

**ON THE IDENTITY OF *Terpnosia graecina* (DISTANT) AND DESCRIPTION OF NEW SPECIES *Terpnosia lamrii* sp. nov. FROM MALAYSIA**

**Azman Sulaiman**

Centre for Insect Systematics,  
Department of Biological Science and Biotechnology,  
Universiti Kebangsaan Malaysia,  
43600 Bangi, Selangor, Malaysia  
Corresponding author: [as@ukm.edu.my](mailto:as@ukm.edu.my)

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**ABSTRACT**

*Terpnosia graecina* (Distant) is re-examined and redescribed. This has led to discovery of a new species *Terpnosia lamrii* sp. nov. and herewith described as new to science.

**Keywords:** Cicadidae, *Terpnosia*, *graecina*, *lamrii*

**ABSTRAK**

*Terpnosia graecina* (Distant) telah diperiksa dan diperihalkan semula. Ini telah membawa kepada penemuan satu spesies baru *Terpnosia lamrii* sp. nov. dan bersama ini diperihalkan sebagai baru kepada sains.

**Katakunci:** Cicadidae, *Terpnosia*, *graecina*, *lamrii*

**INTRODUCTION**

The species of *Pomponia graecina* was firstly described by Distant (1889) based on type specimen from North Borneo (Sabah) in his excellent writing on A Monograph of Oriental Cicadidae. Distant (1890) was listed this species in his writing while in 1906, he listed and mentioned about this species in A synonymic Catalogue of Homoptera. Moulton (1912) was mentioned the occurrence of this species from Sabah. He was listing this species in his publication on Cicadas of Malaysia (Moulton 1923). Three years after, Moulton and China (1926) had published the raw drawing of the male genitalia of *Po. graecina*. Since that, almost no publication regarding this species except by Metcalf who has listed this species in his General catalogue of the Homoptera (Metcalf 1963).

In late nineties, local scientists by Zaidi and Ruslan (1998) had recorded these species from Sarawak while Zaidi et al. (1999), Zaidi and Nordin (2001) and Zaidi and Azman (2003) had recorded it from Sabah. Study visit to British Museum of Natural History, London in 2009 has confirmed the species of *Po. graecina* after examining the type specimen. Recently, based on a new definition of the genus *Terpnosia* Distant by Lee (2012), the species of *Po. graecina*

is transferred to *Terpnosia* in the subtribe Psithyrisriina and *T. graecina* is redescribed. This include the description of possible new species that is very similar to *T. graecina* from almost the same area with lower altitude and herewith proposed as *Terpnosia lamrii* sp. nov.

## MATERIALS AND METHODS

### Specimens Collection

The materials of this study are collections of cicada specimens of historically two-closely related genera, previously named as *Pomponia* Stål and *Terpnosia* Distant from Sundaland. Specimens deposited in a total of 9 museums and/ or institutions as abbreviated below have been examined (Table 1). Visit trip to BMNH have successfully examined the type materials of known described species formerly as *Pomponia graecina* and a possible new species.

Table 1. List of depositories or institutions of studied materials

No	Abbreviation	Depositories/Institutions
1	BMNH	British Museum Natural History, London
2	KCCS	Kinabalu Conservation Centre, Kinabalu Park, Sabah
3	MNM	Muzium Negara Malaysia, Kuala Lumpur
4	MZB	The Museum Zoologicum Bogoriense, Bogor, Indonesia
5	RMN	Nationaal Natuurhistorisch Museum (former Rijksmuseum voor
6	SMK	Sarawak Museum Kuching, Sarawak
7	UKM	Centre for Insect Systematics, Universiti Kebangsaan Malaysia
8	UMS	Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah
9	ZMAN	The Zoologisch Museum, Universitet van Amsterdam, The Netherlands

### Species Illustrations

Illustrations of external morphological characters and male genitalia were done using Stereo Microscope, Zeiss Stemi SV11, x6-x66, equipped with camera lucida. The morphological characters of head, thorax, abdomen, wing and venations, operculum, tymbal cover and male genitalia have been illustrated. The male genitalia illustration is the most important being produced for species identification and grouping since this character is species specific.

### Distribution Mapping

An online Google Earth program was used for tracing the coordinates of localities for every specimen referred in this study. The traced coordinates were placed and saved on google maps. A high quality of outline map borneo was obtained online from internet address, [http://d-maps.com/carte.php?num\\_car=5267 &lang=en](http://d-maps.com/carte.php?num_car=5267 &lang=en). The maps of the species distributions were constructed by tracing the saved coordinates on google maps onto the outline map following the species.

## RESULTS AND DISCUSSION

### *Terpnosia graecina* (Distant), 1889

(Figures 1a, 2a – f)

*Pomponia graecina* Distant, 1889: 421 [North Borneo, Mt. Kinabalu (type, male)]; Distant, 1890: 70; Distant, 1906: 68; Distant, 1912: 54; Moulton, 1912: 144; Moulton, 1923: 112; Moulton, 1925: 435; Moulton & China, 1926: 122; Metcalf, 1963: 841; Zaidi and Ruslan, 1998b: 363; Zaidi & Nordin, 2001: 183; Zaidi & Azman, 2003: 99; Zaidi et al. 1999: 310.

*Terpnosia graecina* (Distant), Lee 2012: 2023

**Redescription of male.** Head, thorax and abdomen (Figures 1a, 2a) with greenish to yellow ground colour; markings on head and thorax reddish brown, dark brownish to blackish on abdomen. Life specimen with greenish ground colour and dark castaneous marking on head and thorax, darker and blackish on abdomen. Ratio of body length to pronotum width about 3.10 (3.00–3.26).

