



New and little known taxa of the genera *Gymnogryllus* and *Macrogryllus* (Orthoptera: Gryllidae: Gryllinae) from Indo-Malayan and Papuan Regions

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Submitted April, 3, 2021; revised December 25, 2021; accepted January 17, 2022.

ABSTRACT

A new material on the genera *Gymnogryllus* Sauss. and *Macrogryllus* Sauss. is considered. Three new taxa from the Indo-Malayan and Papuan Regions are described: *G. egorovi* sp. nov. (Indonesia: Maluku Utara Province); *G. vietnamensis mada* subsp. nov. (Vietnam: Dong Nai Province); *M. canorus* sp. nov. (Malaysia: Pahang State). The first species is distinguished from all the other congeners by a few distinct features of the male tegminal venation and some important characters of the male genitalia; the second new taxon differs from the nominotypical subspecies of the same species almost only in small details of the male genitalia; and *M. canorus* sp. nov. is different from the only other species of *Macrogryllus* mainly in the male genitalia with a very characteristic shape of the ectoparameres. The male genitalia of *M. ephippium ephippium* (Saussure, 1877) are firstly examined, and previously unknown male of *M. bicolor* Chopard, 1930 is also described; for the both latter taxa, some new localities are recorded; and for *M. bicolor*, its calling burrow is firstly found (this burrow is very characteristic, in the shape of a ground cone with an almost vertical tunnel leading to the underground cavity, where the male is hiding during its calling song).

Key words: Brachytrupina, *Gymnogryllus*, Gryllini, Indo-Malayan and Papuan Regions, *Macrogryllus*, new taxa

Новые и малоизвестные таксоны родов *Gymnogryllus* и *Macrogryllus* (Orthoptera: Gryllidae: Gryllinae) из Индо-Малайской и Папуасской областей

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Представлена 3 апреля, 2021; после доработки 25 декабря, 2021 принята 17 января, 2022.

РЕЗЮМЕ

Рассмотрен новый материал по родам *Gymnogryllus* Sauss. и *Macrogryllus* Sauss. Из Индо-Малайской и Папуасской областей описаны три новых таксона: *G. egorovi* sp. nov. (Индонезия: провинция “Maluku Utara”); *G. vietnamensis mada* subsp. nov. (Вьетнам: провинция “Dong Nai”); *M. canorus* sp. nov. (Малайзия: штат “Pahang”). Первый вид отличается от всех остальных таксонов этого рода несколькими заметными особенностями жилкования надкрылий самца и некоторыми важными признаками гениталий самца; второй новый таксон отличается от номинативного подвида того же рода почти только мелкими деталями гениталий самца; и *M. canorus* sp. nov. отличен от единственного другого вида рода *Macrogryllus* главным образом гениталиями самца с очень характерной формой их эктопарамероов. Впервые изучены гениталии самца *M. ephippium ephippium* (Saussure, 1877), а также описан ранее неизвестный самец *M. bicolor* Chopard, 1930; для этих двух таксонов указаны некоторые новые местонахождения; и для *M. bicolor*

впервые обнаружена его певчая нора (эта нора очень характерна – в форме земляного конуса с почти вертикальным туннелем, ведущим в подземную камеру, где прячется самец в течение его призывной песни).

Ключевые слова: Brachytrupina, *Gymnogryllus*, Gryllini, Индо-Малайская и Папуасская области, *Macrogryllus*, новые таксоны

INTRODUCTION

The genera *Gymnogryllus* Saussure, 1877 and *Macrogryllus* Saussure, 1877 belong to a group of closely related genera containing largest crickets in the World (the pronotal length in largest representatives of *Tarbinskiellus* Gorochov, 1983, *Macrogryllus*, *Brachytrupes* Audinet-Serville, 1838, *Gymnogryllus* and *Megalogryllus* Chopard, 1930 reaches almost 10, 9.5, 9, 7 and 6.5 mm, respectively). However, taxonomy of these digging crickets is not very elaborated, because some closely related genera have species with convergent similarity in the male genital structures (Gorochov 2001, 2019), and descriptions of new taxa from these genera are also rather usual. Moreover, their mode of life (especially acoustic and sexual behavior) is known only for a few species, therefore any new information on this question is useful and briefly given in the present paper.

MATERIAL AND METHODS

The material studied (including type specimens) is deposited at the Zoological Institute, Russian Academy of Sciences, Saint Petersburg. All the specimens are dry and pinned. The photographs of their morphological structures were made with a Leica MZ16 stereomicroscope, and schematic pictures of the ectoparamere (one of the genital structures) were performed according to the methodology recently proposed by Gorochov (2019) for the subtribe Brachytrupina (Figs 20, 21, 26, 27). The online catalogue Orthoptera Species File (Cigliano et al. 2021) is here cited as OSF.

