars: A–B = 250 µm; C–E = 125 µm.

Megaprosternum neolongiceps Azevedo, 2018

Megaprosternum longiceps Azevedo, 2006: 38–40 [nec *A. longiceps* Ashmead, 1900] [pre-occupied, not available name].
Megaprosternum neolongiceps Azevedo *et al.*, 2018: 235 [replacement name].

Megaprosternum longiceps – Gupta *et al.* 2017: 89.

Differential diagnosis

The males of this species differ from those of the other species by having the head about 1.6× as long as wide, rectangular and with sides subparallel, in dorsal view, the median clypeal lobe with lateral carinae parallel posteriorly, the ocelli nearly touching one another, the propodeal spiracle on lateral surface of the metapectal-propodeal complex, the hypopygium with spiculum narrowing apicad, and the aedeagal apex aligned to cuspis apex.

Material examined

Holotype
FIJI – **Viti Levu** • ♂; "Viti Levu, Nandaravatu, Microwave St[atio]n, 1100 m, 16–23.VIII.[19]78, Malaise trap, S. & J. Peck col."; ANIC.

Redescription

Male
Measurements (mm). Body length 3.33; LH 0.65; WH 0.41; WF 0.20; WOT 0.10; surface of median clypeal lobe 0.17; HE 0.25; OOL 0.30; LFW 2.23.

Color. Head, mesosoma and metasoma dark castaneous.

Head. Oval, in lateral view; sides converging posterad, in dorsal view; malar space 0.1× HE; median clypeal lobe straight, as long as lateral ones, with pair of lateral carinae, parallel posteriorly, lobe delimitation distinct; mandible with three apical teeth; antenna with 11 flagellomeres, pedicel as long as flagellomere I; eye weakly setose, contour not protruding; frons coriaceous; ocellar triangle with anterior angle acute, postocellar line shorter than DAO.

Mesosoma. Pronotal flange polished, with posterior margin at most 1.5× as wide as anterior one; dorsal pronotal area coriaceous, posterior margin almost straight; probasisternum with anterior margin strongly angulated, posterior margin almost straight; epicnemium with anterior margin weakly incurved; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe not evident, mesopleural pit present, upper mesopleural fovea absent; metapectal-propodeal disc longer than wide medially, with evident constriction at propodeal spiracle; transverse anterior carina absent; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; forewing with prestigmal abscissa of radial 1 subrectangular, 3.0× as long as pterostigma, 2.0× as wide as Sc+R vein, prestigmal flexion line present, pterostigma small and circular; hind wing with three non-equidistant distal hamuli.

Metasoma. Second abdominal spiracle circular; abdominal tergum narrowing apicad; hypopygium with spiculum narrowing apicad, hypopygeal anterolateral apodeme present, hypopygeal posterior margin weakly outcurved. Genitalia with harpe 2.5× as long as gonostipes; digitus with posterior margin denticulate; aedeagal apex aligned to cuspis apex.

Female

Unknown.

Remarks

This species was initially described based only on a single male specimen collected in Viti Levu, Fiji. Subsequently, Gupta *et al*. (2017) provided a taxonomic key and comparisons between the females of *M. cleonarovorum* and apterous females of *M. longiceps*, claiming that this species was described based on both males and females. This assertion was reiterated by Azevedo & van Noort (2018). However, the apterous female mentioned by the authors belongs to the species *M. pentagonal*, and the authors made a mistake.

Host

Unknown.

Distribution

Fiji (Viti Levu).

Megaprosternum norfolcensis (Dodd, 1924)
Fig. 10

Sclerodermus norfolcensis Dodd, 1924: 184–185.

Sclerodermus norfolcensis – Hawkins 1942: 883. — Naumann 1990: 20, 22, 26. — Lanes & Azevedo 2008: 81, 83. — Azevedo *et al*. 2020: 478.
Scleroderma norfolcensis – Smithers 1998: 44.
Megaprosternum pentagonal – Lanes & Azevedo 2008: 81.
Megaprosternum norfolcensis – Azevedo *et al.* 2018: 235.

Differential diagnosis

The females of this species differ from those of the other species by having the head at most 1.2 × as long as wide, the median clypeal lobe straight, the antennae with 11 flagellomeres, the mesoscuto-scutellar foveae absent and wings polymorphism, with macropterous and apterous forms.

Material examined

Holotype

AUSTRALIA – **Norfolk Island** • ♀; "Norfolk Island, rotting leaves, A.M. Lea (type 14585)"; SAM. [By description.]

Non-types

AUSTRALIA – **Norfolk Island** • 2 ♀♀; "Norfolk Island, under decayed palm leaves M.T. Pitt, 1.000 ft. 12.vi.1939, I. McComish, 156, Brit. Mus. 1940-154"; NHMUK 015663882, 015663883. – **Queensland** • 1 ♀; "Peachester, 19.iii.1974, R.A. Yule, Dept. For. Qld., Nicher Accn. nº. 722, C.I.E. A8556"; NHMUK 015663884. [Previously identified as *M. pentagonal* by Lanes *et al.* (2008).]

Redescription

Female

Measurements (mm). Body length 3.0–3.4 mm; LH 0.75; WH 0.65; WF 0.45; WOT 0.12; surface of median clypeal lobe 0.38; HE 0.25; OOL 0.40; LFW 2.15.

Color (Fig. 10A). Head, mesosoma and metasoma dark castaneous.

Head (Fig. 10B). Oval, in lateral view; sides almost parallel, in dorsal view; malar space 0.2× HE; median clypeal lobe straight, as long as lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation indistinct; mandible with three apical teeth; antenna with 11 flagellomeres, pedicel longer than flagellomere I; eye weakly setose, contour not protruding; frons coriaceous; ocellar triangle with anterior angle acute, postocellar line longer than DAO.