Head with ratio of head width to pronotum width about 0.78, and to mesonotum width about 0.92. Dorsal side of head with brownish to dark brownish ochraceous markings as follow: median mark between lateral ocelli extending to posterior margin, connected with narrow ring marks enclosing lateral ocelli at ocular tubercles; anterior part of median mark forms an upside down triangle, with median ocellus in lower angle, reaching the frontoclypeal suture; a pair of irregular oblique fasciae on vertex between postclypeus and eyes, elongated posteriorly between lateral ocelli and eyes, connected with narrow ring fasciae at half of median margin; a pair of darker spot at supra-antennal plates; a pair of spots behind the eyes; and dorsal surface of postclypeus. Distance between lateral ocelli and eyes about twice as wide as distance between the two lateral ocelli.

Supra-antennal plates with rounded anterior margins. Anteroventral side of head (Figure 2b) with antennae brown to ochraceous; postclypeus greenish with indistinct two median greenish yellow spots: an anterior oval spot on swollen structure, open towards the frontoclypeal suture, and a ventral lanceolate spot to posterior margin; indistinct two series of brownish narrow transverse fasciae interrupted at median. In some specimens, postclypeus with uniform dark ochraceous ground colour with two series of 8-9 transverse yellowish line on transverse groove. Anteclypeus greenish yellow or dark ochraceous, as ground colour of postclypeus. Rostrum greenish yellow with black-brown apical part, reaching beyond the hind coxae, almost reaching hind margin of sternite II. Genae greenish yellow and mandibular plates brownish. Behind the eyes with smoky bronzed hairs.





Figure 1. *Terpnosia graecina* group (scale, x1.0); a, *T. graecina*, male, Mt. Kinabalu; b, *T. lamrii* sp.nov., male, holotype, Crocker Range, Sabah

Thorax (Figures 1a, 2a) with median fasciae on pronotum dark brownish castaneous in life specimen, other markings on thorax brownish to dark brownish ochraceous in dried specimens. Pronotum with median longitudinal fascia usually widened and extended to anterior, connected to darker transverse fascia at anterior margin, narrowed at one-third of length from bases, widened posteriorly, posterior ends with up-side down triangular-shaped connected with narrow transverse fascia at ambient fissure; narrow oblique fascia at paramedian fissure connected to anterior transverse fascia of the same colour; lateral and ambient fissures with narrow fasciae; oblique areas between paramedian, lateral and ambient fissures brownish ochraceous, darker in poorly preserved specimens. Pronotal collar with blackish transverse fascia at posterior margin; a pair of narrow longitudinal fascia at lateral area attached to ambient fissure; and lateral margin slightly toothed.

Mesonotum (Figures 1a, 2a) with a pair of paramedian obconical fasciae, reaching to half-length of mesonotum disk; a pair of narrow irregular triangle spots at anterior margin between paramedian and lateral fasciae; lateral longitudinal fasciae extending from anterior to posterior margin, somewhat interrupted almost at one-third to anterior, darker in poorly preserved specimens; a pair of spots in front of cruciform elevation, enclosing scutal depressions; and a pair of blackish spots at apex of anterior arms of cruciform elevation.

Legs, greenish to yellowish olivaceous with brownish and fuscous markings. Fore and middle legs with fuscous spot at the apex and lateral longitudinal brownish fascia of coxae; a pair of brownish lateral spots at the bases and just before apex of femora; a pair of fuscous rings at the bases and just before apex of tibiae; and fuscous tarsus. Hind legs with small fuscous spot at the apex of coxae; and small brownish spots near the bases and apex of femora.