SYSTEMATICS

Tribe Gryllini Laicharting, 1781

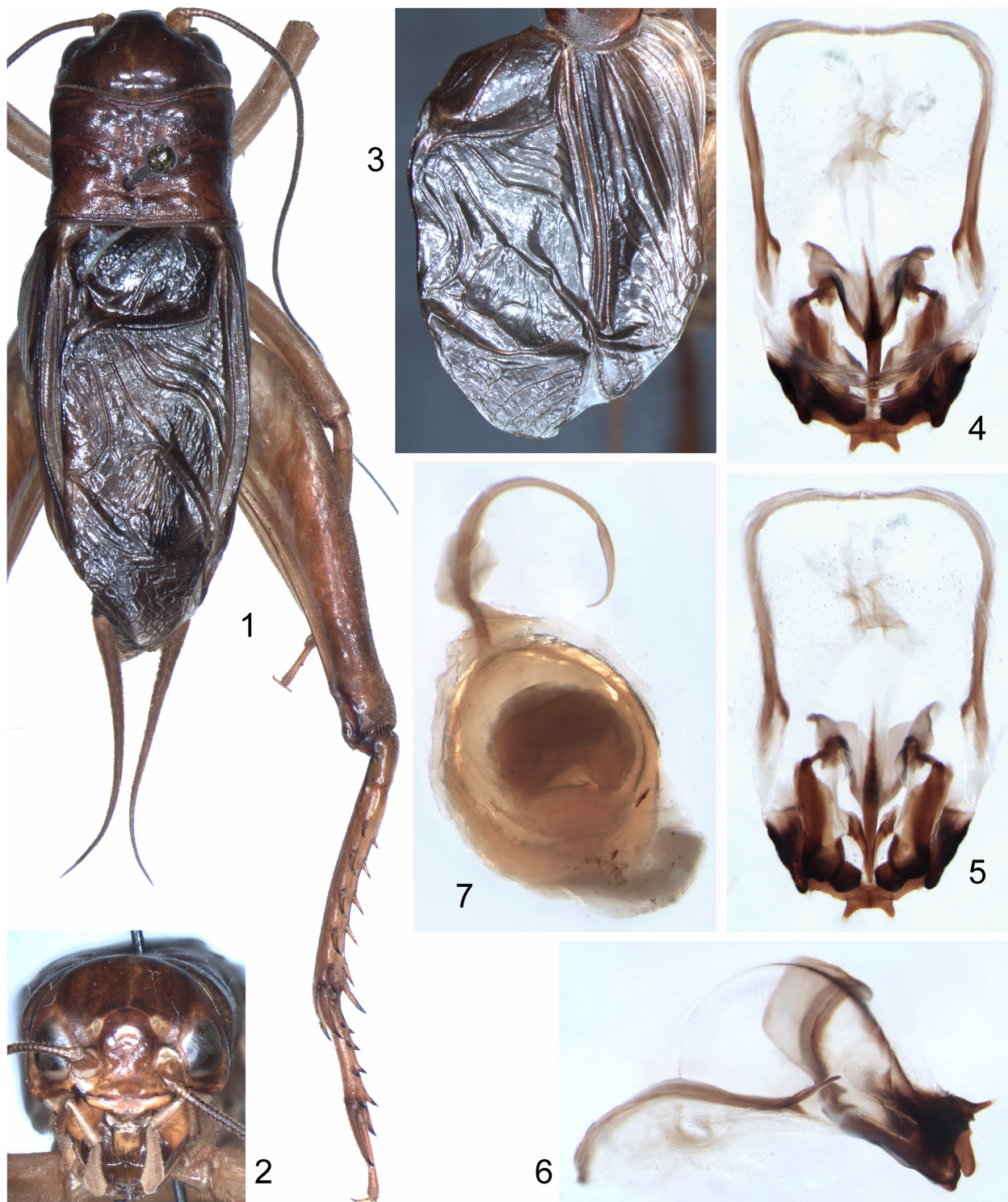
Subtribe Brachytrupina Saussure, 1877

Gymnogryllus egorovi Gorochov sp. nov. (Figs 1–7, 18)

Etymology. This species is named after its collector, A.M. Egorov.

Type material. *Holotype* – male, INDONESIA: Maluku Utara Prov., Halmahera I., eastern coast not far from Veda Town, forest on hill, 8–11 May 2019, A. Egorov.

