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A case of the higher-level classification of praying mantises (Mantodea) obscuring the synonymy of *Majangella* Giglio-Tos, 1915 (Liturgusidae, Liturgusinae) and *Ephippiomantis* Werner, 1922 (Hymenopodidae, Acromantinae)

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Abstract

The praying mantis genus *Majangella* Giglio-Tos, 1915 is taxonomically treated with a re-description of the genus and the two included species, *M. moultoni* Giglio-Tos, 1915 and *M. carli* Giglio-Tos, 1915. The genus *Ephippiomantis* Werner, 1922 is newly determined to be the junior synonym of *Majangella* Giglio-Tos, 1915 based on morphology. The species for which the genus name *Ephippiomantis* was erected, *E. ophirensis* Werner, 1922, is re-described and now included within *Majangella*. This synonymy was determined herein as the direct result of erroneous higher-level placement of *Majangella* within the Majanginae by Giglio-Tos and was not recognized even after the genus was moved to within Liturgusidae. Action is now taken to move *Majangella* from within Liturgusidae to within the Hymenopodidae subfamily of Acromantinae, which is supported by morphological and molecular data. A key to the three species is provided along with habitus images, images of the head, pronotum, and foreleg, and illustrations of the male genitalia. Species distributions are presented and locality coordinates are provided in print as well as being available for download as a KML file viewable in Google Earth.

Key words: Southeast Asia, Mantodea, Hymenopodidae, Liturgusidae *Majangella*, *Ephippiomantis*, systematics, new synonymy, praying mantis

Introduction

Majangella was first created by Ermanno Giglio-Tos in 1915 to include his two newly described species *M. moultoni* Giglio-Tos, 1915 and *M. carli* Giglio-Tos, 1915. By original designation, *M. moultoni* was named as the type species for the genus and is deposited in the Sarawak Museum, Borneo. Giglio-Tos (1915) included his new genus, *Majangella*, within the group Majangae, which also included the genus *Majanga* Wood-Mason, 1891 from Madagascar, presumably because he thought the two genera were closely related. The characters used to diagnose the group Majangae included a process on the vertex of the head, preapical lobes on the hind femora, and conical tubercles on the pronotum. Subsequent to creating the genus, Giglio-Tos continued to classify *Majangella* with *Majanga* in his group Majangae and subfamily Majanginae (Giglio-Tos, 1919, 1927). This taxonomic arrangement remained unchanged until Beier (1935) placed the two genera within the tribe Liturgusini under Mantinae and disposed of the Giglio-Tos' subfamily Majanginae, but also noted the likely relationship between *Majangella* and other Acromantini. With its original placement within Majanginae and now within the Liturgusini, *Majangella* was considered a close ally to the broader group of bark dwelling mantises such as *Majanga*, *Liturgusa*, *Theopompella*, and others. However, the habits and life strategy of *Majangella* species are unknown.

The genus *Ephippiomantis* was created by Franz Werner in 1922 for his newly discovered species *E. ophirensis* Werner, 1922 collected in Sumatra. The monotypic genus was included within the Acromantinae by Werner, a subfamily of the flower mantis family Hymenopodidae. This placement has remained unchanged and the

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species is widely accepted as an Acromantinae with recent molecular evidence strongly placing *E. ophirensis* within a clade comprised of *Acromantis*, *Psychomantis*, *Oxypiloidea*, *Chrysomantis*, *Anasigerpes*, and *Otomantis* (Svenson & Whiting, 2009).

Upon completing a thorough morphological and taxonomic review of the two genera *Majangella* Giglio-Tos, 1915 and *Ephippiomantis* Werner, 1922, we find that taxonomic action is necessary. Morphological evidence is presented to establish herein that *Ephippiomantis* Werner, 1922 is the junior synonym of *Majangella* Giglio-Tos, 1915. Therefore, the genus *Majangella* Giglio-Tos, 1915 now contains three species, *M. moultoni*, *M. carli*, and *M. ophirensis*. The three species have a recorded distribution across parts of Southeast Asia including Malaysia, Borneo, and Indonesia, but their full distribution is unknown due to limited sampling for the species. Unfortunately, only males have been known for the genus and we have presumed that females are much rarer or sexually dimorphic to the degree that we simply have not recognized them in collections. However, a female has been located in the Zoologische Staatssammlung, München, Germany, and has been identified as *M. carli* by Max Beier, but we did not have the opportunity to examine this specimen and it has not been included in the current study (see below). This study also outlines the reasons that may have led to the creation of the junior synonym, which is the result of erroneous higher-level placement of senior synonym, *Majangella*.

Material and Methods

Habitus and morphological structure photographs were captured using a Visionary Digital™ BK Plus Lab System, which takes multiple y-axis shots for focus stacking in Helicon Focus 5.2.4 for deep field images. Examination and dissection of male genital complex followed standard protocols established by Roger Roy (Muséum national d'Histoire naturelle, Paris, France), which include removal of complex with fine forceps, clearing with a 10% KOH solution, disarticulated to separate the right and left epiphallus from the hypophallus, cleaned and slide mounted in euparal. Illustrations of the genital complex were directly input digitally using a Wacom Intuos® 4 professional pen tablet interfaced with Adobe® Creative Suite 5 software including Illustrator® and Photoshop®. Coloration discussed within this study relates specifically to praying mantises and is largely based on contrasting colors rather than specific pigments. Praying mantises preserve with great variation in coloration, some preserving the original colors, but most fading from greens to yellows or light browns. However, dark areas almost always stay darker than light areas, which provide consistency in contrast patterns between specimens showing great variability in color preservation. Therefore, we believe these contrast patterns are worth including within the descriptions as they are informative, thus we refer to light coloration (yellows, light browns, and tans) of the integument as "pale" while other areas are usually referred to as "dark" or "black" unless more specific judgment calls can be made.

The examined material is deposited in the following institutions and private collections: British Museum (The Natural History Museum), London-UK (BMNH); Institute for Tropical Biology and Conservation at the University of Malaysia, Sabah- Borneo (BORN)**;** Gavin Svenson Mantodea Collection-USA (GSMC); Muséum d'Histoire naturelle, Geneva-Switzerland (MHNG); Muséum national d'Histoire naturelle, Paris-France (MNHN); P.E. Bragg Mantodea Collection, Nottingham-UK (PEB)**;** Rijksmuseum van Natuurlijke Histoire, Leiden-Netherlands (RMNH); Collection of Martin Stiewe-UK (Stiewe Coll.)**;** United States National Museum, Smithsonian Inst., Washington DC-USA (USNM).

Taxonomic Treatment

Majangella Giglio-Tos, 1915

Majangella: Giglio-Tos, 1915: 93; Giglio-Tos, 1919: 66; Giglio-Tos, 1927: 309, 310, 700; Beier, 1931: 151; Beier, 1935: 6, 13; Beier, 1942: 141; Beier, 1964: 943; Beier, 1968: 8; Ehrmann, 2002: 213, 375; Otte & Spearman, 2005: 134; Bragg, 2010: 21-22, 24–25, 30, Figs. 3, 6–7, 18–19, 36.

= *Ephippiomantis*: Werner, 1922: 123; Giglio-Tos, 1927: 651; Werner, 1933: 267; Beier, 1934: 15; Beier, 1964: 939; Beier, 1968: 6; Ehrmann, 2002: 135, 374; Otte & Spearman, 2005: 75; Svenson & Whiting, 2009: Fig. 3. **syn. nov.**

Type species: *Majangella moultoni* Giglio-Tos, 1915 by original designation.

Original Descriptions. Included to provide strong evidence of synonymy.

Original Description of Majangella by Giglio-Tos (1915: 93):

> "Gen. Majangella n. Gen
> Caput latum. Clypeus facialis prominens, triangularis. Clypeus frontalis transverses, basi bigranulato margine supero angulato, medio in dentem acutum producto. Oculi rotundati, prominentes. Ocelli magni. Vertex in medio super ocellos in processum conicum breve productus, inter processum et oculos tuberculo conico minute utrinque instrumetus. Summus vertex truncutas, ad oculos tuberculo rotundato parum distinto. Pronotum coxis ant. paulo longius marginibus fortiter dentatis, ampliatione lata, angulari, prozona compressa, antice in gibbam unicam rotundata, postice in gibbas binas conicas acutas elevate, sulco supracoxali profundo, metazona pone sulcum in gibbas binas conicas acutas elevate. Elytra longa, subopaca, laxe reticulate. Alae hyalinae, vena discoidali ramosa. Abdomen dilatatum, segmentis posticis angulis lobatis, acutis. Femora antica margine supero crenulato, a basi ultra medium in laminam lobum rotundatum formantem elevato, sulco unguiculari pone medium sito, spinus discoidalibus 4, spinis esternis 4 intus incurvis, longis. Tibiae anticae extus spinis 11, 1–6 ab apice erectis, 7–11 basalibus procumbentibus. Femora 4 postica basi nonnihil incrassate, subtus ante apicem lobulo dentiforme instructa. Tibiae 4 apice nonnihil attentuato. Lamina supraanalis transversa brevis. Cerci graciles longi."