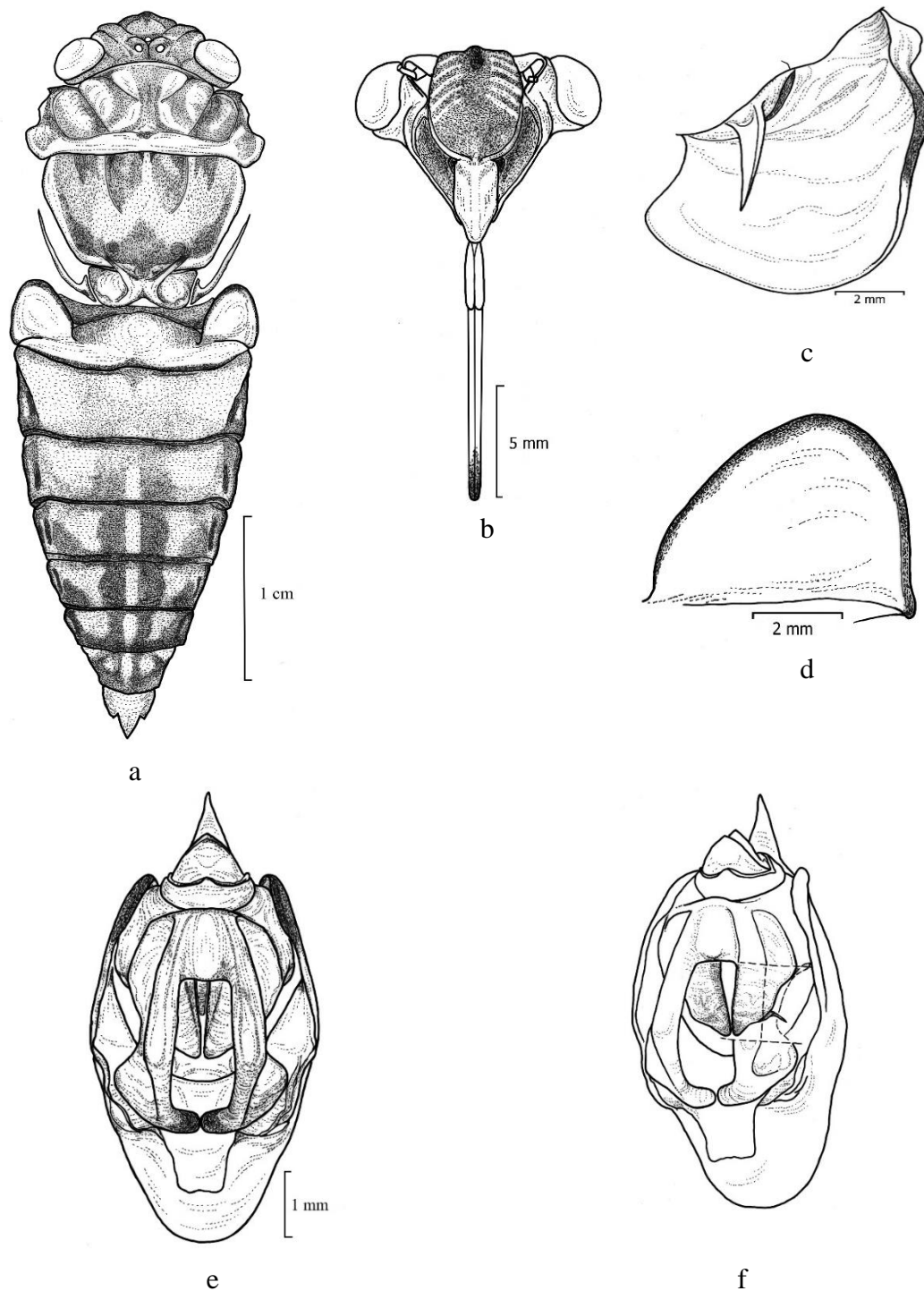


Figure 2. *Terpnosia graecina*, male, Mount Kinabalu. a, body from dorsal view; b, head from anteroventral view; c, left operculum from lateroventral view; d, right tymbal cover from dorsolateral view; e, male genital from posteroventral view; f, male genital from lateroventral view

Tegmina and wings (Figure 1a), hyaline with dark greyish basal membrane. Tegmina with coastal membrane, veins R+Sc, CuA, CuP+1A and 2A+3A greenish for life specimens, and yellowish for dried specimens; other venation greenish or yellowish to brownish, variegated with fuscous; basal cell pale yellowish, longer than broad; marginal area with smoky bronzed tinge. Transverse veins r, r-m, m and m-cu distinctly with light centred or smudged infuscations;

apices of longitudinal veins to apical cells with distinct oblong and almost uniform light centred or smudged infuscations; nodal line, nodal line intersection and apex of CuA faintly infuscated; apex of CuA<sub>2</sub> distinctly with smudged infuscation. Infuscation at r cross vein extending to one-third area of first apical cell; the apex of oblong infuscations slightly extended to ambient veins. Wing with brownish venation; claval margin darker in hue.

Operculum (Figure 2c). Greenish to yellowish, broader than long, reaching the abdominal sternite II. Lateral margin sinuated at base and thereafter about straight and oblique to convex distal margin. Surface of operculum flat to very weakly convex. Medial margin fairly concave at base. Dark brown band extended partly between lateral margin to distomedial corner.

Abdomen (Figure 2a) about 1.37 times (n=22) longer than the length of head and thorax combined; slender, tapering towards posterior, widest across tymbal covers. Dorsal surface with brownish broad longitudinal band, darker towards posterior at tergites 4 to 8; lateral sides of tergites 3 to 7 with a pair of dark brown to blackish oval spots; narrow transverse blackish fasciae at posterior margin of tergites 2 to 8; and tergite 8 brownish ochraceous with darker broad anterior transverse fascia. Tymbal covers (Figure 2d) greenish with dark brown band extended from base of lateral margin to medial margin; lateral margin enlarged lateroventrally, about slightly concave at base, somewhat straight then weakly convex; anterior margin strongly convex and medial margin weakly convex.

Genitalia (Figures 2 e & f). Pygofer with length includes dorsal beak, less than twice as width about 1.96x; tapering and semicircular anteriorly. Pygofer primary basal lobes triangular but strongly reduced. Secondary basal lobes only separated from lateral margin at lateral side. Pygofer lateral lobes semicircular or angular rounded. Dorsal beak, long, slender and pointed apically, with the tip passing the tip of anal styles. Anal styles projected towards posteroventral. Uncus bearing two long and broad, more or less parallel lobes, with curved lateral margin at two-third of length, broadened towards apex, with single side hammer head of apex. Clasper protruding from below the uncus; broad at the bases, triangular with blunt apex, and small twice curved spine with pointed apex protruding at two-third of lateral margin.

**Redescription of Female.** Head, thorax, legs and tegmina are similar to male, and distinguished by the markings on abdomen; but pronotum and mesonotum somewhat shows dimorphic characters. Operculum triangular; greenish ochraceous. Pronotum with prominent dark brownish to fuscous medial longitudinal fascia, somewhat only prominent at anterior half. Abdomen, shorter than the length of head and thorax combined with dark brownish markings as follow; a median spot at tergite 2; a pair of paramedian transverse spots at posterior margin of tergite 2 and 3; a pair of lateral spots at tergites 2 to 4; tergite 5 with two pairs of paramedian and sublateral spots; tergites 6 to 9 with dark brownish ochraceous ground colour; and a pair of lateral fuscous spots at tergite 9.