Description. *Male* (holotype). Body medium-sized for this genus, shining, with following coloration: head intensively brown with light brown ocelli, three proximal segments of each antenna, indistinct areas on epicranium along clypeal suture and on lower halves of genae behind eyes, with greyish eyes, with dark brown a pair of transverse stripes on epicranium under eyes and a pair of small spots in dorsolateral corners of clypeus, with greyish brown labrum and rest of each antenna, and with more or less light brown rest of mouthparts (except for small and narrow blackish marks on maxillae but not on their palpi; Figs 1, 2); pronotum intensively brown but with poorly distinct reddish brown spots on disc, with also poorly distinct dark brown areas on lateral parts and with almost light brown band on each lateral lobe along anterior and middle thirds of its ventral edge (this edge rather dark); legs uniformly light brown but with numerous and almost indistinct yellowish/brownish oblique lines on lateral surface of hind femur, and with darkened denticles on hind basitarsus as well as distal portions of all spines (and spurs) and small marks in places of femorotibial articulations; tegmina with greyish brown dorsal field having dark brown basal area and semitransparent membranes in stridulatory apparatus (Fig. 1), and with light brown lateral field having brown band along dorsal edge (this band located between Sc and M and additionally occupying upper halves of membranes between Sc branches in distal third of this field; rest membranes between branches of Sc in distal half of this field almost semitransparent); other tergites more or less brown; anal plate and paraprocts greyish brown; venter of body light brown with light greyish brown genital plate having a pair of slightly darker and poorly distinct lateroproximal areas;



Figs 1–7. *Gymnogryllus egorovi* sp. nov., male, holotype (1, 2, 4–7) and paratype (3): 1 – body from above; 2 – head in front; 3 – right tegmen; 4–6 – genitalia from above (4), from below (5) and from side (6); spermatophore from side (7).

cerci also light greyish brown, with somewhat lighter bases. Structure of body almost typical of *Gymnogryllus*: rostrum between antennal cavities almost twice as wide as scape (Fig. 2); pronotum hardly wider than head, barely narrowing to posterior part which slightly widening to pterothorax (Fig. 1); legs with moderately large and oval outer tympanum (its length almost equal to width of fore tibia in tympanal region, and approximately 2.5 times as great as width of this tympanum), with much smaller inner oval tympanum (outer tympanum almost 2.5 times as long and almost 1.5 times as wide as inner tympanum), with normal apical spurs and five pairs of articulated dorsal spines on hind tibia, with four pairs of large dorsal denticles on hind basitarsus, and with inner spur of this basitarsus reaching distal third of apical segment of hind tarsus and almost twice as long as outer spur of this basitarsus (Fig. 1). However, tegmina not typical of this genus, because their oblique veins numerous (6–7), two of them distinctly S-shaped, chords and diagonal vein rather long and less curved, mirror primitive in structure (rather large, almost rectangular) but with short and incomplete dividing vein, apical area moderately long (with six branches) and reaching apex of anal plate (Fig. 1); lateral tegminal field with 9–10 branches of Sc (seven costal of them starting from base of this field, slightly oblique and from almost straight to somewhat arcuate; others starting from distal half of Sc stem, mostly shorter and from slightly S-shaped to clearly arcuate) and with moderately numerous but poorly distinct crossveins; hind wings strongly shortened, much shorter than tegmina. Genitalia and spermatophore (Figs 4–7) also clearly distinguished from those of other congeners: epiphallus (Figs 4, 6) transverse, with very short and wide posteromedian lobe having a pair of small lobules directed backwards and slightly aside, with a pair of short but narrower posterolateral lobes, with a pair of longer and rather wide anterolateral lobes having narrowly angular anteromedial projections, and with very wide and moderately deep as well as more or less rounded anteromedian notch; ectoparamere (Figs 5, 18) rather narrow and long (longer than epiphallus), with partly semisclerotized widened posterior portion having almost angular apical part and connected with narrowly triangular mesal lobe by very thin and rather short sclerotized ribbon, with longer and sclerotized proximal portion, with mesal lobe having narrow and long ribbon running backwards and almost reaching

apex of strong but not very long posterodorsal sclerite (process); endoparamere rather short, with large dorsal apodeme, without ventral apodeme, and with somewhat thinner (almost hooked) part connected endoparamere with ectoparamere (Figs 4, 6); virga rather short, moderately wide in middle part and with narrower but strong distal portion having acute apical part (Fig. 5); sacculus medium-sized, semicircular in profile, without sclerotized semitube along its anterior and dorsal edges (Fig. 6); rami very long, strongly curved in anterior portions and almost fused with each other anteriorly (Figs 4, 5); spermatophore as in Fig. 7.

