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)

GAVIN J. SVENSON¹* & WILLIAM VOLLMER²
¹ Department of Invertebrate Zoology, Cleveland Museum of Natural History, 1 Wade Oval Drive, Cleveland, OH 44106 USA. Email: gsvenson@cmnh.org
² University at Albany, State University of New York, Albany, New York, USA.
* Corresponding Author

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 Liturgusinae 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
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 Historie, 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


= *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.
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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 motting 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 tip 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 pigmentation, 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 motting across external surface; inner surface with dark pigmentation 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 motting 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 motting in costal and discoidal regions covering multiple cells in broad splotches. Hindwings hyaline with brown pigmented veins and slight brown motting 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 pigmentation 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 Historie, Leiden, Netherlands.
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Key to species using males

1 Process on the vertex bifid, emarginated medially (Figs. 2B & 2D) ................................................................. 2

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)


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. Pruet, 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, Stiwe genitalia prep.No. Ma.Su. (Locality M.m.5) (Stiwe Coll.); 1 ♂—West Malaysia, Cameron Highlands, leg. Wang, 4.XI.1986 (Locality M.m.6) (Stiwe Coll.); 1 ♂—West Malaysia, Cameron Highlands, Sep 2002, Patrice Folschweiller, 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-M157); 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](image-url)


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

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. moultom 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)


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”.


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 antic a 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 symmetrical 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 & Spearmain, 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, Tanantagaloe, 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/.

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

Vordercoxae 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 Femoralzähne 5 (mit Einschluss des apicalen), Discoidalzähne 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 Tibialzähne 11, die basalen sehr kurz, gegen den Apex an Länge stark zunehmend; äussere 13, lang, ebenso apicalwärts verlängert. Metatarsus lang, Mittel- und Hintertibialzähne mit deutlichen praeapicalen Läppchen.

Subgenitalplatten am Ende und an den Seitencken breit abgestutzt. Cerci?

Grundärbung etwa hellgelbbraun, schwarzbraun gefleckt. Elytren glashell, Costafeld 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. Vordercoxae 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 Tanantalo, 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, Köpfbreite 5.5, Kopfhöhe (incl. Fortsatz) 3.6."

Translation:

"Ephippiomantis ophirensis" n. sp. Head higher than wide, 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 angularly; prozone slightly narrowed anteriorly, 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 prontal 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 stripped 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, costafeld 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.
SYNONYMY OF EPhippiomantis WITH MAjangella

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 elytra 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.

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<tr>
<th>Majangella moultoni</th>
<th>M.m.1)</th>
<th>1 ♂: Sabah, Tawau District, Brumas Camp</th>
<th>* GPS Coordinates: 04.635014 N, 117.738676 E</th>
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<td></td>
<td>M.m.2)</td>
<td>1 ♂: Sabah, Tawau</td>
<td>* GPS Coordinates: 04.301050 N, 117.904396 E</td>
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<td>M.m.3–4)</td>
<td>2 ♂: Sumatra, Sumatera Utara Prov., 18 km N. of Prapat</td>
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<td>M.m.5)</td>
<td>1 ♂: West Sumatra, Mt. Sanggul</td>
<td>* GPS Coordinates: 00.000254 N, 100.657239 E</td>
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<td>M.m.6–8)</td>
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<td>* GPS Coordinates: 04.515791 N, 101.328360 E</td>
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<td>M.m.9)</td>
<td>1 ♂: Thailand, Phuket</td>
<td>* GPS Coordinates: 07.974944 N, 098.323051 E</td>
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<td>M.c.3)</td>
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<td>* GPS Coordinates: 05.933279 N, 117.312074 E</td>
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<td>M.c.5)</td>
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<td>* GPS Coordinates: 04.515791 N, 101.328360 E</td>
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<td>M.c.6)</td>
<td>1 ♂: Burma, Dawna</td>
<td>* GPS Coordinates: 16.833333 N, 098.250000 E</td>
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<th>Majangella ophirensis</th>
<th>M.o.1)</th>
<th>Holotype ♂ Ephippiomantis ophirensis: Sumatra, Tanantaleo</th>
<th>* GPS Coordinates: 01.189723 S, 101.021872 E</th>
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<td>M.o.3)</td>
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<td>M.o.4)</td>
<td>1 ♂: Sarawak, Gunung Mulu National Park</td>
<td>* GPS Coordinates: 04.029720 N, 114.872677 E</td>
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