**Measurements** (mm). Males (n=22). Body length 40.88 (35.00–43.80); abdomen length 23.63 (20.35–25.33); head width 9.84 (9.40–10.35); pronotum width 12.59 (11.40–13.31); mesonotum width 10.64 (9.40–11.14); expanded tegmen 111.57 (95.80–116.27). Females (n=17). Body length 29.95 (27.53–31.80); abdomen length 11.97 (10.75–13.41); head width 9.83 (9.07–10.30); pronotum width 12.73 (11.72–13.34); mesonotum width 10.88 (10.00–11.45); expanded tegmen 114.06 (105.53–118.24).

**Materials Examined.** 39 males, 32 females. MALAYSIA: SABAH; TYPE (holotype), Kinabalu (=Mt. Kinabalu), N. Borneo (Sabah), no date, type (with blue round label), male, (BMNH); B.N. Borneo, Mt. Kinabalu, no date, Waterstradt, *Pomponia graecina* Dist (Distant's hand writing), male, (BMNH); Crocker Range Park, 9-12.x.2003, Yusilie K, SP/EHO/01126, female, (KCCS); Ekspedisi Tambuyukon, 599m, 24-29.ix.2005, Welfred T, SP/EHO/02002, female, (KCCS); Gn. Trusmadi, Sg.Kidukaruk, 1400m, 24.i.1992, H.Sadamori, SP/EHO/00633, female, (KCCS); same data but 25.i.1992, SP/EHO/00630, female, (KCCS); 25.i.1992, SP/EHO/00619, male, (KCCS); 27.i.1992, SP/EHO/00629, female, (KCCS); Gunung Kinabalu, Sayap, 1000m, 06°10'N/ 116°34'E, ranger house edge of primary forest, 12-15.iii.2001, at light, J.P. & M.J. Duffels, male, (ZMAN); Gunung kinabalu, Sayap, 3-8.vi.1992, Zaidi, Ismail, Ruslan, female, (UKM); Kinabalu Park, 1602m, 19.iii.2005, Pete, Ali, T.Wan, Johnny, male, (MNM); 19.xi.1981, Keiji Morishima, female, (UKM); Kinabalu Park HQ, 10.v.2007, Duni M, SP/EHO/01741, male, (KCCS); Same data but 11.iv.1994, Gunik G, SP/EHO/00625, male, (KCCS); 17.iv.2007, Jusimin, SP/EHO/01742, female, (KCCS); 18.ii.1994, Sinail D, SP/EHO/00631, female, (KCCS); 25.iii.2010, H.Takizawa, male, (UMS); 7.v.1995, Sinail D, SP/EHO/00622, male, (KCCS); 1400-1600m, 8.vi.2004, Dominik, SP/EHO/01753, female, (KCCS); 1500m, 10.ix.2002, Sinail D, SP/EHO/00968, male, (KCCS); 11.ix.1995, Sinail D, SP/EHO/00621, male, (KCCS); 11.viii.1993, Toru K, SP/EHO/00632, female, (KCCS); 13.xi.1990, H.Sadamori, SP/EHO/00628, female, (KCCS); 16.xi.2002, Nancy J, SP/EHO/01027, male, (KCCS); 21.iv.1991, H.Sadamori, SP/EHO/00618, male, (KCCS); 24.ix.1993, Hamaniah, SP/EHO/00623, male, (KCCS); 6.v.1995, Sinail D, SP/EHO/00620, male, (KCCS); 1600m, 19.x.1993, Hamaniah Tahir, HO/93/00050, ex-KCCS, male, (UKM); Same data but Alt.1450-1600m, 24.iii.2004, Sinail D, SP/EHO/01125, female, (KCCS); Alt.1450m, 11.iv.2003, Sinail D, SP/EHO/01026, male, (KCCS); 29.vi.2003, Sinail D, SP/EHO/01025, male, (KCCS); Alt.1500m, 30.iv.1994, Sinail D, SP/EHO/00624, male, (KCCS); 8.v.2002, Sinail D, SP/EHO/00969, female, (KCCS); Bangunan P&P, 1600m, 14.vi.2008, SP/EHO/01999, male, (KCCS); Same data but 5.v.2008, Yusilie K, SP/EHO/02000, female, (KCCS); IBOY-MYHQ-LTG, 12.xi.2002, SP/EHO/02004, male, (KCCS); Same data but 12.xi.2002, SP/EHO/02006, male, (KCCS); 8.iii.2002, SP/EHO/02003, male, (KCCS); 8.v.2002, SP/EHO/02005, male, (KCCS); Kota Belud, Kg. Kiau Nuluh, 3.ix.1999, Sinail D, SP/EHO/00634, female, (KCCS); Same data but 6.i.2006, Sinail D, SP/EHO/01605, female, (KCCS); Mt. Kinabalu, B.N. Borneo (Waterstradt), no date, *Pomponia graecina* Dist., male, (BMNH); Mt. Kinabalu, Kenokok, 3300ft., 26.iv.1929, H.M.Pendlebury, male, (MNM); N. Borneo, Mt. Kinabalu, Mesilau Camp., 1.ii.1964, 5000', Royal Soc Exped., Coll S. Kueh, B.M. 1964-250, male, (BMNH); Same data but 1.iv.1964, 5000', Royal Soc Exped., Coll S. Kueh, B.M. 1964-250, male, (BMNH); 13-15.iii.1964, 5000', Royal Soc Exped., Coll S. Kueh, B.M. 1964-250, male, 3 females, (BMNH); 29.iii.1964, 5000', Royal Soc Exped., Coll S. Kueh, B.M. 1964-250, male, (BMNH); Trail, 5000ft., 16-18.iii.1964, Royal Soc Exped., Coll S. Kueh, B.M. 1964-250, female, (BMNH); 4.iv.1964, Royal Soc Exped., Coll S. Kueh, B.M. 1964-250, 3 females, (BMNH); S. Sabah, Beufort 105km S of Long Pa Sia area, Payakalabe, 04°25'N/ 115°44'E, at light, 1000m, 12.iv.1987, van Tol & Mutsman, female, (RMNH); Sayap, Alt:948-956m, 19.iii.2005, Pete, Ali, T.Wan, Johnny, male, (MNM); Sipitang, Muaya, 760m, 12-14.viii.2009, Simon, Nordin, Chin, female, (UMS); Taman Negara Kinabalu, 25.v.1991, Zaidi, female, (UKM); Tambunan, VJR Rafflesia, iv.1994, Arthur C., female, (FRCS); Tawau, Balung, 18.v.2006, Yusilie Kumin, SP/EHO/01604, female, (KCCS); Telupid, Deramakot, 29.iv.2006, Sinail Dunsul, SP/EHO/01593, female, (KCCS); SARAWAK: Rinai Batu, (Whitehead), Type (Red round label), Distant coll., 1911-383, *graecina* Dist., female, (BMNH); Mt. Dulit, 4000ft., Moss forest, x.1932, Oxford Univ. Expdn., B.M. Hobby & A.W. Moore, B.M. 1933-254, Native collected house clearing, male, female, (BMNH); 1908, C.J. Brooks, 97, female, (BMNH); Gunong Mulu Nat. Park, Site 1, Camp 4,