Variation. Inner tympanum of left fore leg almost 1.5 times as long and wide as that of right fore leg (i.e. one inner tympanum somewhat smaller than in holotype, but other one slightly larger than in holotype); tegmina with 5–6 oblique veins in dorsal field and with less curved dividing vein in mirror (Fig. 3); hind tibia with four outer and five inner dorsal articulated spines; hind basitarsus with five inner and 3–4 outer dorsal denticles.

Female unknown.

Length (mm). Body 25–26; pronotum 5.6–5.8; tegmen 17–18; hind femur 17.5–18; hind tibia 11.4–11.7; hind basitarsus 4.6–4.8.

Comparison. The new species is clearly distinguished from all other congeners by the more numerous and partly S-shaped oblique veins in the male dorsal tegminal field, by the more primitive structure of the male tegminal mirror, and by the characteristic both the epiphallic shape and the ectoparameral structure in the male genitalia.

***Gymnogryllus vietnamensis mada* Gorochov
subsp. nov.**
(Figs 8–10, 19)

Etymology. This subspecies is named after Ma Da Forest (now Vinh Cuu Nature Reserve), its type locality.

Type material. *Holotype* – male, VIETNAM: Dong Nai Prov., Vinh Cuu Distr., Vinh Cuu Nature Reserve (= Ma Da Forest), TW Cuc Forest Station, 11°22'51"N, 107°03'44"E, ~75 m, 21–29 November 2010, L. Anisyutkin, A. Anichkin, A. Abramov, S. Kruskop. *Paratype* – male, same locality as for holotype, but 18–27 June 2011, L. Anisyutkin, A. Anichkin.

Description. *Male* (holotype). General appearance very similar to that of all other subspecies of



Figs 8–17. *Gymnogryllus vietnamensis* Gor., male: 8–10 – *G. v. mada* subsp. nov., holotype; 11–13 – *G. v. longidens* Gor.; 14–17 – *G. v. vietnamensis*. Dorsal tegmina in rest position (8, 11, 14); genitalia from below (9, 12, 15, 16) and from side (10, 13, 17). Scale bars show length of distal part of ectoparamere behind base of posterodorsal sclerite (10), and this length (bar nearest to ectoparamere) in comparison with that of *G. v. mada* subsp. nov. (13) as well as with those of *G. v. longidens* and *G. v. mada* subsp. nov. (17).

this species: epicranium and pronotum almost dark brown with slightly lighter (brown) but poorly distinct longitudinal lines on posterior half of epicranial dorsum, with almost blackish eyes, with light brown ocelli as well as round spot under median ocellus and triangular spot under previous spot, with almost yellowish areas in lower halves of genae and small lateral spot near each lateral ocellus, and with light brown to yellowish lower half of each lateral pronotal lobe; antennae greyish brown with almost light brown few proximal segments (including scapes); mouthparts mainly light brown (including palpi) with brown mandibles; legs also light brown, but hind femur with reddish tinge on outer surface and small dark marks in apical part; venter of body (including genital plate) and lower parts of abdominal tergites as well as cerci and anal plate light brown, but genital plate with brown to greyish brown distal part, and anal plate with darkened lateral parts (paraprocts also more or less darkened); tegmina with greyish brown but semi-transparent dorsal field and with yellowish and almost transparent lateral tegminal field having brown branches of Sc and stripe along dorsal edge of this field (areas between Sc and M); tegmina reaching apex of anal plate, with mirror in stridulatory apparatus slightly and barely more obliquely transverse than in *G. v. vietnamensis* Gorochov, 1992 and *G. v. longidens* Gorochov, 2011, respectively (compare Figs 8, 11, 14); hind wings insignificantly protruding beyond tegminal apices (exposed parts of hind wings approximately 1.5 mm in length). Genitalia distinguished from all other subspecies of this species by following characters: apical part of epiphallus with a pair of ventral teeth very long and located very near each other (almost as in *G. v. longidens*; compare Figs 28, 29 and 30); ectoparamere with distal (denticulate) portion clearly narrower than in nominotypical subspecies (see Figs 9 and 15, 16) and distinctly longer than in *G. v. longidens* (see Figs 9, 10 and 12, 13) as well as with more distinct angular projection (*pp*) at base of posterodorsal sclerite (see Figs 9, 10, 12, 13, 15–17, 19).