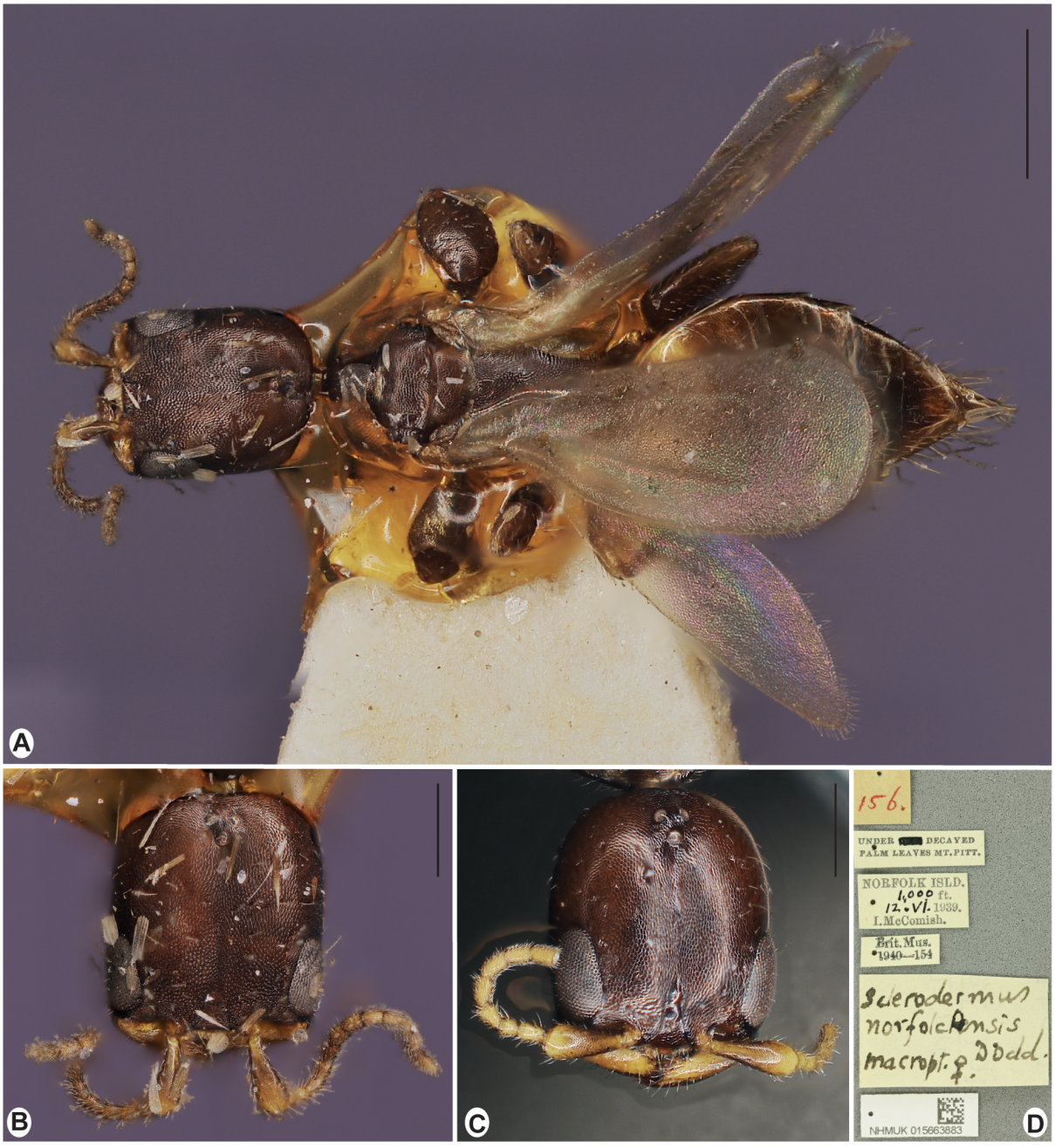

Fig. 10. *Megaprosternum norfolcensis* (Dodd, 1924). **A–B, D**. Non-type, ♀ (NHMUK 015663883). **C**. Non-type, ♀ (NHMUK 0015663884). **A**. Habitus, dorsal view. **B–C**. Head, dorsal view. **D**. Labels. Scale bars: A = 500 μm; B–C = 250 μm.

Mesosoma. Pronotal flange polished, with posterior margin at most 1.5 × as wide as anterior one; dorsal pronotal area coriaceous, posterior margin almost straight; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure inconspicuous; mesoscuto-scutellar suture absent; metapectal-propodeal disc longer than wide medially, without evident constriction at propodeal spiracle; transverse anterior carina absent; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; forewing with prestigmal abscissa of radial 1 subrectangular, 4.0 × as long as pterostigma, 2.0 × as wide as Sc+R vein, prestigmal flexion line present, pterostigma small and circular; hind wing with three equidistant distal hamuli.

Metasoma. Second abdominal spiracle circular; abdominal tergum narrowing apicad.

Male

Unknown.

Variations

The vertex of the head can be angled (Fig. 10B), as observed in the specimens from Norfolk Island, while it can be rounded (Fig. 10C), as seen in the specimen from Queensland. The wings can be present and well developed (macropterous form) as in the holotype and the specimen from Queensland, whereas they can be absent (apterous form) as in the three paratypes.

Remarks

This species is known only from four female specimens collected on Norfolk Island; a subtropical island located in the South Pacific Ocean. Dodd (1924) highlighted the wing polymorphism in this species, stating that "of the four specimens, three are apterous". Although Dodd (1924) did not explicitly state how the association of the two forms (apterous and macropterous) was made, based on the author's statement "there appear to be no structural differences between the two forms", it can be inferred that, as the only variation lies in the wing development, the author associated them due to the morphological similarity.

Naumann (1990) stated that this species is endemic to Norfolk Island and is known for submacropterous (probably brachypterous or micropterous forms) females and macropterous males. However, after an extensive literature review, we did not find the description of the males of this species, and as a result, they are considered unknown at this time. Interestingly, he mentioned that females are submacropterous. However, upon examination of the provided forewing drawings of females (Naumann 1990: fig. 21), it is evident that they possess wings typical of a macropterous pattern, similar to the holotype. Consequently, we found no evidence to support the presence of micropterous or brachypterous forms in this species, as observed in other species such as *M. pentagonal*, for instance.

We did not have access to the holotype and the apterous paratypes mentioned by Dodd (1924). However, it is probable that the paratypes are micropterous, as reported for *M. pentagonal* (see below) and several species of *Sclerodermus* Latreille, 1809 (see Azevedo & Colombo 2022b). Nevertheless, a thorough study of these specimens is necessary to confirm whether they exhibit microptery or aptery. In contrast, the apterous specimen (NHMUK 015663882) studied by Hawkins (1942), upon closer examination, appears to be a macropterous specimen with a damaged wing, supported by the division of the mesonotum into anteromesoscutum and mesoscutellum.

We are considering the specimen from Queensland (NHMUK 015663882) as belonging to the species *M. norfolcensis*, despite its head vertex being angled, in contrast to the holotype and other paratypes which have a rounded head vertex. This decision is supported by the consistent diagnostic morphology of the species, as listed in the Differential diagnosis section, which remains consistent across specimens. Furthermore, given the substantial volume of new material added compared to what was previously

known about Megaprosternum, it is prudent, for the time being, to maintain this classification as belonging to the same species.

Host

Probably parasitic on larvae of Coleoptera Linnaeus, 1758 in wood or litter (Naumann 1990).