Mulu 1790m, i.1978, 452463 Lower montane (mosses) forest, MV-canopy, J.D. Holloway, RGS Mulu Exped., B.M. 1978-206, male, (BMNH); Same data but Site 14, Camp 2.5, Mulu 1000m, ii.1978, 412461 Lower montane forest, MV-canopy/ understory, 2 males, (BMNH); Belaga, Malinau, 17.xi.1910, male, (SMK); Limbang, 1.iv.1910, male, (SMK); Mt. Selenguit, 31.v.1911, male, (SMK); BRUNEI: *Pomponia graecina* Dist., Brunei, Museum Paris, coll. Noualhier 1898, Distant coll., 1911-383, male, (BMNH).

**Distribution.** Endemic to Borneo, so far only recorded from Sabah, Sarawak and Brunei (Figure 4).

**Remarks.** A visit to British Museum in London (BMNH) is a great opportunity to check all the type specimen of the related species deposited here. Type specimen of *T. graecina* have been check and confirmed, as the specimen that being used by Moulton (1923) and Moulton and China (1926). This has lead to the description of a species identified as new to science that is very similar to *T. graecina* and herewith being publish as *Terpnosia lamrii* Azman, sp. nov. from nearby area.

***Terpnosia lamrii* sp. nov.**

(Figures 1b, 3a–f)

**Type materials.** – Holotype: male. MALAYSIA: ‘SABAH / Keningau / Crocker Range Park / 20.vi.2001 / Yusilie K / HO/01/00864’ / (KCCS). – Paratypes: 15 male, 9 females. SABAH: B.N. Borneo, Mt. Kinabalu, no date, Waterstradt, male, female, (BMNH); Kinabalu Park, Monggis Sub-station, Alt. 330m, 8-16.xi.2009, Kumpulan 3, male, (KCCS); same data but 8-16.xi.2009, Kumpulan 4, female, (KCCS); 2-16.x.2009, Yusilie Kumin, female, (KCCS); Long Pa Sia, Kampong along Sg. Padas, 1000m, 8.xiii.1989, J. Huisman, JB8913, JB8914, A.L cultivated, male, (RMNH); Mt. Silam, 9.v.1902, Dist. Coll 1911-383, male, (BMNH); N. Borneo, Kinabalu, no date, female, (BMNH); Penampang, Inobong Sub-Stesen, 450m, 28.xi.2002, Sinail D, SP/EHO/00974, female, (KCCS); Stesen Inobong TBC, ii.2008, Johnny L, SP/EHO/02001, female, (KCCS); S. Sabah, Beufort 105km S of Long Pa Sia area, Payakalabe, 04°25’N/ 115°44’E, at light, 1000m, 12.iv.1987, van Tol & Mutsman, male, (RMNH); Sipitang, Long Pasia, Ekspedisi Ulu Padas, Alt.1125m, 22-27.i.2003, Johnny L, HO/02/00987, male, (KCCS); same data but HO/02/00988, male, (KCCS); SARAWAK: 8.xii.1908, C.J. Brooks, Tringos, female, (BMNH); Bau, Gunung Doya, 19.ii.2003, Raymond, 2 males (SBC); Bidi, 1907-1908, C.J. Brooks, 2 males, (BMNH); Gunung Mulu Nat. Park, site 20, West Melinau George, 150m, iii-iv.1977, 422577, FEG 3, Kerangan, MV-understory, RGS Exped 1977-8, J.D. Holloway, B.M. 1978-206 2 males, (BMNH); INDONESIA: KALIMANTAN: Kalimantan Timur, Lalut Birai field Station, Sungei Nggeng, Kayan Mentarang N.P. Kabupaten Bulungan, 03°07’N/ 115°49’E, 29.x.1996, male, (ZMAN); Midden O-Borneo (Dutch East Borneo Expedition 1925), 3.ix.1925, H.C. Siebers, MZB.HEMI 17724, *Pomponia picta* det. A.J.de Boer 1988, male, (MZB); same data but 16.ix.1925, MZB.HEMI 17725, male, (MZB); 20.ix.1925, MZB.HEMI 17727, female, (MZB); 2.x.1925, MZB.HEMI 17728, female, (MZB); 4.x.1925, MZB.HEMI 17729, male, (MZB).