Translation:

> "Gen. Majangella n. Gen
> Head broad. Clypeus prominent, triangular. Frontal shield transverse, the base rough with upper margin angulate, producing a medial acute process. The eyes rounded, prominent. Ocelli large. A short conical process is produced medially above the ocelli on the vertex, small conical tubercles present on each side between the process of vertex and the eyes. The uppermost vertex is truncate, a rounded tubercle a slight distance before the eyes. Forecoxae a little longer than pronotum and the margins strongly dentate, supracoxal bulge wide, angulate, prozone compressed, anteriorly with a single rounded process, located posteriorly are two elevated and pointed, conical processes, supracoxal sulcus deep, after sulcus on the metazone are two elevated and pointed, conical processes. Elytra long, sub-opaque, loosely reticulate. Hindwings hyaline, discoidal vein branching. Abdomen dilated, segments with posterior corners forming angular, acute lobes. Forefemora with upper margin crenulate, from the base to beyond the middle forming an elevated lamellar, rounded lobe, the tibial groove located proximal to the middle, 4 discoidal spines, 4 external spines that are long and curved inward. Foretibiae with 11 external spines, spines 1–6 from the apex are erect, 7–11 toward the base are decumbent. The 4 hind femora thickened at the base, furnished with a ventral denticulate pre-apical lobe. The 4 tibia simple at the apex. Supra-anal plate transverse, short. Cerci long, slender."

Original Description of Ephippiomantis by Werner (1922: 123):

> "*Ephippiomantis* n. g. Generi *Acromantis* proximum, sed tuberculis duabus valde prominentibus pronoti ante sulcum transversum, duobusque pone sulcum sitis, acutis, appositis contiguis, post-positis distantibus, processu verticis distincte bifido, necnon elytris maculates sat distincta.
> Diese merkwürdge Acromantine, die im Habitus ebenso an *Haania* erinnert, wie sie in den wichtigen morphologischen Merkmalen sich völlig an *Acromantis* anschliesst, ist an den zwei Paaren von kegelförmigen Pronotumhöckern, zwischen denen sich eine sattelartige Vertiefung befindet (daher der Genusname), stammt aus Sumatra."

Translation:

> "*Ephippiomantis* n. g. Closest to genus *Acromantis*, but well-enough distinguishable by the two very prominent tubercles on the pronotum anterior to the transverse sulcus and the two [tubercles] lying posterior to the sulcus, being acuminate [pointed], closely adjacent, the posterior ones distant [from each other?], by the vertical process being distinctly bifid, as well as by the speckled elytra. This strange Acromantine, resembling in habit as to *Haania*, as in the important morphological features that completely connects it to *Acromantis* is the two pairs of conical pronotal cusps, between which a saddle like depression is located (hence the genus name), comes from Sumatra."

Generic Synonymy

The initial description of *Majangella* by Giglio-Tos in 1915 was thorough and accurately reflects the morphological features present. However, we surmise, based on our investigations of the original 1915 work, that Giglio-Tos found compelling similarities among *M. moultoni* and *M. carli* with another species he was describing at the same time, *Majanga spinosa* Giglio-Tos, 1915. Specifically, it is probable that while he was treating these

three species in the same work, he became convinced of their close relation based primarily on the presence in all three species of two sets of conical processes on the pronotum, one set on the prozone that are separated by a deep furrow from a second set on the anterior portion of the metazone. Therefore, he grouped the three species within Majangae, which later was included within the tribe Liturgusini by Max Beier (1935), a group containing bark dwelling mantises. Beier's action is somewhat confusing since most other bark mantises included within the Liturgusinae do not have preapical lobes on the metathoracic femora as do *Majangella* and *Majanga*. Whatever the initial reason for this action, *Majanga* and *Majangella* have been considered as Liturgusinae from then onward. The subsequent works including the taxonomic position of *Majangella* (Ehrmann, 2002; Otte and Spearman, 2005) most likely occurred independent of any further examination of the genus group in comparison to a broader diversity of mantises. We can't place too much fault on this neglect since very few specimens exist in collections. This study was only able to gather 13 specimens from four collections while only a few other specimens are known to exist in a few European and Asian collections.

Seven years after the description of *Majangella*, Franz Werner described a new monotypic genus from Sumatra, *Ephippiomantis* Werner, 1922, the type of which was deposited in the Rijksmuseum van Natuurlijke Histoire (Leiden, Netherlands). Werner immediately recognized similar characteristics *Ephippiomantis* shared with other Acromantinae, specifically *Acromantis*, which he was treating within his same 1922 work. Therefore Werner allied *Ephippiomantis* with other Acromantinae based on a pronotal character; a deep furrow between the prozone and metazone of the pronotum. Werner apparently never compared his new species, *Ephippiomantis ophirensis* Werner, 1922, with a broader diversity of mantises including Liturgusinae taxa, but settled on its position within the Hymenopodidae.

Upon collecting and identifying a specimen of *M. carli* from Sarawak, Borneo in 2005 and initially identifying it as *E. ophirensis*, Svenson and Whiting (2009) included it within a molecular based phylogeny and found the expected result of *Ephippiomantis* being placed within a diversity of Acromantinae taxa as Werner initially suggested. However, with the recent publication of a review of the Liturgusidae of Borneo (Bragg, 2010), it appeared, based on habitus images presented of *Majangella* species, that *Ephippiomantis* Werner, 1922 was the junior synonym of *Majangella* Giglio-Tos, 1915. After examination of the type specimen of *E. ophirensis*, the gathered museum material identified as *Majangella*, and translations of the original descriptions, we conclude that *Ephippiomantis* and *Majangella* are synonyms. Further, we find the likely reason for the creation of the junior synonym was the result of the two independent interpretations of the close relationship of *Majangella* with *Majanga* (Giglio-Tos, 1915) and *Ephippiomantis* with other Acromantinae taxa (Werner, 1922). It is Werner's interpretation that is accurate, but the original grouping of *Majangella* with *Majanga* by Giglio-Tos that appears to have obscured Werner's ability to recognize that the genus was already described when he described *Ephippiomantis ophirensis*.

We now consider the placement of *Majangella* Giglio-Tos, 1915 within Liturgusidae as invalid. Therefore, we take further taxonomic action to remove the genus *Majangella* Giglio-Tos, 1915 from the family-group Liturgusidae and place it within the family-group Acromantinae.

Luckily, there is limited research on both of these two praying mantis groups and the establishment of this new synonymy and the change in higher-level placement of *Majangella* will not influence very many studies. However, it does illustrate the need for careful re-evaluation of the classification of Mantodea without reliance on previous notions of higher-level groupings. In addition to other studies that identify rampant paraphyly across higher-level praying mantis groups (Svenson and Whiting, 2004, 2009; Yager and Svenson, 2008), this study presents yet another example of higher-level classification problems within Mantodea.

New Description

Habitus (Fig. 1): Medium sized mantises (length from head to tip of the abdomen ranges 29–37 mm), light brown-green, but with a substantial amount of darker brown mottling across the wings and body. Length of forecoxae slightly longer than the metazone of the pronotum. Meso- and metathoracic legs relatively short compared to overall body size.

Head (Fig. 2): Head transverse with bulging eyes projecting laterally and anteriorly; the anterior face of the head moderately emarginated between each eye and the center. Vertex with a short process centrally located just posterior to the ocelli, angled anteriorly; terminus either bifid or ending with a rounded tip. Vertex straight or

slightly convex with the area between the parietal sutures and the eyes convex; the parietal sutures forming marked depressions; the medial region just posterior to process bulging above surrounding area with depressions laterally; two small, symmetrical, conical protuberances are located between the parietal sutures and the lateral depressions of the central bulge just posterior to the medial process. The ocelli are large and are typically located centrally. The frontal sclerite very transverse; lower margin is concave with two bumps symmetrically located between the center and lateral edge; upper margin accommodating for antennal insertions and forming a pronounced medial process projecting anteriorly. Clypeus with a moderately sized, blunt process located medially about one third the distance from the upper margin; below medial process is a transverse carina creating the appearance of a strong lower margin with convex lateral regions and a concave medial region, but below this carina is a subtle expansion, narrower than the overall clypeus, resembling a large, rounded lip that may be slightly emarginated; a small medially located carina present running from the medial process to the lower margin. Labrum of typical shape with a rounded lower margin. The palpi are pale except for terminal segment, which is darkened with a pale tip. The proximal third of the antennae are pale, then darkening to black distally.

Pronotum (Fig. 3): The metazone approximately twice the length of the prozone and separated by a distinct supracoxal sulcus. Lateral margin forms a slight lamellar expansion with numerous, variably sized denticles, which are either pale or darkly pigmented. Supracoxal bulge pronounced and triangular shaped, coming to a distinct point. Margins of prozone nearly parallel. Metazone more constricted than other regions of pronotum, margins nearly parallel widening to the supracoxal bulge as well as to the posterior margins. In total, there are five prominent processes positioned on the pronotum; one process, the smallest of the five, is located centrally on the anterior half of the prozone and is rounded at its peak; two symmetrically placed processes, separated by a deep central groove, are positioned in the posterior half of the prozone and curve anteriorly to their terminus, forming either a slightly sloped or flat dorsal margin; two symmetrically placed conical processes, separated by a deep central groove, are positioned in anterior half of the metazone and are the largest of the processes. The metazone descends posteriorly from the two large conical projections only to rise again with a distinct dorsal upturn to form an angle between forty-five and ninety degrees, which then terminates flush with the mesothorax; from a lateral perspective, the metazone forms a concave half ellipse between the conical processes and the posterior margin. Near the posterior margin of the metazone are two small bulges separated by the slight medial depression. The dorsal surface of the pronotum irregularly smooth and mottled with dark pigmenting, particularly two symmetrically place dark splotches at the anterior margin of the prozone and the middle of the metazone. The dark markings in the middle of the metazone denote two small, symmetrical, smooth bulges that run from the lateral edge nearly to the medial line.