Distribution

Australia (Norfolk Island and Queensland).

Megaprosternum nuaulu sp. nov.
urn:lsid:zoobank.org:act:9A0F3D1D-5268-422F-AE26-A6363740DE37
Fig. 11

Differential diagnosis

The females of this species are morphologically similar to those of *M. navatu* sp. nov., as aforementioned in its section of the differential diagnosis.

Etymology

The epithet *nuaulu* is derived from the Nuaulu, a Melanesian people who live in the jungles of the island of Seram, Indonesia.

Material examined

Holotype

INDONESIA – **North Ceram** • ♀; "N[orth] Ceram, 9 km E Wahai, nr PHPA-Q, coastal rainforest, 28.ii-21.iii.1997, Mal. trap 7, C.v.Achterberg & R.de Vries, RMNH'97"; RMNH.

Description

Female

Measurements (mm). Body length 2.6; LH 0.50; WH 0.40; WF 0.20; WOT 0.06; surface of median clypeal lobe 0.10; HE 0.21; OOL 0.26; LFW 1.36.

Color (Fig. 11A–B). Head, mesosoma and metasoma castaneous.

Head (Fig. 11C). Oval, in lateral view; sides almost parallel, in dorsal view; malar space absent; median clypeal lobe incurved, as long as lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation indistinct; mandible with three apical teeth; hypostoma rounded medially; antenna with 11 flagellomeres, pedicel longer than flagellomere I; eye glabrous, contour not protruding; frons smooth coriaceous; ocellar triangle with anterior angle acute, postocellar line shorter than DAO.

Mesosoma (Fig. 11D–E). Pronotal flange polished and coriaceous, with posterior margin at most 1.5× as wide as anterior one; dorsal pronotal area polished, posterior margin outcurved medially, overlapping anterior area of mesoscutum; probasisternum very large, anterior margin strongly angulated, posterior margin curved; epicnemium with anterior margin weakly incurved; mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea present, mesopleural epicoxal lobe not evident, mesopleural pit present, upper mesopleural fovea absent; metapectal-propodeal disc almost as long as wide medially, without evident constriction at propodeal spiracle; transverse anterior carina present; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; metadiscrimen absent; metafurcal pit absent; forewing

with prestigmal abscissa of radial 1 triangular; 4.0 × as long as pterostigma; 3.0 × as wide as Sc+R vein; prestigmal flexion line present; pterostigma small and oval; hind wing with three non-equidistant distal hamuli.

Metasoma. S2aa with anterior margin incurved; S2pa longer than wide medially, evenly wide; second abdominal spiracle oval; third abdominal sternum with anterior margin outcurved; abdominal tergum widening apicad.

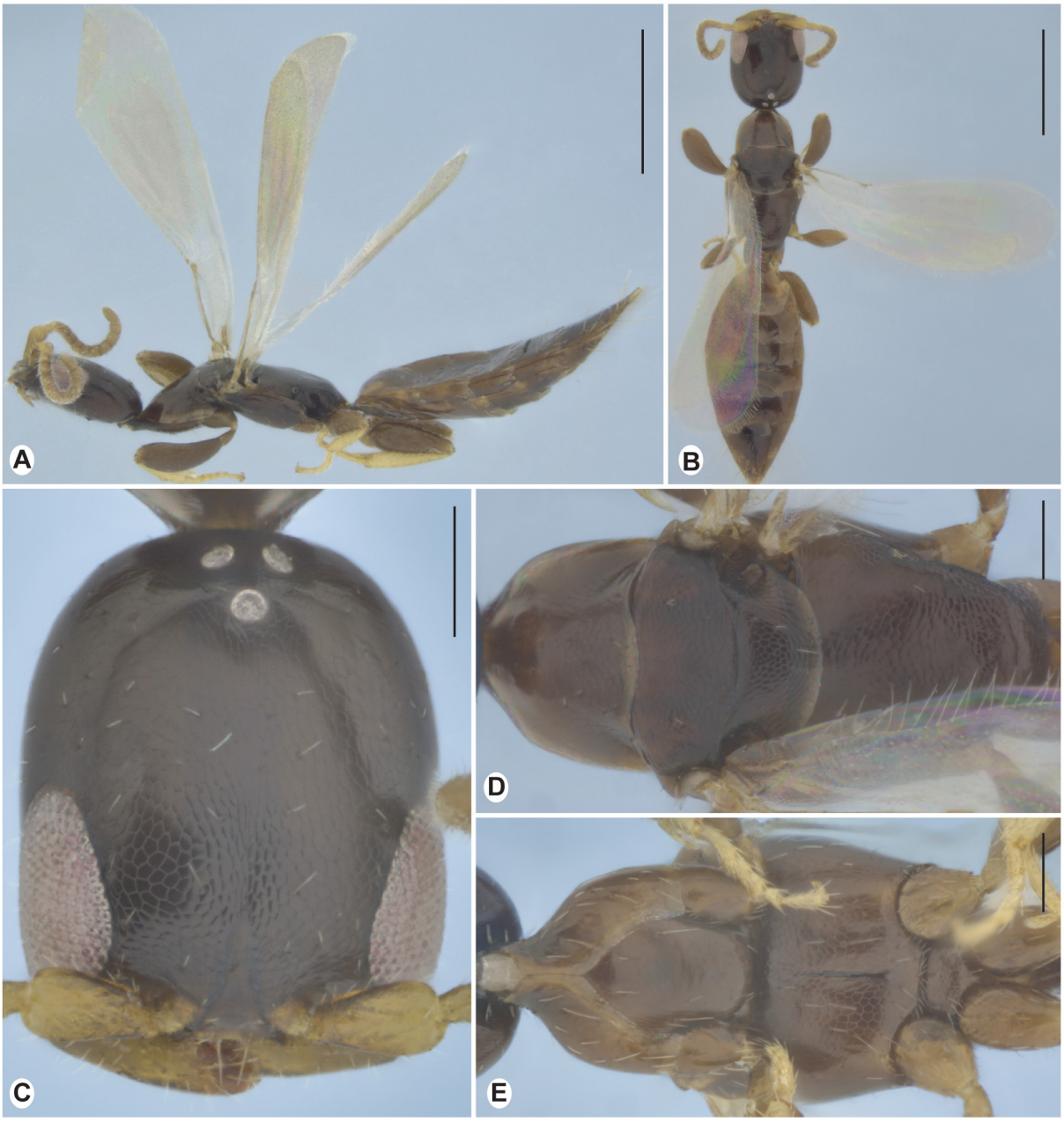

Fig. 11. *Megaprosternum nuaulu* sp. nov., holotype, ♀ (RMNH). **A–B**. Habitus. **A**. Lateral view. **B**. Dorsal view. **C**. Head, dorsal view. **D–E**. Mesosoma. **D**. Dorsal view. **E**. Ventral view. Scale bars: A–B = 250 μm; C–E = 125 μm.