Holotype specimen is deposited in the insect depository, Entomology Section, Kinabalu Conservation Centre, Kinabalu Park Head Quarters, Sabah (KCCS). Paratype specimens are deposited in the depository as mentioned and abbreviated in the list of type materials examined.



**Etymology.** This species is named after Datuk Lamri Ali, a former director of Sabah Parks, in recognition of his contribution to nature conservation and protected area movement in Malaysia.

**Diagnosis.** *Terpnosia lamrii* sp. nov. is a medium-sized species with expansion of tegmina and body length about 10.9% and 10.0% smaller than *T. graenina*, respectively. This species can be distinguished from *T. graecina* by four main characters (1) markings on head, pronotum, mesonotum and dorsal part of abdomen are less prominent to indistinct, (2) infuscation on tegmina is not translucent or light-centered and smaller, instead of light-centered and larger infuscation in *T. graecina*, (3) a pair of parallel elongated uncus lobes is farther apart, instead of nearer (Figure 3e), (4) the twice curved sharply pointed lateral spine on a triangular clasper is relatively bigger compared to the size of triangular clasper, but smaller in *T. graecina*.

**Description of male.** Head, thorax and abdomen with greenish yellow ground colour; markings on head and thorax brownish ochraceous to dark brownish ochraceous, and darker on abdomen. Life specimen with greenish ground colour and ochraceous marking on head and thorax, darker on abdomen. Ratio of body length to pronotum width about 3.21 (3.14–3.36). Head with ratio of head width to pronotum width about 0.82 (n=5), and to mesonotum width about 0.96. Dorsal side of head (Figures 1b, 3a) with brownish to dark brownish ochraceous markings as follow: median mark between lateral ocelli extending to posterior margin, connected with narrow ring marks enclosing lateral ocelli at ocular tubercles; anterior part of median mark forms an upside down triangle, with median ocellus in lower angle, reaching the frontoclypeal suture; a pair of irregular oblique fasciae on vertex between postclypeus and eyes, elongated posteriorly between lateral ocelli and eyes to posterior margin, connected with narrow ring fasciae at half of median margin; a pair of darker spot at supra-antennal plates; a pair of spots behind the eyes; and dorsal surface of postclypeus. Distance between lateral ocelli and eyes about twice as wide as distance between the two lateral ocelli. Supra-antennal plates with rounded anterior margins. Postclypeus slightly swollen. Supra-antennal plates with rounded anterior margins. Distance between lateral ocelli and eyes more than twice as wide as distance between the two lateral ocelli. Anteroventral side of head (Figure 3b) with antennae brown to ochraceous; postclypeus almost uniformly ochraceous with two series of 8 to 9 greenish narrow transverse lines on the ridge of transverse groove; without any spots and fasciae. Anteclypeus uniformly dark brownish ochraceous. Rostrum greenish yellow with black- brown apical part, reaching beyond posterior coxae, almost reaching hind margin of sternite II. Genae greenish yellow with a pair of brownish spots between postclypeus and eyes; and lorum of mandibular plates brownish, darker at median side attached to lateral margin of postclypeus. Behind the eyes with smoky bronzed hairs.

Thorax (Figures 1b, 3a). Pronotum surface almost uniformly ochraceous with indistinct median longitudinal fascia, widened and extended to anterior margin, arrowed at one-third of length from bases, widened posteriorly to ambient fissure; paramedian transverse marks at ambient fissure wider towards centre; narrow oblique fascia at paramedian, lateral and ambient fissures dark brownish ochraceous. Pronotal collar with blackish narrow transverse fascia at posterior margin; a pair of narrow longitudinal fascia at lateral area attached to ambient fissure; and lateral margin slightly toothed. Mesonotum with dark brownish mark along anterior margin; paramedian obconical marks reaching to half-length of mesonotum disk; narrow triangle spots at anterior margin, between paramedian and lateral fasciae; lateral longitudinal fasciae extending from posterior to anterior margin, brownish ochraceous; a pair of spots in front of cruciform elevation enclosing scutal depression; a narrow transverse fasciae at anterior

margin of cruciform elevation, curved twice, connecting left and right anterior arms, darker than other marks.