Variation. Coloration of second male slightly darker: dorsum of epicranium very dark brown and without lighter lines; pronotal disc also very dark brown but with a pair of distinct reddish brown marks; apical parts of all femora, dorsal part of hind femur and base of hind tibia brown; apical area of dorsal terginal field dark greyish brown.

Female unknown.

Length (mm). Body 25–28; body with wings 27–30; pronotum 5.7–6.8; tegmen 19–21; hind femur 17.0–18.5; hind tibia 9.5–10.5; hind basitarsus 4.5–4.8.

Comparison. The new subspecies is clearly distinguished from two other subspecies of *G. vietnamensis* by the characters of the male genitalia listed above (in the description), and from some most similar species, by the notch between the apical epiphallal teeth narrower and/or less deep (in caudal view; compare Figs 28 and 31–33).

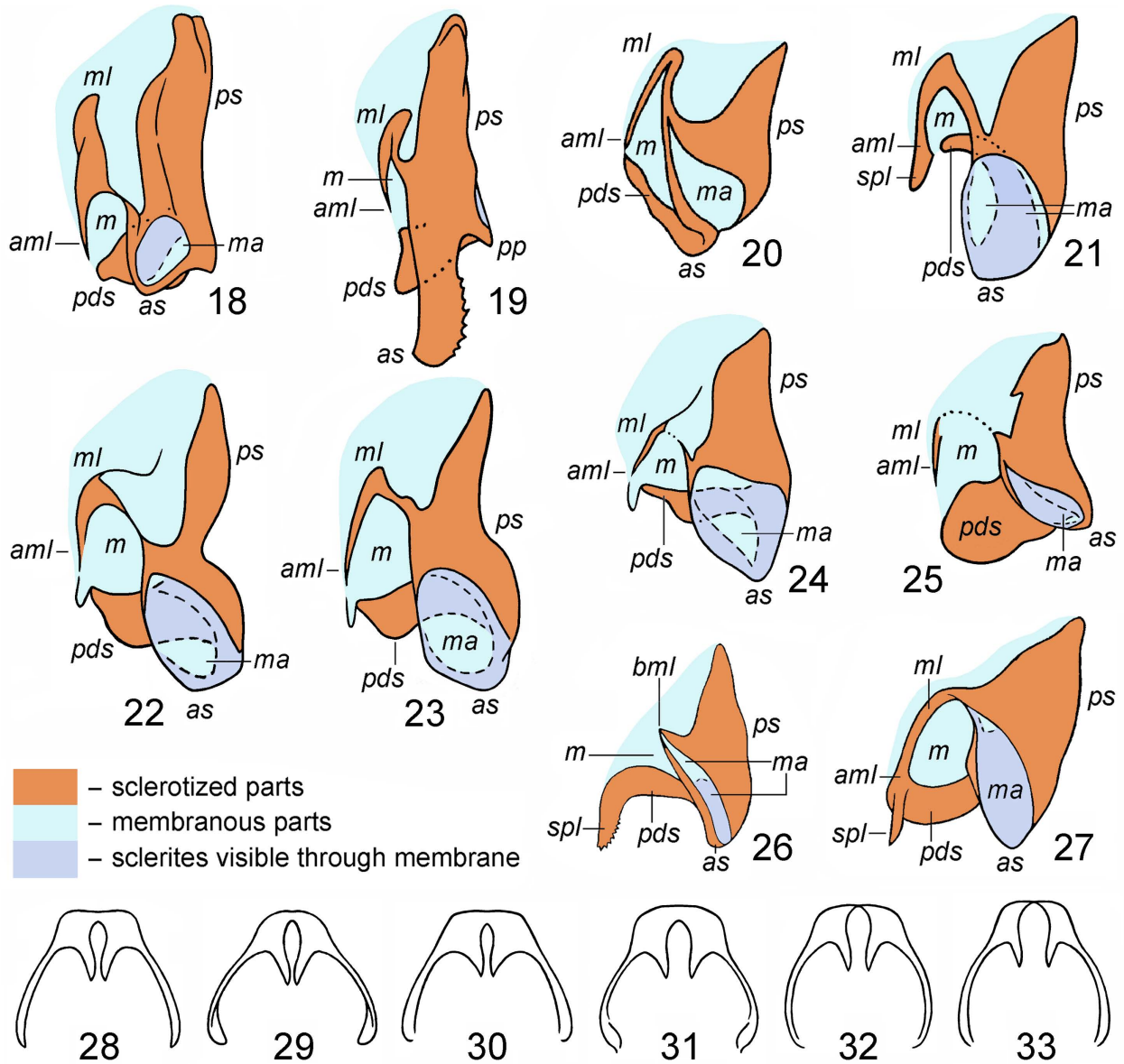
***Macrogyllus ephippium ephippium* (Saussure, 1877)**