Forelegs (Fig. 4): Coxae strong, anterior margin with six large denticles with smaller denticles located between; dark pigmented spotting on exterior surface; inner surface pigmented black at the base and the tip, pale across the remaining surface. Femora have 4 discoidal spines, 4 external spines, 13–15 internal spines; upper margin with slight foliaceous expansion running from the base with widest region medially and narrowing towards the distal tip; dark pigmented mottling across external surface; inner surface with dark pigmenting in the distal two thirds, but terminating just prior to distal tip of femora. Tibiae with 11–12 external spines and 11–13 internal spines; only the first three to six proximal external spines are decumbent as seen in other Hymenopodidae; dark pigmented mottling on external surface; inner surface with only slight pigmentation appearing as two faint, but broad bands.

Meso- and Metathoracic legs: Femora slender with broad transverse bands, usually three; all with carina on the posterior edge that include a small, triangular preapical lobe; metathoracic femora may also include additional small lobes medially and/or near the base. Tibiae slender and somewhat short with three dark, transverse bands that also correspond to the regions where tibial girth is greater, except for the most distal band, where the tibia widens until the terminus. First segment of tarsi about as long as remaining segments combined.

Wings: Forewings mostly hyaline with green and/or brown pigmentation on veins and in limited cells; costal region opaque; distinct brown mottling in costal and discoidal regions covering multiple cells in broad splotches. Hindwings hyaline with brown pigmented veins and slight brown mottling in the distal area of the costal region and very distal edge in the discoidal region. Wings surpassing the length of the abdomen.

Abdomen: Moderately elongate with dark pigmenting on the tergites while sternites are mostly brown. Lateral margins of tergites terminating with acute angles while lateral margins of medial and distal sternites terminate with small, foliaceous expansions. The posterior margin of sternites with a medial lip that is strongly or slightly emarginated and exhibiting a small carina running along the midline.

Male Genitalia (Fig. 5): Right epiphallus classic shape, may or may not have setae across distal end; apophysis of classic shape and sclerotized. Hypophallus elliptical with truncate distal margin; setae present on the distal half and slight sclerotization along the left margin. Left epiphallus with short, non-projecting titillator that is slightly setose;

pseudophallus straight and terminating slightly past the distal margin of the left epiphallus, the sclerotized tip bulbous, truncate, or slightly curved. The psuedophallus is the only feature with enough variation to distinguish the species; otherwise the genitalia are indistinguishable across the species.

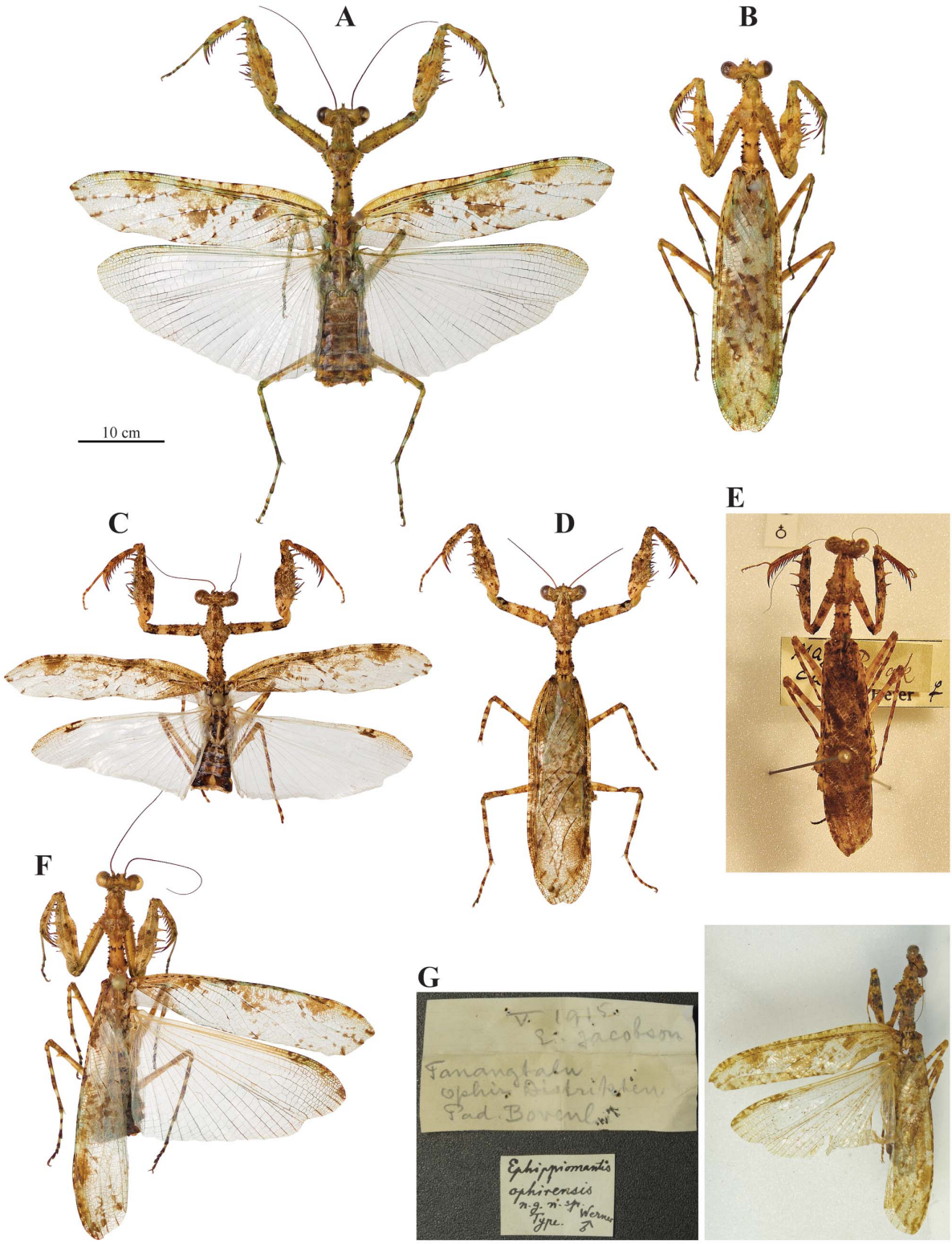

FIGURE 1. *Majangella*, dorsal habitus. *M. moultoni* Giglio-Tos, 1915: A, male from the Cameron Highlands, West Malaysia (MAJ08); B, male from Tawau, Sabah (MAJ13). *M. carli* Giglio-Tos, 1915: C, male from Lambir Hills National Park, Sarawak (MAJ03); D, male from the Cameron Highlands, West Malaysia (MAJ10); E, purported female specimen deposited in the Zoologische Staatssammlung, München, Germany. *M. ophirensis* (Werner, 1922): F, male from Trus Madi, Sabah (MAJ11); G, male holotype and labels deposited in the Rijksmuseum van Natuurlijke Histoire, Leiden, Netherlands.

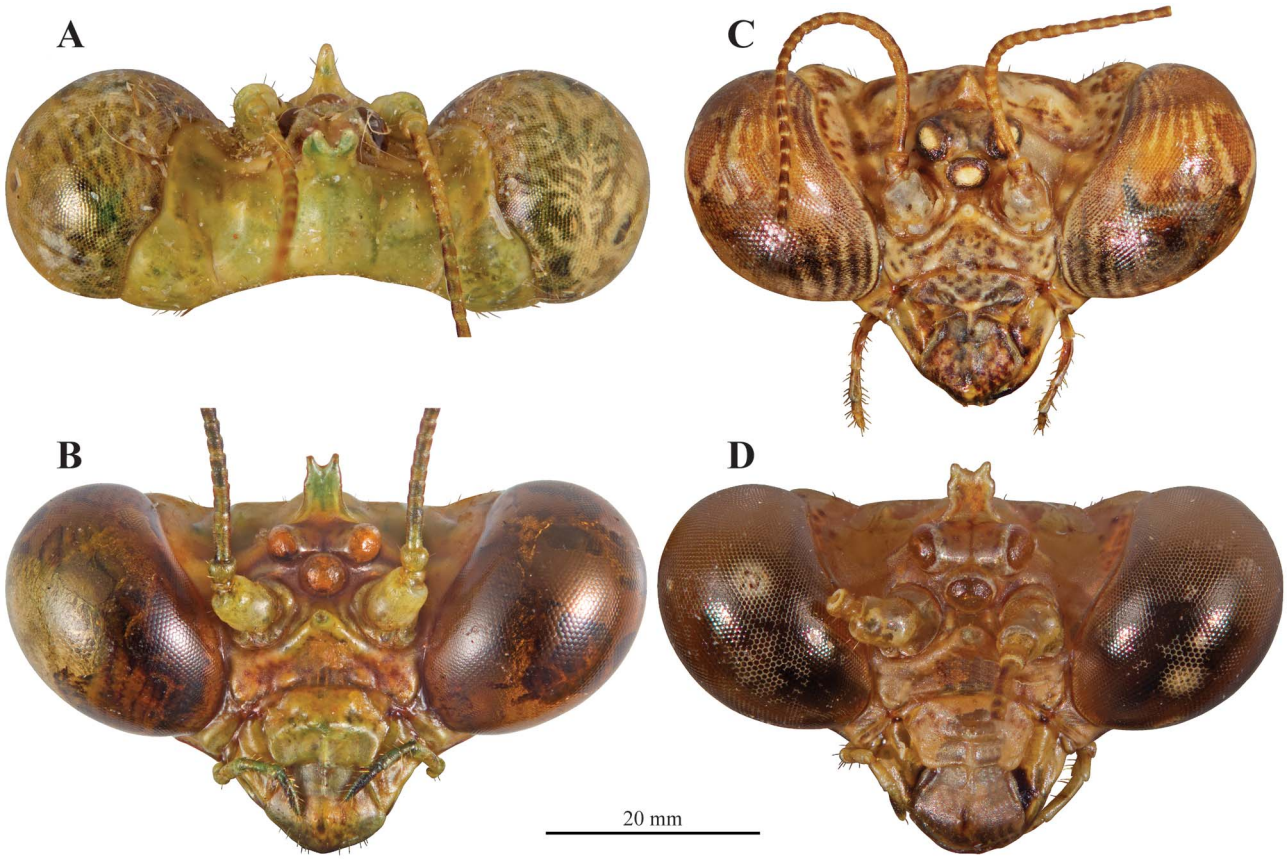

FIGURE 2. *Majangella*, head. A, dorsal view of *M. moultoni* Giglio-Tos, 1915, showing the anterior process of the frontal sclerite (MAJ07). Anterior view: B, *M. moultoni* Giglio-Tos, 1915 (MAJ08); C, *M. carli* Giglio-Tos, 1915 (MAJ03); D, *M. ophirensis* (Werner, 1922) (MAJ12).