Male

Unknown.

Host

Unknown.

Distribution

Indonesia (North Ceram).

Megaprosternum pentagonal Azevedo, 2006

Megaprosternum pentagonal Azevedo, 2006: 40–42.

Megaprosternum pentagonal – Gupta *et al*. 2017: 89. — Azevedo *et al*. 2018: 235.

Differential diagnosis

The males of this species differ from those of the other species by having the head about 1.2× as long as wide, with the sides converging posterad, in dorsal view, the median clypeal lobe with lateral carinae parallel or subparallel posteriorly, the antennae with 11 flagellomeres, ocelli distant each other about 0.5× DAO, the postocellar line almost shorter than DAO, the propodeal spiracles on lateral surface of the metapectal-propodeal complex, the hypopygium with spiculum narrowing apicad and, the aedeagal apex aligned to cuspis apex. The females of this species differ from those of the other species by having the antennae with 11 flagellomeres and the wings very reduced, shorter than tegulae (micropterous form).

Material examined

Holotype

AUSTRALIA – **Queensland** • ♂; "Queensland, Mount Glorious, 27º19'54"S 152º45'29"E, 29.XI–5.XII.1997, Malaise trap 3, T. Hiller col"; ANIC.

Allotype

AUSTRALIA – **Queensland** • ♀; same data as for holotype, except "630 m, dry sclerophyll *Eucalyptus* forest, S.F., 28.II–9.III.1984, L. Masner col"; ANIC.

Redescription

Male

Measurements (mm). Body length 2.56 mm; LH 0.46; WH 0.40; WF 0.22; WOT 0.09; surface of median clypeal lobe 0.12; HE 0.19; OOL 0.19; LFW 1.59.

Color. Head and mesosoma black, metasoma dark castaneous.

Head. Oval, in lateral view; sides almost parallel, in dorsal view; malar space 0.2× HE; median clypeal lobe straight, as long as lateral ones, with pair of lateral carinae, parallel posteriorly, lobe delimitation distinct; mandible with three apical teeth; antenna with 11 flagellomeres, pedicel longer than flagellomere I; eye glabrous, contour not protruding; frons coriaceous; ocellar triangle with anterior angle obtuse, postocellar line shorter than DAO.

Mesosoma. Pronotal flange polished, with posterior margin at most 1.5× as wide as anterior one; dorsal pronotal area coriaceous, posterior margin almost straight; probasisternum very large, anterior margin strongly angulated, posterior margin almost straight; epicnemium with anterior margin weakly

incurved; mesoscutum almost as long as mesoscutellum medially; parapsidal signum absent; transscutal fissure inconspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesopleural pit present; metapectal-propodeal disc almost as long as wide medially, without evident constriction at propodeal spiracle; transverse anterior carina absent; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle oval, on lateral surface of the metapectal-propodeal complex; forewing with prestigmal abscissa of radial 1 triangular; 2.0 × as long as pterostigma; 3.0 × as wide as Sc+R vein; prestigmal flexion line present; pterostigma small and oval.

Metasoma. Second abdominal spiracle circular; abdominal tergum narrowing apicad; hypopygium with spiculum narrowing apicad, hypopygeal anterolateral apodeme present, hypopygeal posterior margin straight. Genitalia with harpe 2.5 × as long as gonostipes; digitus with posterior margin smooth; aedeagal apex aligned to cuspis apex.

Female

Measurements (mm). Body length 3.92 mm; LH 0.51; WH 0.41; WF 0.25; WOT 0.07; surface of median clypeal lobe 0.05; HE 0.20; OOL 0.29.

Color. Head, mesosoma and metasoma dark castaneous.

Head. Rectangular, in lateral view; sides almost parallel, in dorsal view; malar space 0.2 × HE; median clypeal lobe straight, as long as lateral ones, without pair of lateral carinae, lobe delimitation indistinct; mandible with three apical teeth; antenna with 11 flagellomeres, pedicel longer than flagellomere I; eye weakly setose, contour not protruding; frons coriaceous; ocellar triangle with anterior angle acute, postocellar line longer than DAO.

Mesosoma. Pronotal flange polished, with posterior margin at least 1.6 × as wide as anterior one; dorsal pronotal area polished and coriaceous, posterior margin almost straight; probasisternum very large, anterior margin strongly angulated, posterior margin almost straight; epicnemium with anterior margin almost straight; mesoscutum almost as long as mesoscutellum medially; parapsidal signum absent; transscutal fissure inconspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesopleural pit present; metapectal-propodeal disc longer than wide medially, with evident constriction at propodeal spiracle; transverse anterior carina absent; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle oval, on lateral surface of the metapectal-propodeal complex; micropterous with tegulae present.

Metasoma. Abdominal tergum narrowing apicad.

Variations

Males are macropterous, along with a short clypeus projecting beyond the anterior margin of the antennal rim, and the head with sides converging posterad. In contrast, females exhibit a greatly reduced wings (micropterous form), characterized by the shorter clypeus than the anterior margin of the antennal rim, the head rectangular, and the profemur thicker than those of males.

Remarks

This species was described from two specimens (one male and one female) collected in Queensland, Australia. Although Azevedo (2006) did not explicitly detail the method of associating the two strongly dimorphic sexes (micropterous female and macropterous male), it can be inferred from the author's statement: "The shape of the antenna, mandible teeth, ocellar triangle, and mesosoma are very similar in both sexes, but sexual dimorphism is strong". The author likely linked them based on morphological

similarities and the specimens' common type-locality. Azevedo (2006) initially described the female of this species as apterous. However, upon further review, it became apparent that there is a wing, albeit highly reduced, leading to the consideration that the females of this species are micropterous.

Host

Unknown.

Distribution

Australia (Queensland).

Megaprosternum samburu sp. nov.
urn:lsid:zoobank.org:act:AEC941A9-075D-44BB-AA90-B4AEA8F8B91C
Fig. 12

Differential diagnosis

The females of this species are morphologically similar to those of *M. navatu* sp. nov., by having the head at least 1.25× as long as wide, and the antennae with 11 flagellomeres. However, *M. samburu* sp. nov. has the probasisternum large with the anterior margin weakly angulated, whereas *M. navatu* has the probasisternum markedly large with the anterior margin strongly angulated.

Etymology

The epithet *samburu* is derived from the Samburu, a semi-nomadic pastoralist of north-central Kenya.