= *Brachytrypus (Macrogyllus) ephippium* Saussure, 1877
(Fig. 22)

Material studied. INDONESIA: 2 males, *Southern Sumatra*, Lampung Prov., Bukit Barisan Selatan National Park, 20–30 km WNW of Kotagung Town, environs of Sukaraja Vill., 05°30′–31′S, 104°25′–27′E, ~600 m, primary forest in evening, during calling song near own burrow, 14–18 April 2009, A. Gorochov, M. Berezin, E. Tkatsheva; 1 male, *Borneo*, East Kalimantan Prov., ~20 km N of Balikpapan City, Bukit Bangkirai Park, 01°01′43″S, 116°51′49″E, forest on hills in evening, in same conditions, 4–8 October 2015, A. Gorochov, M. Berezin, I. Kamskov, E. Tkatsheva. MALAYSIA: 3 males, *Borneo*, Sabah State, Trus Madi Mt, ~1000 m, primary/secondary forest in evening, in same conditions, 13–25 May 2007, A. Gorochov.

Note. This subspecies was originally described as a species with the following geographical data: “Java?; l’Afrique?” (Saussure 1877). This description contained only some species characters: the body is very large; its coloration is almost uniformly dark; the hind tibia has three pairs of dorsal spines (other than apical spurs); the male tegmen is with seven free longitudinal veins in the lateral field, with eight oblique veins in the dorsal field, and with a slightly longitudinal mirror. Later this species was redescribed by Chopard (1969) who assigned specimens to it only from Java and the Malay Peninsula; however, neither of these authors described or illustrated the male genitalia of this species. Possibly the Malay specimens may belong to another species of this genus which is described below as new one.

The general appearance of the above-mentioned males from Southern Sumatra and Borneo is almost



Figs 18–33. Structures of male genitalia (schematically), left ectoparamere from below (18–27) and epiphallallic apex from behind (28–33): 18 – *Gymnogryllus egorovi* sp. nov.; 19 – *G. vietnamensis mada* subsp. nov.; 20 – *Phonarellus minor* (Chop.); 21 – *Tarbinskiellus portentosus* (Drury); 22 – *Macrogryllus ehippium ehippium* (Sauss.); 23 – *M. e. vespertinus* Gor.; 24 – *M. canorus* sp. nov.; 25 – *M. bi-color* Chop.; 26 – *Megalogyllus (Megalogyllus) excellens* Gor.; 27 – *M. (Gigantogyllus) neotropicus* (Gor.); 28 – *G. v. mada* subsp. nov.; 29 – *G. v. longidens* Gor.; 30 – *G. v. vietnamensis* Gor.; 31 – *G. sylvestris* Gor.; 32 – *G. obscurus* Gor.; 33 – *G. equinus* Gor. [20, 21, 26, 27 – after Gorochov (2019); 29–33 – after Gorochov (2011).]

Abbreviations: *aml* – apex of mesal lobe; *as* – apical (medial) sclerite; *bml* – base of mesal lobe without most part of this lobe (26); *m* – membrane between mesal lobe and posterodorsal sclerite; *ma* – membranous area between apical and proximal sclerites (18, this area in *G. egorovi* sp. nov. semisclerotized; 19, this area in majority of other species of this genus perhaps secondarily sclerotized); *ml* – mesal lobe; *pds* – posterodorsal sclerite; *pp* – posterolateral projection at base of posterodorsal sclerite (19); *ps* – proximal (main) sclerite; *spl* – spine-like process at apex of mesal lobe (21), at apex of posterodorsal sclerite (26), and in place of their fusion (27).

identical to the description of *M. e. vespertinus* Gorochov, 2001 from Central Sumatra (Gorochov 2001), including the presence of a rather large yellowish area on the apical part of the hind femur (this area almost completely occupying this apical part, except for a pair of darkened lateral spots); but these males differ from those of the latter subspecies in some small characters of the male genitalia: their ectoparamere is with the posterior portion shorter and having more convex medial edge, and with the anterior portion longer and more strongly narrowed near the posterior portion (for comparison see Figs 22 and 23). Also these males are in accordance to Saussure's description and pictures, because the number of dorsal spines in their hind tibiae is somewhat varied (3:3; 3:4; 4:4; 4:5), and the male tegminal mirror is from slightly longitudinal to almost as long as wide; and it is highly probable that Javanese subspecies may also live in Southern Sumatra (these territories are faunistically very similar), although the presence of Javanese forest subspecies in Borneo is somewhat surprising.