Key to species using males

1 Process on the vertex bifid, emarginated medially (Figs. 2B & 2D) 2
- Process on the vertex forming a single projection that narrows distally to a dull rounded point (Figs. 2C) . . . . . ***carli***
2 Bifid process on the vertex taller and strongly emarginated with both processes appearing more parallel projecting dorsally, margins either straight or slightly bulging. Black marking on the inner surface of the forefemora with a distinct interruption that forms a pale transverse band cutting through the black region about two thirds from the base to the terminus (Fig. 4A) . . . . . ***moultoni***
- Bifid process on the vertex shorter and less emarginated with both processes diverging at thirty-degree angles, lateral margins bulging. Black marking on the inner surface of the forefemora is uninterrupted with the two pale markings along the dorsal edge flanking the widest part of the foliaceous expansion that are slightly larger than those in *M. carli*, while the more distal pale region is sometimes expanded, nearly reaching across the femora (Fig. 4C) . . . . . ***ophirensis***

Majangella moultoni Giglio-Tos, 1915

(FIGURES 1A–B; 2A–B; 3A–B; 4A; 5B, F; 6)

Majangella moultoni: Giglio-Tos, 1915: 95; Giglio-Tos, 1927: 310; Beier, 1931: 151; Beier, 1935: 14; Ehrmann, 2002: 213; Otte & Spearman, 2005: 134; Bragg, 2010: 24, 30, Figs. 6, 18, 36.

Holotype: Male deposited in Sarawak Museum; Type Locality: Sadong, Borneo

Material Examined. 1 ♂—Borneo, Sabah, Tawau district, Brumas camp, 500–700 ft., 17–31.x.1973, C.J.M. Pruett, B.M. 1974–277, clay, shale and limestone hills. Primary rainforest, genitalia prep. MAJ07 (Locality M.m.1) (BMNH); 1 ♂—Borneo, Sabah, Tawau, 25 May 1996, genitalia prep. MAJ13 (Locality M.m.2) (MNHN); 1

♂—Indonesia, Sumatra, Sumatera Utara Prov., 18 km N. of Prapat, at MV light, 14 Nov.1985, J.D. Weintraub collector, genitalia prep. MAJ01 (Locality M.m.3) (USNM); 1 ♂—Indonesia, Sumatra, Sumatera Utara Prov., 18 km N. of Prapat, nr. Tigadolok, at MV light, 8 Nov.1985, J.D. Weintraub collector, genitalia prep. MAJ02 (Locality M.m.4) (USNM); 1 ♂—West Sumatra, Mt. Sanggul, Landai env., 1200-1500m, 30 km N of Payakumbuh, leg. Jakl, 1.2007, Stiewe genitalia prep.No. Ma.Su. (Locality M.m.5) (Stiewe Coll.); 1 ♂—West Malaysia, Cameron Highlands, leg. Wang, 4.XI.1986 (Locality M.m.6) (Stiewe Coll.); 1 ♂—West Malaysia, Cameron Highlands, Sep 2002, Patride Folschveiller, genitalia prep. MAJ08 (Locality M.m.7) (MNHN); 1 ♂—West Malaysia, Cameron Highlands, genitalia prep. MAJ09 (Locality M.m.8) (MNHN). Localities presented in Bragg (2010): 1 ♂—Thailand, Phuket. Local collector. v.1996 (Locality M.m.9) (PEB-MI57); 1 ♂—Sabah, Kinabalu N.P., 1580m. Anthony Lamb. April 1982 [ex. c.L. Chan's collection] (Locality M.m.10) (PEB-M228); 1 ♂—Sabah, Crocker Range, Kota Kinabalu-Tambunan road. S. Chew, 26.ix.2006 (Locality M.m.11) (PEB-M345); 1 ♂—Sabah, Danum Valley Conservation Area, Light trap. Ling Kai Lin, 21.v.2009 (Locality M.m.12) (BORN).

Diagnosis. The largest of the three species, *M. moultoni* exhibits a subtle green pigmentation across the wings and body with comparatively paler brown pigment across the body. The process on the vertex is bifid as in *M. ophirensis*, but longer and more emarginated with both processes appearing more parallel. This species can also be easily distinguished based on the interruption of the black marking on the inner surface of the forefemora, which forms a pale transverse band cutting through the black region about two thirds from the base to the terminus.

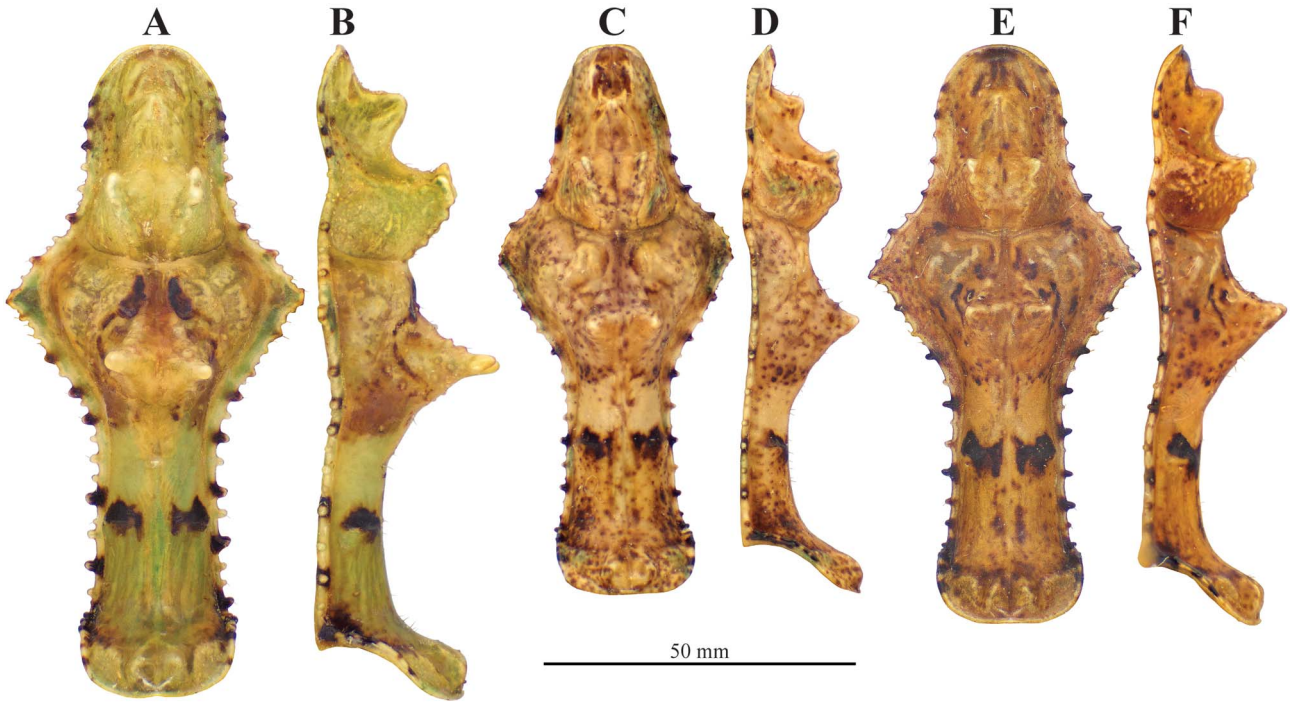

FIGURE 3. *Majangella*, pronotum (ventral surface removed in lateral perspective for clarity). *M. moultoni* Giglio-Tos, 1915 (MAJ07): A, dorsal; B, lateral. *M. carli* Giglio-Tos, 1915 (MAJ10): C, dorsal; D, lateral. *M. ophirensis* (Werner, 1922; MAJ12): E, dorsal; F, lateral.

Original Description of Majangella moultoni by Giglio-Tos (1915: 95):

> "Moultoni n. sp. ♂. Mellea. Processus verticis brevis, apice bifido. Pronoti dentes marginales majors nigri, minors interpositi concolores: discus metazonae maculis duabus nigris inter sulcum et gibbas notatus, alteraque utrinque in medio metazonae: ampliatione lata, angulis acutis. Elytra abdomen longe superantis, submembranacea, albido olivaceo brunneoque marmorata. Alae hyalinae. Coxae anticae spinas 5–6, 3 basalibus fortioribus, armatae, inter spinas spinulis nonnullis minutis; intus apice nigro, nitido, ima basi nigro, signata. Femora antica intus fascia media irregulari transversa nigra sinata, maculaque praeapicali, spinis internis nigris. Long. Corp.mm. 36; long. Pron. 11; metaz. 7,5; lat. Pron.5; long. Elytr.30."