Material examined

Holotype

KENYA – **Coast Province** • ♀; "Coast Province, Kasigau Mountain, Indigenous Forest, -3.82700S 38.64875E, 1065 m above sea level, Malaise trap, next to campsite in forest, 16–30 NOV 2011, R. Copeland"; ICIPE 49458.

Description

Female

Measurements (mm). Body length 1.45; LH 0.34; WH 0.27; WF 0.17; WOT 0.07; surface of median clypeal lobe 0.05; HE 0.12; OOL 0.18; LFW 0.79.

Color (Fig. 12A). Head, mesosoma and metasoma castaneous.

Head (Fig. 12B). Rectangular, in lateral view; sides almost parallel, in dorsal view; malar space 0.3× HE; median clypeal lobe outcurved, as long as lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation distinct; mandible with three apical teeth; hypostoma angled medially; antenna with 11 flagellomeres, pedicel longer than flagellomere I; eye glabrous, contour protruding; frons weakly punctate; ocellar triangle with anterior angle obtuse, postocellar line shorter than DAO.

Mesosoma (Fig. 12C–D). Pronotal flange polished, with posterior margin at most 1.5× as wide as anterior one; dorsal pronotal area coriaceous, posterior margin almost straight; probasisternum large, anterior margin weakly angulated, posterior margin almost straight; epicnemium with anterior margin weakly incurved; mesoscutum almost as long as mesoscutellum medially; parapsidal signum present; transscutal fissure conspicuous; mesoscuto-scutellar suture present, not sulcate; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea present, mesopleural epicoxal lobe not evident, mesopleural pit present, upper mesopleural fovea absent; metapectal-propodeal disc longer

than wide medially, without evident constriction at propodeal spiracle; transverse anterior carina absent; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent; propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; metadiscrimen present; metafurcal pit oval; forewing with prestigmal abscissa of radial 1 subrectangular; 3.0 × as long as pterostigma; 6.0 × as wide as Sc+R vein; prestigmal flexion line present; pterostigma large and subrectangular, hind wing with three non-equidistant distal hamuli.

Metasoma. S2aa with anterior margin incurved, S2pa longer than wide medially, widening posterad; second abdominal spiracle circular; third abdominal sternum with anterior margin straight; abdominal tergum narrowing apicad.

Fig. 12. *Megaprosternum samburu* sp. nov., holotype, ♀ (ICIPE 49458). **A**. Habitus, lateral view. **B**. Head, dorsal view. **C–D**. Mesosoma. **C**. Dorsal view. **D**. Ventral view. Scale bars: A–B = 250 µm; C–D = 125 µm.

Male

Unknown.

Host

Unknown.

Distribution

Kenya (Coast Province).

Megaprosternum wakawaka sp. nov.

urn:lsid:zoobank.org:act:4CD8B790-5F5C-4AD3-9895-28700252A31D

Fig. 13

Differential diagnosis

The males of this species differ from the males of the other species by having the antennae with 10 flagellomeres.

Etymology

The epithet *wakawaka* is derived from the Waka Waka, an Aboriginal Australian community in the state of Queensland.

Material examined

Holotype

AUSTRALIA – **South East Queensland** • ♂; "S[outh] E[ast] Q[ueens]l[an]d, W[est] of Brisbane, Moggill Farm, 25m., 23–27.I.1961, J.L. Gressitt, Malaise trap"; BPBM.

Description

Male

Measurements (mm). Body length 1.6; LH 0.32; WH 0.26; WF 0.18; WOT 0.08; surface of median clypeal lobe 0.08; HE 0.13; OOL 0.16; LFW 0.93.

Color (Fig. 13A–B). Head, mesosoma and metasoma castaneous.

Head (Fig. 13C). Rectangular, in lateral view; sides of head converging posterad, in dorsal view; malar space 0.5 × HE; median clypeal lobe straight, as long as lateral ones, with pair of lateral carinae, converging posteriorly, lobe delimitation indistinct; mandible with three apical teeth; hypostoma rounded medially; antenna with 10 flagellomeres, pedicel longer than flagellomere I; eye weakly setose, contour protruding; frons smooth and coriaceous; ocellar triangle with anterior angle obtuse, postocellar line almost as long as DAO.

Mesosoma (Fig. 13D–E). Pronotal flange polished and coriaceous, with posterior margin at most 1.5 × as wide as anterior one; dorsal pronotal area polished, posterior margin almost straight; probasisternum very large, anterior margin strongly angulated, posterior margin almost straight; epicnemium with anterior margin almost straight. mesoscutum longer than mesoscutellum medially; parapsidal signum absent; transscutal fissure conspicuous; mesoscuto-scutellar suture absent; mesopleuron with mesepimeral lobe not evident, anterior mesopleural fovea absent, mesopleural epicoxal lobe not evident, mesopleural pit present, upper mesopleural fovea absent; metapectal-propodeal disc longer than wide medially, without evident constriction at propodeal spiracle; transverse anterior carina present; lateral marginal carina absent; paraspiracular sulcus absent; paraspiracular carina absent; metapostnotal median carina absent;