Remark. The burrows of the above-mentioned calling males were very similar to those of *M. e. vespertinus* described previously (Gorochov 2001: figs 193, 194).

***Macrogryllus canorus* Gorochov sp. nov.**
(Figs 24, 39–43)

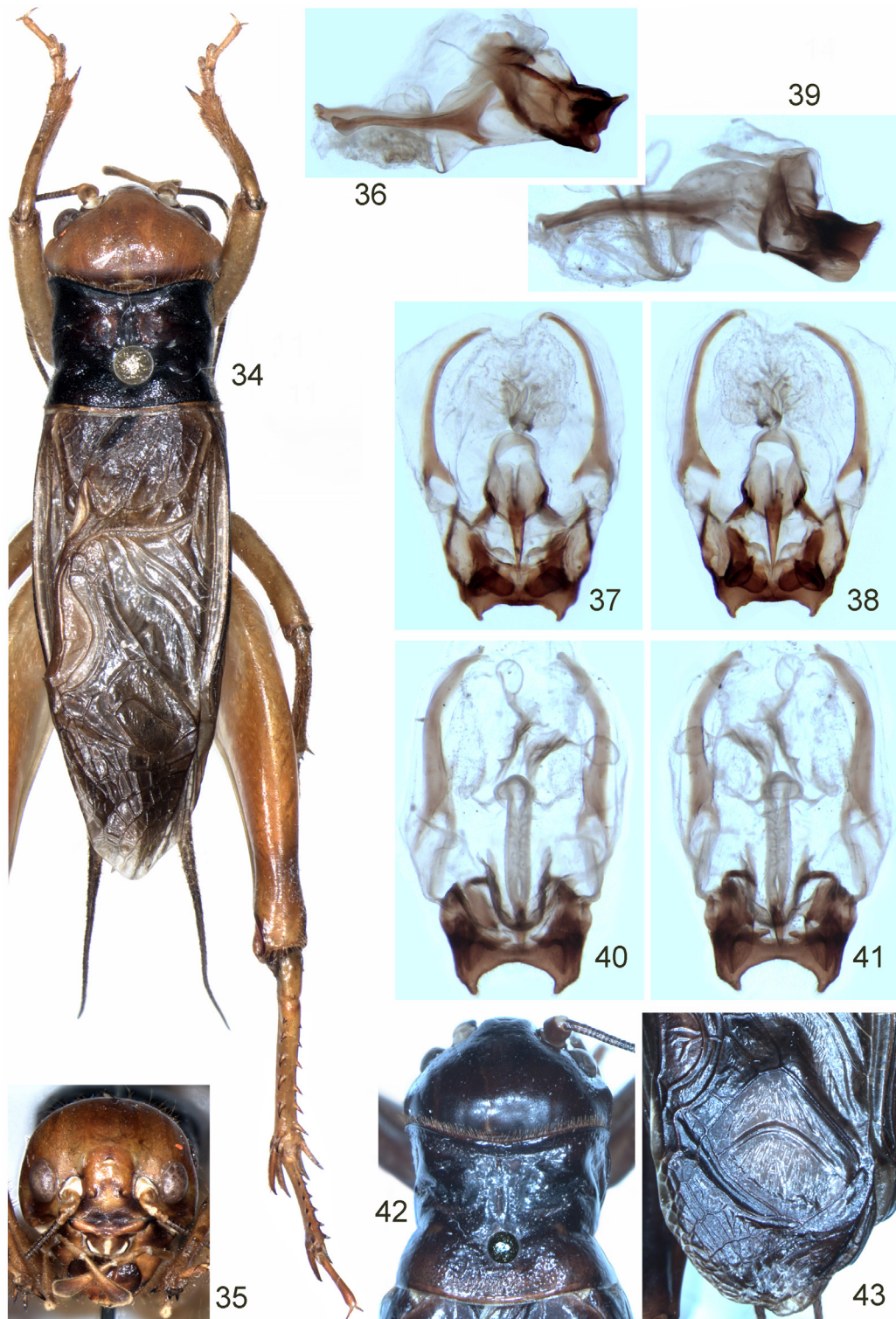
Etymology. This species name is the Latin word "canorus" (loud) in connection with its loud calling song.

Type material. *Holotype* – male, MALAYSIA: Malay Peninsula, Pahang State, Fraser's Hills near border with Selangor State, 17–18 km SW of Raub Town, 1000–1300 m, primary forest in evening, during calling song near own burrow, 15–23 April 2010, A. Gorochov, M. Berezin, E. Tkatsheva. *Paratypes*: 5 males, same data as for holotype.