Translation:

> "Moultoni n. sp. ♂. Honey colored. Process of vertex short, apex bifid. Greater marginal denticles of the pronotum are black, the smaller interposed being the same color [as pronotum]: metazonal plate with two black spots between transverse sulcus and conical projections, and one on both sides in the middle of the metazone; lateral expansion [supra-coxal bulge], acute angled. Elytra surpassing the length of the abdomen, semi-translucent, whitish marbled with olive and brown. Hindwings hyaline. Forecoxa with 5–6 spines, 3 basal are most robust, armed, between with a few tiny spines; inner surface of distal apex black, shining, markedly black proximally. Inner surface of the forefemora with an irregular black mark interrupted medially, terminating pre-apically, internal spines black. Body Length 36 mm; length of pronotum 11 mm; metazone 7.5 mm; width of pronotum 5 mm; length of elytra 30 mm."

Redescription. ***Male*** (Figs. 1A & 1B). Length measurement from head to tip of abdomen 34–37 mm, of forewings 28–30.5 mm, of pronotum 9.9–10.8 mm, of metazone 6.5–7 mm, of forecoxae 8–9 mm, of forefemora 9.5–11 mm, of metathoracic femora 9–9.5 mm, of metathoracic tibiae 8.5–10 mm, of metathoracic tarsi 7–8 mm, and width of head 6 mm.

Head (Figs. 2A & 2B): Process of the vertex bifid and strongly emarginated with the two processes projecting dorsally and appearing nearly parallel; margins either closely parallel and straight or with slight to moderate bulging in some specimens. The two small, symmetrical, conical protuberances located between the parietal sutures and the lateral depressions of the central bulge are small and appear as a dull conical bulge. Clypeus with a moderately defined transverse carina that is mostly defined laterally and nearly absent medially; medial carina moderately defined; lower lip slightly emarginated medially.

Pronotum (Figs. 3A & 3B): The two posterior prozonal processes with prominent, large tubercles running up the posterior ridge, which steeply ascends to the forward oriented terminus. Two symmetrically placed conical processes in the anterior portion of the metazone are with prominent tubercles.

Forelegs (Fig. 4A): A black marking on the inner surface of the femora interrupted by a pale transverse band cutting through the black region about two-thirds from the base to the terminus. Femora with 13–15 internal spines. Tibiae with 11 external spines and 12–13 internal spines.

Legs: Preapical lobes on femoral carina are distinctly triangular. Carina of metathoracic femora always includes small lobe at the base, which is very small and resembles only slight bulging; may or may not include an additional small lobe medially.

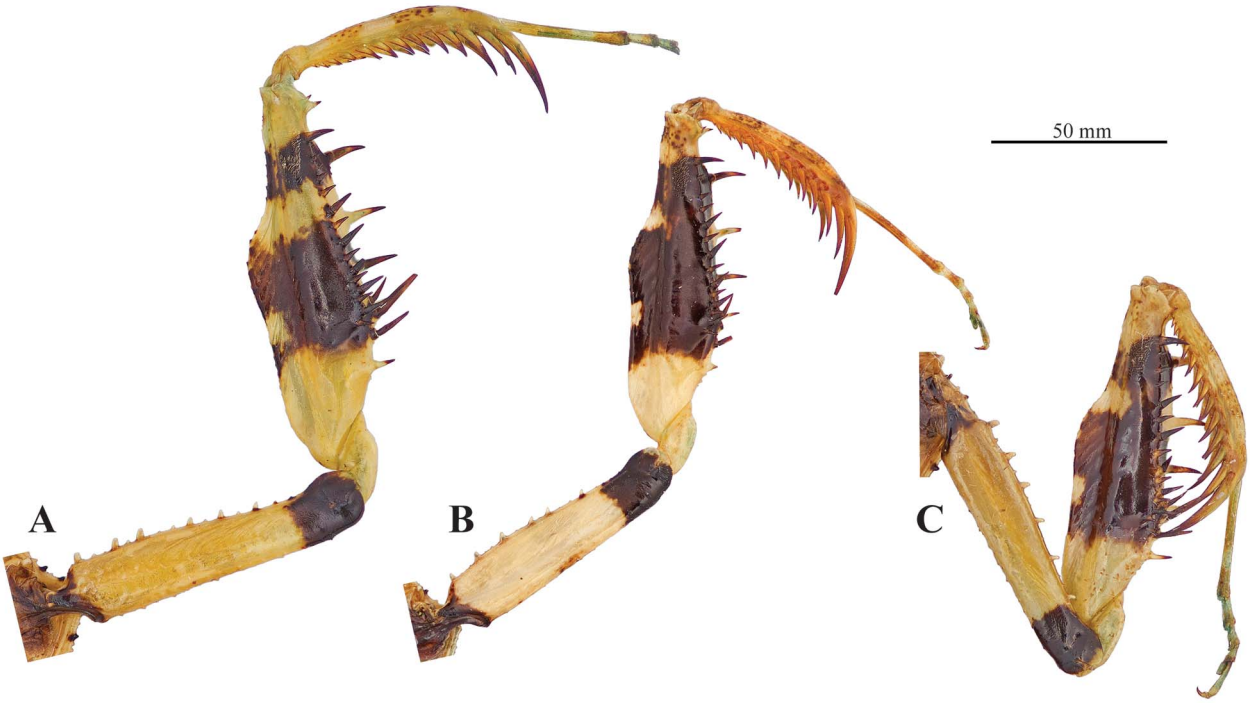

FIGURE 4. *Majangella*, inner surface of foreleg. A, *M. moultoni* Giglio-Tos, 1915, from Sumatera Utara Province, Sumatra (MAJ01); B, *M. carli* Giglio-Tos, 1915, from Cameron Highlands, West Malaysia (MAJ10); C, *M. ophirensis* (Werner, 1922) from Trus Madi, Sabah (MAJ11).

Wings: Forewings mostly hyaline with green and brown pigmentation on veins and in limited cells; costal region opaque greenish-brown; distinct brown mottling in costal and discoidal regions covering multiple cells in broad splotches. Hindwings hyaline and lack the strong brown pigmentation in the distal portion of the costal and discoidal areas of the hindwing seen in the other two species, but if present it is subtle and faint; veins in the costal region are pigmented green.

Abdomen: The posterior margin of sternites with a medial lip that is emarginated, forming two symmetrical, pronounced rounded lobes; the carina running along the midline is pronounced and extending anteriorly.

Male Genitalia (Figs. 5B–F): The tip of the pseudophallus sclerotized and terminating with a bulb or simply truncate, rarely with a slight curve to one side.