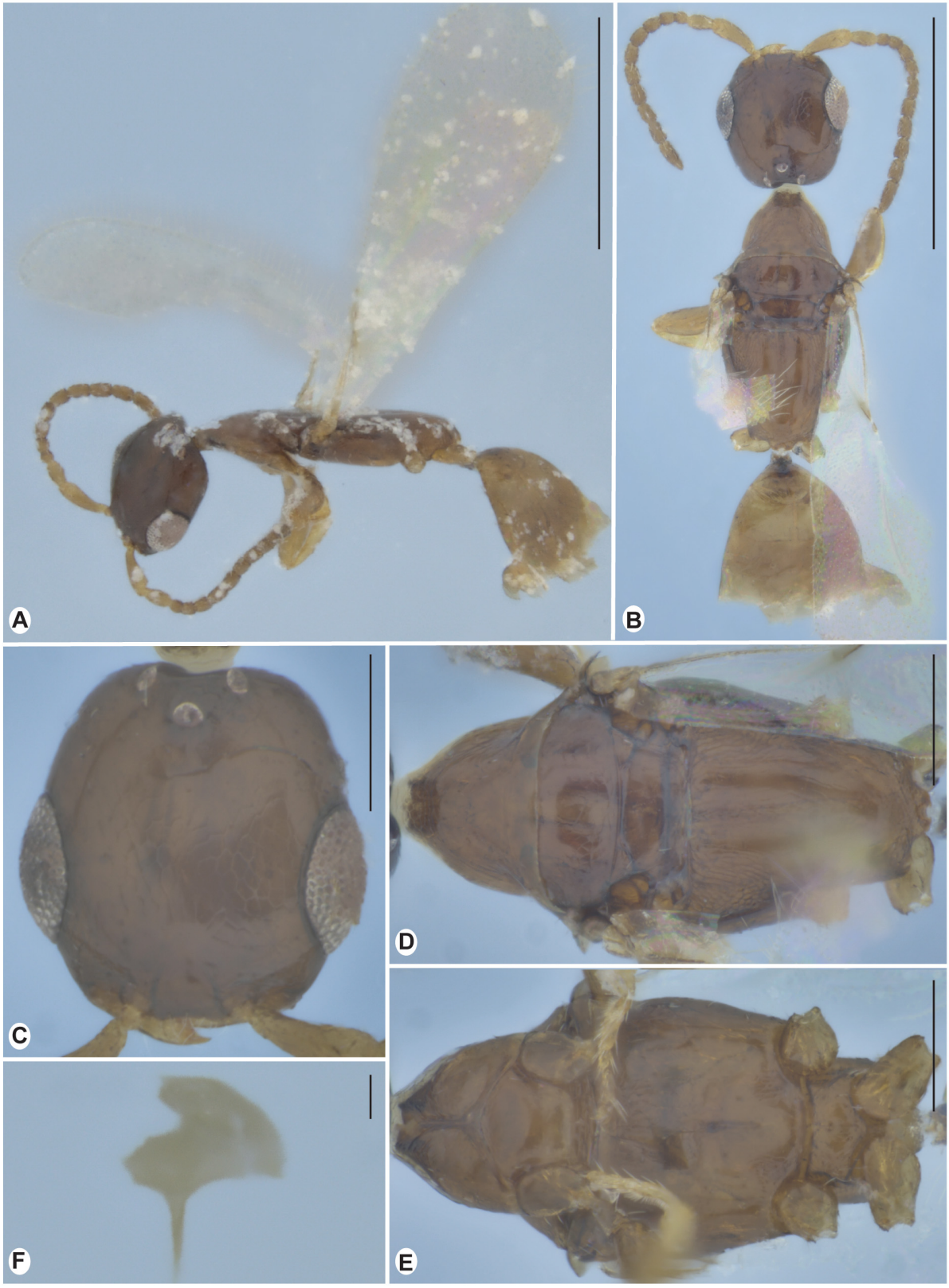

Fig. 13. *Megaprosternum wakawaka* sp. nov., holotype, ♂ (BPBM). **A–B**. Habitus. **A**. Lateral view. **B**. Dorsal view. **C**. Head, dorsal view. **D–E**. Mesosoma. **D**. Dorsal view. **E**. Ventral view. **F**. Hypopygium, external view. Scale bars: A–B = 500 µm; C–F = 125 µm.

propodeal spiracle circular, on lateral surface of the metapectal-propodeal complex; metadiscrimen absent; metafurcal pit absent; forewing with prestigmal abscissa of radial 1 oval; 4.0× as long as pterostigma; 3.0× as wide as Sc+R vein, prestigmal flexion line present, pterostigma large and oval; hind wing with three equidistant distal hamuli.

Metasoma. S2aa with anterior margin straight, S2pa as long as wide medially, widening posterad; second abdominal spiracle circular; third abdominal sternum with anterior margin straight; abdominal tergum narrowing apicad; hypopygium with spiculum narrowing apicad, hypopygeal anterolateral apodeme present (Fig. 13F).

Female

Unknown.

Remarks

This species is known only from the male holotype, and its genitalia is lost. However, the uniqueness of having the antennae with 10 flagellomeres confirmed its identity in comparison to other species known from males, such as *M. cleonarovorum*, *M. neolongiceps*, and *M. pentagonal*, all of which are known for males with 11 flagellomeres.

Host

Unknown.

Distribution

Australia (Queensland).

Discussion

Analysis of diagnostic morphological characters

The diagnosis of *Megaprosternum* proposed by Azevedo *et al*. (2018) and by previous studies (Azevedo 2006; Gupta *et al.* 2017), was mainly based on an analysis of two species, *M. neolongiceps* and *M. pentagonal*. The key diagnostic features put forth by these studies for the genus included: (1) a flattened body, (2) mandible with three apical teeth, (3) antenna with 11 flagellomeres, (4) absence of notaulus, (5) presence or absence of the parapsidal signum, (6) notably large and pentagonal probasisternum, (7) macropterous males and apterous females, (8) forewing lacking closed cells, featuring only the Sc+R vein and a minute linear pterostigma, and (9) male genitalia characterized by an elongate harpe, wide cuspis, and slender aedeagus.

While these diagnostic characters were suitable for known species, their applicability to the ten newly described species in this study prompted a reassessment of the generic diagnosis. Consequently, the generic diagnosis has been updated to better reflect the nuanced characteristics observed in the newly discovered species.

Some of the diagnostic characters described by Azevedo *et al*. (2018) are applicable to both females and males. These include a consistently flattened body, the absence of notaulus, the notably large and pentagonal probasisternum, forewings without closed cells, featuring only the Sc+R vein, and male genitalia with an elongate harpe, a wide cuspis, and a slender aedeagus. However, some of these characters are similar to those found in other sclerodermine and do not provide precise diagnostic specificity for *Megaprosternum*.

Although the strongly flattened body is a distinctive characteristic of *Megaprosternum*, it bears similarities to that found in other sclerodermine genera, such as *Alloplastanoxus* Terayama, 2006; *Alongatepyris* Azevedo, 1992; *Platepyris* Lanes & Azevedo, 2008; *Thlastepyris* Evans, 1973; and *Tuberepyris* Lanes & Azevedo, 2008. These genera stand out as some of the most flattened within the Bethylidae. The thickness of host galleries appears to be a critical factor influencing the evolution of this flattened morphology, as previously suggested and discussed by Vargas *et al.* (2020). However, further information is needed to thoroughly investigate such characteristics. It is worth noting that, among these genera, only one species, *Megaprosternum cleonarovorum*, has available information regarding its life history (see Gupta *et al*. 2017).

The absence of notauli, although not an exclusive condition of *Megaprosternum*, serves to distinguish strongly flattened genera into two major groups. In the first group, comprising genera such as *Megaprosternum*, *Platepyris*, *Thlastepyris*, and *Tuberepyris*, notauli are absent. In the second group, which includes *Alloplastanoxus* and *Alongatepyris*, notauli are present. Therefore, the presence or absence of notauli is likely an independent characteristic in relation to the thickness or probably the host influence. This is supported, for instance, by other genera within Scleroderminae that are robust and lack notauli, such as *Bethylopsis* Fouts, 1935, and *Israelius* Richards, 1952.