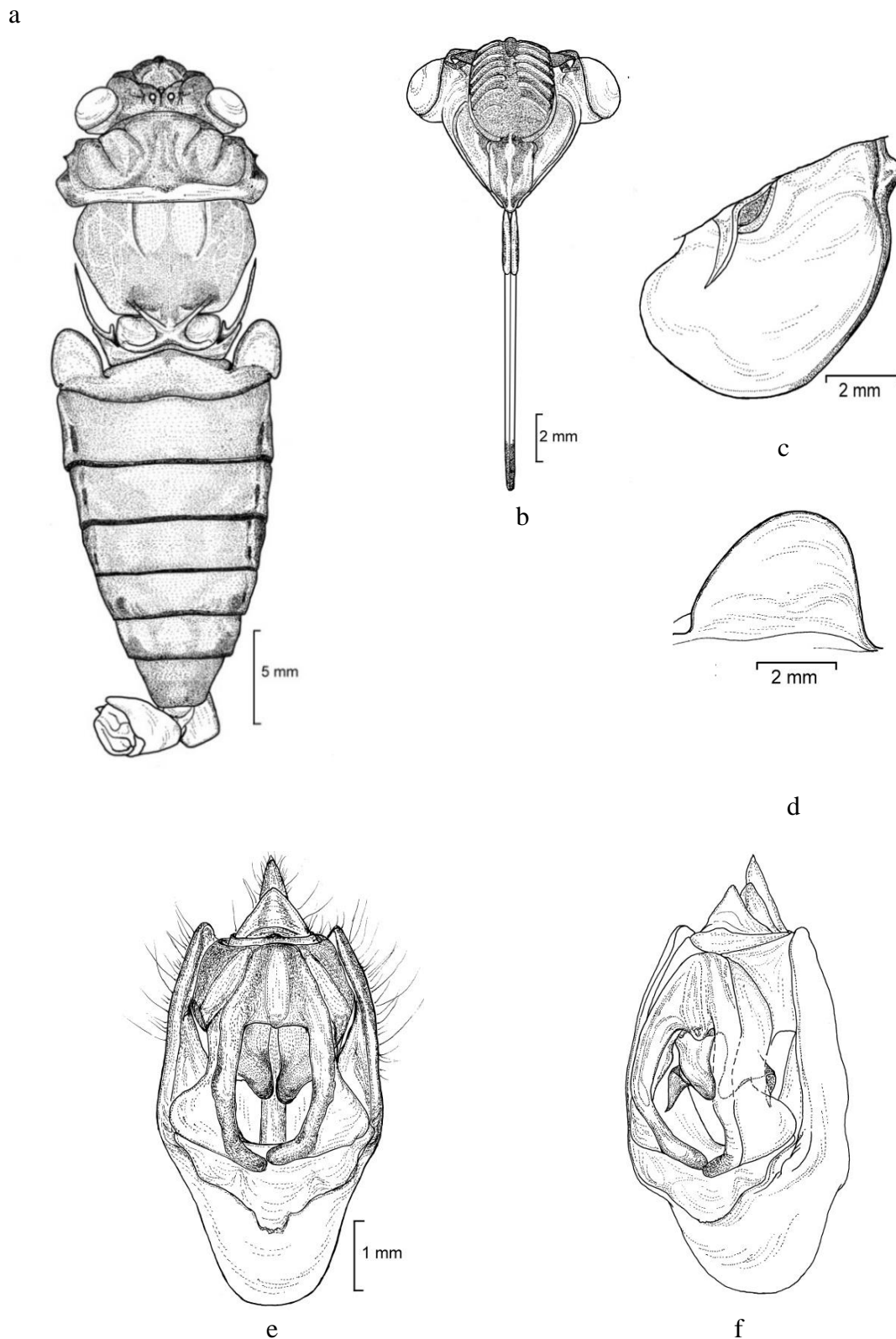


Figure 3. *Terpnosia lamrii* sp.nov., male, holotype, Crocker Range, Sabah. a, body from dorsal view; b, head from anteroventral view; c, left operculum from lateroventral view; d, right tymbal cover from dorsolateral view; e, male genitalia from posteroventral view; f, male genitalia from lateroventral view

Legs. Greenish yellow to ochraceous. Fore femora almost blackish brown. Middle femora with broad basal and subapical, blackish brown rings. Hind femora with broad basal and small apical brown rings. Fore and middle tibiae greenish yellow to ochraceous with dark brownish ochraceous dorsal band, hind tibiae with small basal brown spot. Tarsus of fore and middle legs blackish brown, those of hind legs yellowish.

Tegmina and wings (Figure 1b), hyaline with dark greyish basal membrane. Tegmina with coastal membrane, veins R+Sc, CuA, CuP+1A and 2A+3A greenish for life specimens, and yellowish for dried specimens; other venation greenish or yellowish to brownish, variegated with fuscous; basal cell pale yellowish, longer than broad; marginal area and middle area of second to sixth apical cells with smoky bronzed tinge. Transverse veins r, r-m and m distinctly infuscated; indistinct at m-cu cross vein. Apices of longitudinal veins to apical cells with distinct oval and almost uniform of indistinct light centered infuscations; nodal line, nodal line intersection and apex of CuA without infuscation; apex of CuA<sub>2</sub> distinctly with smudged infuscation. Infuscation at r cross vein extending to one-third area of first apical cell. Wing with brownish venation; claval margin darker in hue.

Operculum (Figure 3c). Pale greenish ochraceous, broader than long, reaching the abdominal sternite II. Lateral margin sinuated at base and thereafter about oblique and slightly convex, to convex distal margin. Surface of operculum fairly flat to weakly convex distal area. Medial margin fairly concave at base. Dark brown band extended between lateral margin to distomedial corner.

Abdomen (Figures 1b, 3a) about 1.20 times (n=5) longer than the length of head and thorax together, slender, tapering towards posterior, and widest across tymbal covers. Dorsal surface with a indistinct pair of paramedian broad dark ochraceous longitudinal marks; lateral sides of tergites 3 to 7 with a pair of dark brown to blackish oval spots; and posterior margin of tergites 3 to 8 with narrow transverse blackish brown fasciae; almost posterior half of tergite 7 with transverse broad band; and almost entire of tergite 8, dark castaneous. Tymbal covers (Figure 3d) greenish castaneous with brown band extended from base of lateral margin to lateral margin; lateral margin enlarged lateroventrally, about slightly concave at base, somewhat straight then weakly convex; anterior margin strongly convex and medial margin weakly convex.