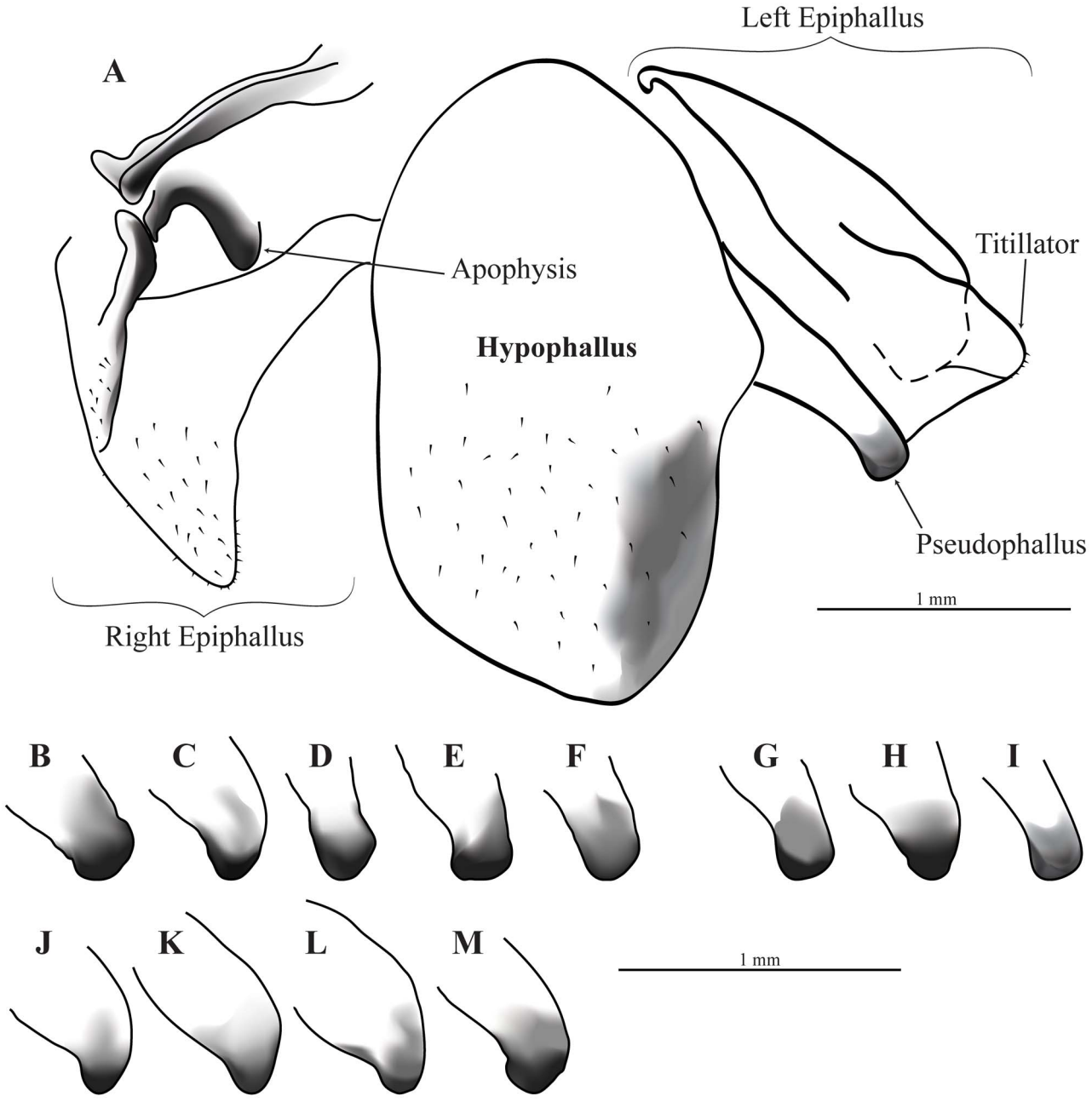

FIGURE 5. *Majangella*, illustrations of male genitalia from ventral perspective. A, *M. ophirensis* (Werner, 1922) preparation MAJ04 from Sarawak, left and right epiphallus and hypophallus. Variation in shape of Pseudophallus: *M. moultoni* Giglio-Tos, 1915: B, preparation MAJ01 from Sumatra; C, prep. MAJ07 from Sabah; D, prep. MAJ13 from Sabah; E, prep. MAJ08 from West Malaysia; F, prep. MAJ09 from West Malaysia. *M. ophirensis* (Werner, 1922): G, prep. MAJ11 from Sabah; H, prep. MAJ12 from Sabah; I, prep. MAJ04 from Sarawak. *M. carli* Giglio-Tos, 1915: J, prep. MAJ03 from Sarawak; K, prep. MAJ05 from Sabah; L, prep. MAJ06 from Sabah; M, prep. MAJ10 from West Malaysia.

***Majangella carli* Giglio-Tos, 1915**
(FIGURES 1C–E; 2C; 3C–D; 4B; 5J–M; 6)

Majangella carli: Giglio-Tos, 1915: 95; Giglio-Tos, 1927: 310; Beier, 1935: 14; Beier, 1942: 141; Ehrmann, 2002: 213; Otte & Spearman, 2005: 134; Bragg, 2010: 24–25, Figs. 7, 19.

Holotype: Male listed as deposited in "Mus. Ginevra", but this specimen cannot be located in the MNHG. We are certain of this repository since the patronym is derived from Dott. Carl, a former assistant at the "Museo di Ginevra". Therefore, we are afraid the specimen is lost or has been borrowed and not returned to the MNHG; Type Locality: "Sumatra".

Material Examined. 1 ♂—Borneo, Sarawak, Lambir Hills National Park, 4.198279°N, 114.041914°E, 15 October 2006, Coll: G.J. Svenson, MN330 Primary Voucher, genitalia prep. MAJ03 (Locality M.c.1) (GSMC); 1 ♂—Borneo, Sabah, Tawau district, Brumas camp, 500–700 ft., 17–31.x.1973, C.J.M. Pruett, B.M. 1974–277, clay, shale and limestone hills, primary rainforest, genitalia prep. MAJ05 (Locality M.c.2) (BMNH); 1 ♂—Borneo, Sabah, Sandakan district, Rumidi estate, River Labuk. 50–150 ft, 14–31.ix.1973, C.J.M. Pruett., B.M. 1974–277, heavy forest near plantations, genitalia prep. MAJ06 (Locality M.c.3) (BMNH); 1 ♂—Borneo, Sabah, Tenom, 18.I.2006, S. Chew leg., Stiewe genitalia prep.No. Ma.Bo. (Locality M.c.4) (BMNH); 1 ♂—West Malaysia, Cameron Highlands, XII.2000, genitalia prep. MAJ10 (Locality M.c.5) (MNHN); 1 ♂—Burma, Dawna, H. Lehmann jr. Leg., 28.V.1996, Stiewe genitalia prep.No. Ma.Bu.01 (Locality M.c.6) (Stiewe Coll.). Localities presented in Bragg (2010): 1 ♂—East Java. Native collector. ii. 2008 (Locality M.c.7) (PEB-M359).

Although females are not known for the other two species, it was brought to our attention late in this study that a female specimen is housed in the ZSMC (Zoologische Staatssammlung, München, Germany) and identified as such by Max Beier. We have neither examined this specimen nor verified its identification, but Martin Stiewe has photographed and briefly examined this specimen (Fig. 1E). Unfortunately, it is the only known representative for the genus and will not be included here in the description of *M. carli*. Perhaps in the future, females for all three species will be discovered and described. Based on the image taken by M. Stiewe, the female is strikingly similar in overall habitus to the male, which does not explain why females have remained unknown for so long as we have previously guessed them to be sexually dimorphic to males.

Diagnosis. The smallest of the three species, colored brown with dark mottling that is similar to *M. ophirensis*, though the external surface of the forefemora has darker brown mottling. The process of the vertex forming a single projection that narrows distally to a dull, rounded point.

This species can also be distinguished based on the uninterrupted black marking on the inner surface of the forefemora with two small pale markings along the dorsal edge flanking the widest part of the foliaceous expansion.

Original Description Majangella carli by Giglio-Tos (1915: 95):

> "♂. *M. Moultoni* similis sed distincta: statura minore, colore testaceo, processus verticis apice integro, gibba antica prozonae pronoti humiliore, angulis ampliationis nonnihil rotundatis, maculis nigris inter sulcum pronoti et gibbas metazonae nullis, costa alarum basi virescente, apice infuscato maculato, femoribus anticis intus a sulco unguiculari ad apicem nigro-nitidis, maculis tribus flavis ad marginem superum. Long. corp. mm. 28; ling. pron. 10; long. metaz. 7; lat. pron. 4; long. elytr. 26."

Translation:

> "♂. *M. Moultoni* similar but distinct: small stature, colored a dull red, the single process of vertex at the apex, process on the prozone of the pronotum lower, the corners of the process somewhat rounded, with black markings between the pronotal sulcus and the processes of the metazone, costal region becoming green at the base of the wings, mottled a dusky color at the apex, inside of the forefemora black-shiny from tibial groove to the apex, three yellow spots on the outer margin distally. Body length 28 mm; length of pronotum 10 mm; length of metazone 7 mm; width of pronotum 4 mm; length of elytra 26 mm."

Redescription. ***Male*** (Figs. 1C & 1D). Length measurement from head to tip of abdomen 29–30 mm, of forewings 22–26 mm, of pronotum 8.5–9.5 mm, of metazone 5.5–6.5 mm, of forecoxa 7–8 mm, of forefemora

9–9.5 mm, of metathoracic femora 8–8.5 mm, of metathoracic tibiae 7–8 mm, of metathoracic tarsi 5–6 mm, and width of head 5–5.5 mm.

Head (Fig. 2C): Process of the vertex forming a single projection that narrows distally to a dull, rounded point. The two small, symmetrical, conical protuberances located between the parietal sutures and the lateral depressions of the central bulge are strongly present and terminate with a distinct protuberance. Clypeus with the medial process projecting towards the lower margin, which creates a strong fold or ledge at the lower margin of the process that extends laterally; the transverse carina present, but smaller and not creating a strong edge to the lower margin above the lower lip, but only a small ridge extending from lateral margin to abut the medial carina medially; medial carina narrow, but distinct; lower lip emarginated medially.

Pronotum (Figs. 3C & 3D): The two posterior prozonal processes with moderately sized tubercles running up the posterior ridge, which slowly ascends to a dull rounded terminus. Two symmetrically placed conical processes in the anterior portion of the metazone are mostly smooth with very few tubercles.

Forelegs (Fig. 4B): Uninterrupted black marking on the inner surface of the forefemora with two small pale markings along the dorsal edge flanking the widest part of the foliaceous expansion. Femora with 15 internal spines. Tibiae with 11–12 external spines and 12 internal spines.

Legs: Preapical lobes on femoral carina projecting distally and resembling a small, narrowing process. Carina of metathoracic femora may or may not include a small lobe at the base, which is very small and resembles only slight bulging; does not include any additional small lobes medially.

Wings: Forewings mostly hyaline with brown and some black pigmentation on veins and in limited cells; costal region opaque brown or dark brown; distinct brown mottling in costal and discoidal regions covering multiple cells in broad splotches. Hindwings hyaline, but has strongly distinct brown markings in the costal region of the hindwing about two-thirds the distance from the base to the distal tip with the remainder of the wing hyaline, particularly from the dark marking to the tip of the wing.

Abdomen: The posterior margin of sternites with a medial lip that is slightly emarginated, forming two symmetrical, broadly rounded lobes; the carina running along the midline is barely elevated and extending anteriorly just beyond the posterior margin and dissipating quickly.

Male Genitalia (Figs. 5J–M): The tip of the pseudophallus sclerotized and terminating with a narrowing tip that is slightly curved.

***Majangella ophirensis* (Werner, 1922) comb. nov.**
(FIGURES 1F–G; 2D; 3E–F; 4C; 5A, G–I; 6)

Ephippiomantis ophirensis: Werner, 1922: 123; Giglio-Tos, 1927: 651; Werner, 1933: 267; Beier, 1934: 15; Ehrmann, 2002: 135; Otte & Spearman, 2005: 75; Svenson & Whiting, 2009: Fig. 3.