The notably large and pentagonal probasisternum is likely the most distinctive characteristic of *Megaprosternum*, bearing a closer resemblance to Scolebythidae than to other Bethylidae. Currently, within Bethylidae, only two sclerodermine genera feature the notably large probasisternum – *Megaprosternum* itself and *Solepyris*. This trait is also observed in Bethylinae Haliday, 1839, exemplified by genera such as *Bethylus* Latreille, 1802, and *Goniozus* Förster, 1856. However, the newly described species presented here reveal that there are two major size patterns for probasisternum within *Megaprosternum*.

The first pattern is characterized by a probasisternum size 2× as long as the procoxa, with a strongly angulated anterior margin (Figs 1F, 3E, 4E, 5E, 7E, 9E, 11E and 13E). This pattern is found in the type species *M. neolongiceps*, as well as in previously described species such as *M. cleonarovorum*, *M. longiceps*, *M. norfolcensis*, and *M. pentagonal*. Additionally, it is observed in the new species described here, including *M. bayaka* sp. nov., *M. chamorro* sp. nov., *M. hmong* sp. nov., *M. kayin* sp. nov., *M. navatu* sp. nov., *M. nuaulu* sp. nov., and *M. wakawaka* sp. nov.

The second pattern, on the other hand, is characterized by a probasisternum size almost as long as the procoxa, with a weakly angulated anterior margin (Figs 2E, 6E and 12D). This pattern is found in only three new species, namely *M. aka* sp. nov., *M. kariri* sp. nov., and *M. samburu* sp. nov. Interestingly, this latter pattern bears a closer resemblance to *Solepyris* (see Azevedo 2006: fig. 21) and bethyline genera than the former.

In contrast to the probasisternum size, its shape emerges as a more distinct diagnostic feature. The pentagonal form stands out as exclusive to *Megaprosternum*, proving to be the most reliable characteristic for identifying its species and differentiating it from other Bethylidae genera. *Solepyris* is distinguished by its kite-shaped (sensu Vargas *et al*. 2020). Conversely, within Bethylidae, Bethylinae displays probasisternum with a diamond-shaped form, which is predominant in Pristocerinae Kieffer, 1914, Epyrinae Kieffer, 1914, and the majority of Scleroderminae. On another note, Mesitiinae Haliday, 1839 genera like *Sulcomesitius* Móczár, 1970, and *Pilomesitius* Móczár, 1971 feature a triangular or subtriangular probasisternum.

Scleroderminae exhibit all possible wing forms, including apterous, micropterous, brachypterous, and macropterous (Evans 1964), and wing polymorphism is not uncommon; it is observed in various Scleroderminae, including *Megaprosternum*, as reported for *M. norfolcensis* (see Dodd 1924). Females of *M. pentagonal* were initially described as apterous. However, through a detailed examination of their

mesothorax, the presence of tiny tegulae and wings was revealed. The wings are often concealed ventral to the tegulae, leading Azevedo (2006) and later Lanes & Azevedo (2008) to diagnose such species as apterous rather than micropterous. A similar situation has been reported for the Neotropical species of *Sclerodermus*, where all non-macropterous females, except for *Sclerodermus soror* Westwood, 1881, were described as apterous and were later redescribed as micropterous (Azevedo & Colombo 2022b).

The forewings, lacking closed cells and featuring only the Sc+R vein and the prestigmal abscissa of the R1 vein (Fig. 1I), serve as an excellent diagnostic characteristic for *Megaprosternum*, as all its species share this trait. The fully developed forewings with seven closed cells is likely the plesiomorphic condition in the family (Colombo *et al*. 2020). However, in the evolutionary history of Scleroderminae, the number of cells and veins has varied multiple times among different taxa (see Vargas *et al*. 2020: fig. 6d). This variation ranges from three closed cells (C, R, and 1Cu) as observed in some genera like *Allobethylus* Kieffer, 1905 and *Proplastanoxus* Terayama, 2005, to two closed cells (R and 1Cu) as seen in *Nothepyris* Evans, 1973, one closed cell (R) as in some species of *Sclerodermus*, and no closed cells as in *Megaprosternum* and *Tuberepyris*, for example.

The forewings of *Megaprosternum* shares similarities with those of *Acephalonomia*, as both genera lack closed cells, featuring only the Sc+R vein and the prestigmal abscissa of the R1 veins. *Acephalonomia*, with a reduced size (1.0–1.3 mm), is known to attack ciid beetles feeding on fungus (Colombo & Azevedo 2020), in contrast to *Megaprosternum*, which is larger (1.40–5.0 mm) and preys on wood-boring beetles. It is likely that the cryptic lifestyle has influenced these characteristics in these groups, as well as in other Scleroderminae, as suggested by Vargas *et al.* (2020).

Characteristics of male genitalia play a crucial role in the taxonomy of several bethylids, especially for Pristocerinae genera (see Azevedo & Colombo 2022a). However, in Scleroderminae, such features are not so evident and useful for genus recognition, being more commonly utilized for species delimitation. Firstly, because over 50% of Scleroderminae genera lack known males, and secondly, because the reductionism of morphological structures is more pronounced in Scleroderminae than in any other subfamily of Bethylidae.

Regarding male genitalia of Scleroderminae, the harpe is a structure that can provide some important characters. Examples include the harpe divided into dorsal and ventral arms in *Sclerodermus* or the simple harpe in *Megaprosternum*. Additionally, the size of the harpe relative to the gonostipes is noteworthy, such as *Megaprosternum* with the harpe 2.5× as long as the gonostipes, while in other genera like *Tuberepyris*, the harpe is as long as the gonostipes (see Azevedo & Mugrabi 2014) or in *Sclerodermus* where it is shorter than the gonostipes (Azevedo & Colombo 2022b). In Bethylidae, only the Epyrinae genus *Calyoza* Hope, 1837 possesses the harpe notably elongated in relation to the gonostipes (see Colombo *et al*. 2022b).

Now, the other previously mentioned characters, once considered diagnostic for *Megaprosternum*, have become obsolete for delimiting the genus as a whole. Firstly, the mandible with three apical teeth, which is actually present in several species of *Megaprosternum*, including all previously described ones. However, two new conditions have been recorded: the first with mandibles possessing two apical teeth, found in *M. bayaka* sp. nov., and the second with mandibles having four apical teeth in *M. kariri* sp. nov. Therefore, the number of apical teeth on the mandibles emerges as a character that can provide guidance for species delimitation within *Megaprosternum*.