Genitalia (Figures 3 e & f). Pygofer with length includes dorsal beak, less than twice as width about 1.95x; tapering and semicircular anteriorly. Pygofer primary basal lobes absent. Secondary basal lobes only separated from lateral margin at lateral side. Pygofer lateral lobes semicircular or angular rounded. Dorsal beak, long, slender and pointed apically, with the tip passing the tip of anal styles. Anal styles projected towards posteroventral. Uncus bearing two long and broad, more or less parallel lobes, with curved lateral margin at half of length, broadened towards apex, with single side hammer head of apex. Clasper protruding from below the uncus; broad at the bases, triangular with blunt apex, and twice curved spine with pointed apex protruding at two-third of lateral margin.

**Description of Female.** Head, thorax, legs and tegmina are similar to male. Operculum triangular; greenish ochraceous. Abdomen, shorter than the length of head and thorax combined with indistinct markings. Tergites 7 to 9 darker than others with a pair of lateral fuscous spots at tergite 9.

**Measurements (mm).** Males (n=5), body length 36.80 (33.60-39.70); abdomen length 20.11 (18.20-21.53); head width 9.39 (8.70-10.09); pronotum width 11.50 (10.00-12.58); mesonotum width 9.82 (8.70-10.78); tegmen length 44.29 (40.00-48.43); expanded tegmina 99.43 (88.80-109.39). Females (n=3), body length 28.62 (27.50-30.24); abdomen length 11.22 (10.85-11.51); head width 9.67 (9.40-10.06); pronotum width 11.86 (11.20-12.75); mesonotum width 10.56 (9.90-11.45); expanded tegmen 104.27 (97.30-111.67).

**Distribution.** *Terpnosia lamrii* sp.nov. is most probably endemic to Borneo since so far it has only been recorded from Sabah (Kinabalu Park, Crocker Range Park and Long Pasia), Sarawak (Bidi, Mount Mulu and Mount Doya) and Kalimantan (Kayan Mentarang National Park). Most of the specimens come from lower elevation below 1000m from sea level, and a single specimen from Gunung Mulu National Park is recorded the lowest about 150m above sea level (Figure 4).

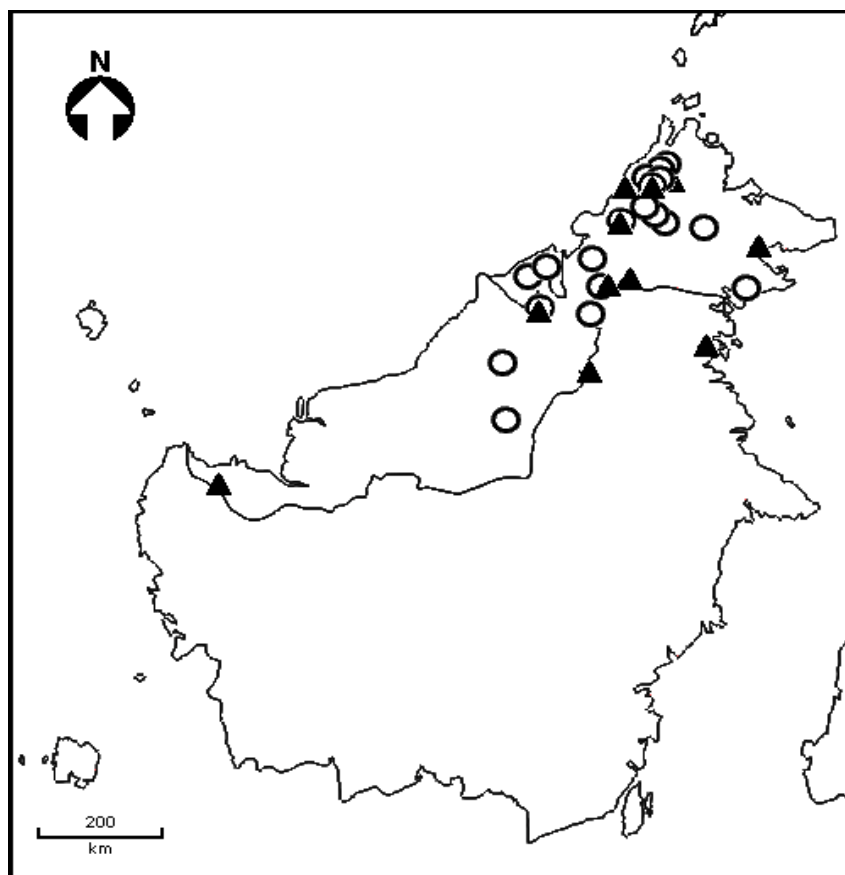


Figure 4. Distribution of *T. graecina* (O) and *T. lamrii* sp.nov. (▲) from Borneo

## CONCLUSION

A species of *Pomponia graecina* being transferred to *Terpnosia* from Borneo and was treated taxonomically, based on 39 males, 32 females specimens including type specimen deposited in 9 depositories. *Terpnosia graecina* is redescribed based on morphological characters and special features of male genitalia. This has led to the finding of a new species namely *Terpnosia lamrii* n sp., being described and illustrated.

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## **AUTHORS DECLARATIONS**

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### **Conflict of Interest**

The authors declare that they have no conflict of interest.

### **Ethics Declarations**

No ethical issue required for this research

### **Data Availability Statement**

None

### **Authors' Contributions**

AS conceived this research and designed experiments and wrote the manuscript.

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