Holotype: Male deposited in RMNH; Type Locality: Sumatra, Tanangtaloe, Ophir districts Padangsche Bovenlanden

Material Examined. 1 Holotype ♂—Sumatra, Tanangtaloe, Ophir districts Padangsche Bovenlanden, Coll. E. Jacobson (Locality M.o.1) (RMNH); 1 ♂—Borneo, Sabah, E. Malaysia, Tawau, 22 Apr. 1996, genitalia prep. MAJ12 (Locality M.o.2) (MNHN); 1 ♂—Borneo, E. Malaysia, Trus Madi, 29 Apr. 1996, genitalia prep. MAJ11 (Locality M.o.3) (MNHN); 1 ♂—Borneo, Sarawak, Gunung Mulu Nat. Park, R.G.S. Exped., 1977–8, J.D. Holloway *et al.*, B.M. 1978–206, Site 15., February, Camp 2.5, Mulu, 1000 m, 413461, Lower 1. montane f., MV—understory, genitalia prep. MAJ04 (Locality M.o.4) (BMNH).

Diagnosis. Smaller than *M. moultoni*, but slightly larger than *M. carli*, this species is colored brown with dark mottling that is similar to *M. carli*, though a little lighter brown on the external surface of the forefemora and the pronotum. The process on the vertex is bifid as in *M. moultoni*, but shorter and less emarginated with both processes diverging at thirty-degree angles. This species can also be distinguished based on the uninterrupted black marking on the inner surface of the forefemora similar to *M. carli*, but the two pale markings along the dorsal edge flanking the widest part of the foliaceous expansion are slightly larger and the more distal pale region is sometimes expanded, nearly reaching across the femora.

FIGURE 6. Distributional map for species of *Majangella* with each examined specimen's location provided in the text and on the map with the following symbols. ×– *M. moultoni*, ⊙– *M. carli*, and ★– *M. ophirensis*. A KML file with all location data viewable with Google Earth is available for download at: http://mantodearesearch.com/Projects/.

Original Description of Ephippiomantis ophirensis by Werner (1922: 123):

"Ephippiomantis ophirensis n. sp. Kopf breiter als hoch, mite norm grossen, kugelig vorspringenden Augen. Clypeus frontalis wie bei *Acromantis* oben in eine nach vorn gerichtete Spitze auslaufend; Vertenhorn parallelseitig, am Ende zweispitzig. Pronotum im supracoxalen Teil stark winkelig erweitert; Prozona nach vorn wenig verschmälert, am Vorderrande abgerundet, Metazona doppelt so lang wie Prozona, zuerst hinter der supracoxalen Erweiterung sehr deutlich verengt, dann wieder verbreitert, Hinterrand abgerundet, vor dem Hinterrand zwei stumpf gekielte Höcker nebeneinander. Seitenrand des Pronotums mit starken, meist schwarzen Dornen. Die beiden Paare von Pronotumtuberkeln sind an den einander zugekehrten Abhängen etwas zackig. Die Entfernung vom Vorderrande des Pronotums zur Spitze der Vordertuberkel verhält sich zu der von letzterem Punkte bis zur Spitze der Hintertuberkel und von diesem Punkte zum Hinterrande der Pronotums etwa wie 1 : 7 : 8.

Die Flugorgane überragen die Spitze des Abdomens bedeutend. Elytren mässig breit, das Costalfeld sehr schmal, netzaderig, das Discoidalfeld mit ebensolcher Aderung, die Maschen in der Grösse sehr verschieden. Im Discoidalfeld sind die beiden basalen Adern einander viel mehr genähert als die beiden Apicalen, die Queradern auf beiden Seiten der Analader fast alle parallel. Das Geäder der Hfl. ist mit Ausnahme der Spitze sehr weitmaschig, die Zellen grösstenteils viereckig.

Vordercoxen am Innenrande mit 5 stärkeren Zähnen, daswischen immer je ein kleinerer, also im ganzen 9; Vorderfemora oben mit deutlicher lamellöser Erweiterung, die schon an der Basis beginnt und über der Mitte sich starker erhebt und an der Innenfläche (wie bei Citharomantis) stark gestreift ist. Äussere Femoraldornen 5 (mit Einschluss des apicalen), Discoidaldornen 4 (der 2. von der Basis gerechnet sehr lang); innere Dornen 13, der 1. 3. 7. 13. länger als die übrigen, namentlich der 13. Äussere Tibialdornen 11, die basalen sehr kurz, gegen den Apex an Länge stark zunehmend; äussere 13, lang, ebenso apicalwärts verlängert. Metatarsus lang, Mittel- und Hinterfemora mit deutlichen praeapicalem Läppchen.

Subgenitalplatte am Ende und an den Seitenecken breit abgestutzt. Cerci?

Grundrärbung etwa hellgelbbraun, schwarzbraun gefleckt. Elytren glashell, Costalfeld hellbraun mit dunklen Punkten am Aussenrande; Discoidalfeld mit grossen und kleinen dunkelbraunen Flecken. Hfl. nur am Aussendrittel des Vorderrandes dunkel gefleckt, sonst vollkommen hyalin; Vorderbeine aussen dunkel gebändert, am deutlichsten die Tibien, am wenigsten die Femora. Vondercoxen innen gelblich, am Apex schwarz. Trochanter und basales Drittel des Femur gelblich, der Rest des Femur glänzend schwarz, mit zwei undeutlichen hellen Querbinden nahe dem Apex. Tibia auch innenseits Schwarz gebändert; Metatarsus am apicalen Ende schwarz. Mittel- und Hinterbeine dunkelbraun gebändert.

1 (male) von Tanangtaloe, Ophir distrikten, Padangsche Bovenlanden, Sumatra, E. Jacobson.

Dimensionen: Totallänge 33 mm, Pronotum Lang 10, "" breit 4.6, Vorderfemur Lang 9 mm, "" breit 2.7, Eltyra Lang 29.4, "" breit 6.6, Kopfbreite 5.5, Kopfhöhe (incl. Fortsatz) 3.6."

Translation:

"*Ephippiomantis ophirensis* n. sp. Head wider than high, with enormously enlarged, spherically protruding eyes. Frontal sclerite terminating dorsally with an anteriorly orientated process, as in *Acromantis*; vertical process with parallel sides, terminating with two tips. Pronotum expanded strongly angular; prozone slightly narrowed anteriorly narrowed, anterior edge being rounded, metazone twice as long as prozone, at first very distinctly narrowed behind the supracoxal dilation, then widened again, posterior edge rounded, two bluntly keeled bulges side by side before the posterior margin. Lateral edge of pronotum with strong, mostly black spines. The two pairs of pronotal tubercles are slightly jagged on the opposing slopes. The distance from the tip to the anterior tubercles to the tip of the posterior tubercles and from that point to the posterior edge of the pronotum is about 1:7:8.

The wings significantly surpass the tip of the abdomen. Elytra moderately wide, the costal area very narrow, mesh-veined, the discoidal field with similar venation, the mesh very different in size. In the discoidal field, the two basal veins are much closer to each other than the two apical veins, the cross-veins on both sides of the anal vein are almost all parallel. The venation of the hind wings is very wide-meshed with the exception of the tip, the cells mostly quadrangular.

Forecoxae with 5 stronger spines on the inner edge, in between always smaller ones, therefore 9 altogether; forefemora dorsally with a distinct lamellar expansion which begins at the base, rises more strongly through the middle and is strongly striped on the inner surface (as in *Citharomantis*). Outer femoral spines are 5 (including the apical one), discoidal spines 4 (the 2nd from the base very long); inner spines 13, the 1st, 3rd, 7th, 13th, longer than the remaining ones, especially the 13th. Outer tibial spines 11, the basal ones very short, increasing in length towards the apex; outer 13, long, elongated towards the apex in the same manner. Metatarsus long, mid- and hind femora with distinct pre-apical lobes.

Subgenital plate broadly truncated at the end and the lateral corners. Cerci?

Basic coloration approximately a bright yellow-brown, black-brown spotted. Elytra bright as glass, costalfield bright brown with dark spots on the outer edge; discoidal field with large and small dark brown spots. Hindwings only spotted on the outer third of the anterior edge, otherwise completely hyaline; forelegs on the outside darkly banded, most distinctly the tibiae, the femora the least. Forecoxae yellowish on the inside, black at the apex. Trochanter and basal third of the femur yellowish, the rest of the femur of a shiny black, with two indistinct bright transverse bands near the apex. Tibia also with black bands on the inside; metatarsus black at the apical end. Mid- and hindlegs dark brown banded.

1 (male) of Tanangtaloe, Ophir districts, Padangsche Bovenlanden, Sumatra, E. Jacobson.

Dimensions: Total length 33 mm, pronotum length 10 mm, pronotum width 4.6 mm, forefemora length 9 mm, forefemora width 2.7 mm, length of eltyra 4.29 mm, elytra width 6.06 mm, width of head 5.5 mm, head height (including process) 3.6 mm."

Redescription. ***Male*** (Figs. 1F & 1G). Length measurement from head to tip of abdomen 29–34 mm, of forewings 29 mm, of pronotum 9.3–9.7 mm, of metazone 6–7 mm, of forecoxa 8 mm, of forefemora 10 mm, of metathoracic femora 8–9 mm, of metathoracic tibiae 8–9 mm, of metathoracic tarsi 6.5–7 mm, and width of head 5.5–6 mm.