Another diagnostic character that was once but is now obsolete for diagnosing *Megaprosternum* is the antennae with 11 flagellomeres. Scleroderminae exhibit a wide range of variation in the number of flagellomeres, but the majority of genera display 11 flagellomeres, including *Nothepyris*, *Sclerodermus*, *Solepyris*, *Thlastepyris*, and *Tuberepyris*, for example. These genera represent the old sense of

Sclerodermini sensu Evans (1964). The condition with 10 flagellomeres appears in a few genera, such as *Alloplastanoxus*, *Cephalonomia* Westwood, 1833, *Israelius*, *Proplastanoxus*, and *Prorops* Waterston, 1923. These genera represent the old sense of Cephalonomiini Evans, 1964.

The morphological plasticity in the number of flagellomeres not only varies between genera but also within some genera, as observed in *Megaprosternum* and *Bethylopsis* where some species have 11 flagellomeres and others have 10. This constitutes the most plastic scenario of this character in the family, as noted by Vargas *et al*. (2020). However, unlike *Cephalonomia formosiensis* Terayama & Ho, 2020 (in Ho *et al*. 2020) for example, where within the same species there are specimens with seven, eight, or 10 flagellomeres (Ho *et al*. 2020), in *Megaprosternum*, the number of flagellomeres remains consistent among specimens of the same species. Thus, it serves as a reliable character for delimiting and recognizing the species.

In general, many of characters hypothesized as diagnostic for *Megaprosternum* by Azevedo *et al*. (2018) and previous studies are relevant for identifying and differentiating this genus from other bethylids. The new species described here allowed for a reanalysis of all proposed diagnostic characters for *Megaprosternum*, confirming whether each character is more suitable for differentiating *Megaprosternum* from other genera or for delimiting and distinguishing species within *Megaprosternum*.

Among the new diagnostic characters identified for *Megaprosternum*, we can highlight the following: the gena is not visible in dorsal view, hind wings have the jugum fully fused to the remigium, and the aedeagal apodeme is dilated basally and short, not surpassing the genital ring.

The gena not visible dorsally, although not exclusive to *Megaprosternum*, is a shared characteristic among all species of this genus, as observed in other closely related genera such as *Alloplastanoxus* and *Alongatepyris*. In contrast, in certain genera of Scleroderminae, such as *Bethylopsis*, some species of *Cephalonomia*, *Discleroderma* Kieffer, 1904, *Nothepyris*, and *Sclerodermus*, the gena is visible dorsally.

The hind wings with the jugum fully fused to the remigium are found only in a few genera of Scleroderminae, including *Alloplastanoxus*, *Mutatio* Vargas, Colombo & Azevedo, 2020, *Prorops*, and *Megaprosternum* itself. In contrast, within Bethylinae, Pristocerinae, Epyrinae, Mesitiinae, and other genera of Scleroderminae, the hind wings may vary from the jugum partially fused to the remigium to fully separated.

The aedeagal apodeme is a diagnostic character of *Megaprosternum*, as in all its species, it is dilated basally and short, not surpassing anterad the genital ring. This pattern is found in other Scleroderminae, such as *Nothepyris* and *Sclerodermus*. Additionally, this pattern is also found in other Bethylidae, such as some pristocerine genera *Apenesia* Westwood, 1874 and *Austranesia* Alencar & Azevedo, 2018 (in Alencar *et al.* 2018) for example.

Finally, a character worth mentioning, even though not included as diagnostic, is the presence of an enlarged prestigmal abscissa of R1 in the forewings. In all species of *Megaprosternum*, it is at least 1.0 × as wide as the Sc+R vein, and only in *M. cleonarovorum*, *M. hmong* sp. nov., and *M. kayin* sp. nov., is it as wide as the Sc+R vein. This widening of the prestigmal abscissa of R1 in the forewings is also found in other sclerodermine genera, such as *Alloplastanoxus*, *Acephalonomia*, *Israelius*, and *Thlastepyris*.

The distribution of *Megaprosternum*

Megaprosternum is currently recognized with a total of 15 species, displaying an intriguing distribution pattern. These species are distributed across various regions, with one found in the Neotropical region (*M. kariri* sp. nov.), three in the Afrotropical region (*M. aka* sp. nov., *M. bayaka* sp. nov., and *M. samburu* sp. nov.), three in Oceania (*M. chamorro* sp. nov., *M. navatu* sp. nov., and *M. neolongiceps*), four in the

Oriental region (*M. cleonarovorum*, *M. hmong* sp. nov., *M. kayin* sp. nov., and *M. nuaulu* sp. nov., the former also recorded in the Malagasy region), and four in the Australian region (*M. longiceps*, *M. norfolcensis*, *M. pentagonal*, and *M. wakawaka* sp. nov.).

Before this study, the genus had been documented in the Malagasy (Azevedo & van Noort 2018), Australian (Ashmead 1900; Azevedo 2006), Oceanian (Dodd 1924), and Oriental (Gupta *et al*. 2017) regions. Now, for the first time, we are recording the genus in the Neotropical region and on the African continent; earlier Azevedo & van Noort (2018) documented *M. cleonarovorum* on Cousine Island in the Seychelles. Additionally, we have doubled the number of species in the Oceanian region and tripled it in the Oriental region.

This distribution of *Megaprosternum*, predominantly restricted to tropical areas, with some Australian species known from continental subtropics, can be attributed to the life strategy of the hosts. The highly flattened body of *Megaprosternum* is an adaptation for penetrating longhorn grub galleries through thin crevices in the bark (Gupta *et al*. 2017; Colombo *et al*. 2022a). Examining the strategy of *Cleonaria bicolor* (the host of *M. cleonarovorum*), this approach is quite common in various species groups living in stems, as it is easier for females to make incisions where the wood is more tender (Colombo *et al*. 2022a).

Cleonaria bicolor adults feed on young leaves, and infestation results in the death of thin but mature branches (Prathapan *et al*. 2009). The gallery width corresponds to the thin stem thickness (Gupta *et al*. 2017), allowing only very flat insects to enter these grub galleries. Despite the injury, attacked plants survive to host several generations of *Cleonaria* Thomson, 1864. *Megaprosternum cleonarovorum* is also documented in the upper canopy forest of *Pisonia grandis* Brown, 1810 (Nyctaginaceae) on Cousine Island (Seychelles), attacking Coleoptera (Gaigher *et al*. 2013; Azevedo & van Noort 2018). If the life strategies of other hosts of strongly flat sclerodermine genera resemble that of *Cleonaria bicolor*, this similarity might elucidate the conspicuous absence of strongly flat sclerodermine genera, such as *Megaprosternum*, beyond tropical regions, as postulated by Colombo *et al*. (2022a).

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