Head (Fig. 2D): Process of the vertex bifid and slightly emarginated with the two processes projecting at a thirty-degree angle from the central axis; margins distinctly bulging, which creates a much wider appearing process. The two small, symmetrical, conical protuberances located between the parietal sutures and the lateral depressions of the central bulge terminate with a distinct protuberance. Clypeus with a strongly defined transverse carina that is strong laterally and still present medially abutting the medial carina; medial carina moderately defined; lower lip distinctly emarginated medially.

Pronotum (Figs. 3E & 3F): The two posterior prozonal processes with prominent, large tubercles running up the posterior ridge, which steeply ascends to the forward oriented terminus, similar to *M. moultoni*. Two symmetrically placed conical processes in the anterior portion of the metazone with few prominent tubercles, but mostly smooth.

Forelegs (Fig. 4C): Uninterrupted black marking on the inner surface of the forefemora similar to *M. carli*, but the two pale markings along the dorsal edge flanking the widest part of the foliaceous expansion are slightly larger and the more distal pale region is sometimes expanded, nearly reaching across the femora. Femora with 14–15 internal spines. Tibiae with 10–11 external spines and 12 internal spines.

Legs: Preapical lobes on femoral carina projecting distally and resembling a small, blunt process that is nearly triangular. Carina of metathoracic femora may or may not include a small lobe at the base, which is very small and resembles only slight bulging; may or may not include any additional small lobes medially.

Wings: Forewings mostly hyaline with limited green and mostly brown pigmentation on veins and in limited cells; costal region opaque greenish-brown; distinct brown mottling in costal and discoidal regions covering multiple cells in broad splotches. Hindwings hyaline, but with distinct brown markings in the costal region of the hindwing starting about two-thirds the distance from the base to the distal tip and ending at the distal tip of the wing, which is distinct from the similar pattern seen in *M. carli*.

Abdomen: The posterior margin of sternites with a medial lip that is strongly emarginated or notched, forming two symmetrical, pronounced rounded lobes; the carina running along the midline is only slightly elevated and extending anteriorly.

Male Genitalia (Figs. 5A, G–I): The tip of the pseudophallus sclerotized and terminating with a straight, truncate end.

Distribution.

All three species are distributed entirely within Southeast Asia, but most of the records are from the islands of Borneo and Sumatra (Table 1, Fig. 6). All three species occur on Borneo and Sumatra and presumably live in sympatry within their ranges. *Majangella carli* has the broadest distribution, with a record from Java, the southern region of Burma on the Thai border, and numerous localities between. *Majangella ophirensis* has not been recorded from the mainland of Southeast Asia or the Malay Peninsula and appears to be limited to the Southeast Asian islands. However, the full distributions of all three species are probably more widespread than what is recorded since past collecting in these regions has been limited. For example, there are no records from Kalimantan, Sulawesi, Cambodia, and Vietnam, but it is likely that at least one of the three species is present in these areas. Future collecting efforts will likely extend the ranges of the species. Records in the literature and personal collecting experiences indicate that all three species live in wet evergreen lowland and montane forests.

TABLE 1. Abbreviated locality information references each collection event (i.e. M.m.1 for *Majangella moultoni* collection event #1) given in the examined material sections for each species. GPS coordinates are converted to decimal degrees for provided coordinates while approximations (marked with *) are given for non-GPS locations based on the information provided on the specimen label and historical maps.

Majangella moultoni		
M.m.1)	1 ♂: Sabah, Tawau District, Brumas Camp	* GPS Coordinates: 04.635014 N, 117.738676 E
M.m.2)	1 ♂: Sabah, Tawau	* GPS Coordinates: 04.301050 N, 117.904396 E
M.m.3–4)	2 ♂: Sumatra, Sumatera Utara Prov., 18 km N. of Prapat	* GPS Coordinates: 02.769211 N, 098.991223 E
M.m.5)	1 ♂: West Sumatra, Mt. Sanggul	* GPS Coordinates: 00.000254 N, 100.657239 E
M.m.6–8)	3 ♂: West Malaysia, Cameron Highlands	* GPS Coordinates: 04.515791 N, 101.328360 E
M.m.9)	1 ♂: Thailand, Phuket	* GPS Coordinates: 07.974944 N, 098.323051 E
M.m.10)	1 ♂: Sabah, Mt. Kinabalu National Park	* GPS Coordinates: 06.007938 N, 116.541359 E
M.m.11)	1 ♂: Sabah, Crocker Range National Park	* GPS Coordinates: 05.806915 N, 116.337776 E
M.m.12)	1 ♂: Sabah, Danum Valley Conservation Area	* GPS Coordinates: 04.966201 N, 117.804609 E
Majangella carli		
M.c.1)	1 ♂: Sarawak, Lambir Hills National Park	GPS Coordinates: 04.198279 N, 114.041914 E
M.c.2)	1 ♂: Sabah, Tawau District, Brumas Camp	* GPS Coordinates: 04.635014 N, 117.738676 E
M.c.3)	1 ♂: Sabah, Sandakan District, Rumidi Estate	* GPS Coordinates: 05.933279 N, 117.312074 E
M.c.4)	1 ♂: Sabah, Tenom	* GPS Coordinates: 04.988095 N, 115.922214 E
M.c.5)	1 ♂: West Malaysia, Cameron Highlands	* GPS Coordinates: 04.515791 N, 101.328360 E
M.c.6)	1 ♂: Burma, Dawna	* GPS Coordinates: 16.833333 N, 098.250000 E
M.c.7)	1 ♂: East Java	* GPS Coordinates: 07.536064 S, 112.238402 E
Majangella ophirensis		
M.o.1)	Holotype ♂ *Ephippiomantis ophirensis*: Sumatra, Tanangtaloe	* GPS Coordinates: 01.189723 S, 101.021872 E
M.o.2)	1 ♂: Sabah, Tawau	* GPS Coordinates: 04.301050 N, 117.904396 E
M.o.3)	1 ♂: Sabah, Trus Madi	* GPS Coordinates: 05.571094 N, 116.499569 E
M.o.4)	1 ♂: Sarawak, Gunung Mulu National Park	* GPS Coordinates: 04.029720 N, 114.872677 E

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References

Beier, M. (1931) Neue und interessante Mantiden (Mantodea). *The Bulletin of the Raffles Museum*, 6, 149–154.

Beier, M. (1934) Mantodea, Fam. Mantidae, Subfam. Hymenopodinae. *Genera Insectorum*, Fascicule 196, 1–37.

Beier, M. (1935) Mantodea. Subfamilie: Mantinae. *Genera Insectorum*, Fascicule 203, 1–146.

Beier, M. (1942) Neue und seltene Mantodeen aus deutschen Museen. *Annalen des Naturhistorischen Museums, Wien*, 52, 126–154.

Beier, M. (1964) *Blattopteroidea-Mantodea. In*: Bronns, H.G. (Ed.), *Klassen und Ordnungen des Tierreichs*. Akademische Verlagsgesellschaft, Leipzig, pp. 849–970.

Beier, M. (1968) Mantodea. *In*: Helmcke, J.G., Starck, D. & Wermuth, H. (Eds.), *Handbuch der Zoologie 12*, 4 (2), pp. 1–47.

Bragg, P.E. (2010) A review of the Liturgusidae of Borneo (Insecta: Mantodea). *Sepilok Bulletin*, 12, 21–36.

Ehrmann, R. (2002) *Mantodea: Gottesanbeterinnender Welt.* Naturund Tier Verlag GmbH, Münster, 519 pp.

Giglio-Tos, E. (1915) Mantidi Esotici: Generie specie nuove. *Bollettino della Societa entomologica italiana*, 46, 31–108.

Giglio-Tos, E. (1919) Saggio di una nuova classificazione dei Mantidi. *Bullettino della Societa Entomologica Italiana*, 49, 50–87.

Giglio-Tos, E. (1927) *Das Tierreich. Orthoptera-Mantidae.* Walter de Gruyter & Co., Berlin & Leipzig, 707 pp.

Otte, D. & Spearman, L. (2005) *Mantida species file. Catalog of the mantids of the world. Vol.1*. Association of Insect Diversity Philadelphia, 489 pp.

Svenson, G.J. & Whiting, M.F. (2004) Phylogeny of Mantodea based on molecular data: evolution of a charismatic predator. *Systematic Entomology*, 29, 359–370.
http://dx.doi.org/10.1111/j.0307-6970.2004.00240.x

Svenson, G.J. & Whiting, M.F. (2009) Reconstructing the Origins of Praying Mantises (Dictyoptera, Mantodea): the roles of Gondwanan vicariance and morphological convergence. *Cladistics,* 25, 468–514.
http://dx.doi.org/10.1111/j.1096-0031.2009.00263.x

Werner, F. (1922) Zur Kenntnis der Mantodeenfauna der niederlandischen Kolonien. *Zoologische Mededeelingen Uitgegeven Vanwege's Rijks Museum van Natuurlijke Historie te Leiden*, 7 (1–2), 115–126.

Werner, F. (1933) Funfter Beitrag zur Kenntnis der Mantodeen von Niederlandisch-Indien. *Treubia*, 14 (2), 255–273.

Wood-Mason, J. (1891) A Cataloque of the Mantodea, with descriptions of new genera and species, and an enumeration of the specimens, in the collection of the Indian Museum, Calcutta. *Mus. Calcutta*, 2, 49–66.

Yager, D.D. & Svenson, G.J. (2008) Patterns of praying mantis auditory system evolution based on morphological, molecular, neurophysiological, and behavioural data. *Biological Journal of the Linnean Society*, 94, 541–568.
http://dx.doi.org/10.1111/j.1095-8312.2008.00996.x