Description. *Male* (holotype). Size and coloration of body very similar to those of *M. ephippium*: head and pronotum shining, black with yellowish ocelli and lower half of clypeus, with greyish eyes, with greyish brown antenna having barely lighter (brown) three proximal segments (including scape), with light brown rest of mouthparts having dark brown upper half of clypeus and upper parts of mandibles as well as brown areas on labrum and on proximal two thirds of maxillary palpi, and with almost dark brown ventral halves of lateral pronotal lobes and brown trans-

verse band along posterior pronotal edge; legs dark brown to brown with light greyish brown coxae and trochanters, with light brown tarsi (except for rather dark hind basitarsus) and apices of tibiae, and with not large yellowish spot on only dorsal surface of apical part of hind femur; tegmina also shining, blackish with almost semitransparent membranes of stridulatory apparatus, with light brown short thickened vein near plectrum, with greyish both intercalary triangle and stripe along medial and posterior edges of apical area of dorsal field, and with dark brown lateral field having ventroproximal area (i.e. area along basal part of costal edge) greyish. External structure also very similar to that of this species (head very large and rather high, rostrum between antennal cavities almost twice as wide as scape, all ocelli located almost along one transverse line, pronotum distinctly saddle-backed in profile and slightly narrowing to its posterior third as well as somewhat widening backwards in this third; Fig. 42), but outer tympanum almost 2.5 times as long as wide and approximately as long as width of fore tibia in tympanal region, this tympanum also almost 1.5 times as long and wide as inner tympanum, hind tibia with three pairs of not large dorsal spines having bases almost fused with this tibia, tegmina hardly protruding beyond abdominal apex and with seven oblique veins as well as with mirror barely transverse (Fig. 43), and hind wings insignificantly not reaching tegminal apices. Genitalia (Figs 39–41) clearly distinguished from those of this species by ectoparamere having proximal (anterior) portion distinctly shorter and not separated from its distal (posterior) portion by strong narrowing, latter (posterior) portion with distinctly less convex lateral edge (in ventral view), mesal lobe somewhat smaller (shorter) but with similar membranous finger-like process at apex, posterodorsal sclerite thinner (narrower) and with longer apical lobule (see Figs 22, 23 and 24).

Variation. Dark parts of body often dark brown or brown, but in latter case, epicranium with large dark brown anterior area, tegmina with dark brown spots on posterior part of basal area in dorsal field and before (near) plectrum as well as with larger light brown mark after (but also near) plectrum reaching place of contact of 1A with 2A in basal area (membranes in rest part of dorsal field and in lateral field also slightly lighter than in holotype), and legs with almost dark brown area in middle part of hind femur and in basal part of hind tibia; light dorsal spot on



Figs 34–43. *Macrogyryllus* Sauss., male: 34–38 – *M. bicolor* Chop.; 39–43 – *M. canorus* sp. nov. Body from above (34); head in front (35); genitalia from side (36, 39), from above (37, 40) and from below (38, 41); head and pronotum from above (42); distal half of dorsal tegminal field (43).

apical part of hind femur sometimes slightly larger than in holotype and with a pair of narrow tongues almost reaching ventral surface of this femur, but often this spot light brown (less distinct) and smaller than in holotype. Hind tibiae sometimes with four dorsal inner spines. Genitalia in some males with slightly narrower anterior portion of ectoparamere and with barely more angular or almost truncate apical ectoparameral part.

Female unknown.

Length (mm). Body 35–40; body with wings 38–42; pronotum 8.0–8.5; tegmen 29–31; hind femur 21.5–23.0; hind tibia 11.5–12.5; hind basitarsus 5.5–5.8.

Comparison. The new species differs from *M. ephippium* mainly in the characters of the male genitalia, listed above, as well as in a smaller light spot located only on the dorsal surface of the hind femur apical part. From three other species included in this genus by previous authors (see OSF), the new species is distinguished by the same characters as *M. ephippium*: the body is distinctly larger, and/or the coloration is different (two of these other species are known only in Africa and may be members of another genus, and data about third one are given below).

Remark. The burrows with calling males of this species were also similar to those of *M. ephippium*.

***Macrogyllus bicolor* Chopard, 1930**
(Figs 25, 34–38)

Material studied. MALAYSIA, *Borneo*: 1 male, Sabah State, Trus Madi Mt, ~1000 m, primary/secondary forest in evening, during calling song in own burrow, 13–25 May 2007, A. Gorochov; 1 male, same state, Tawau Hills National Park near Tawau City, 200–400 m, primary/secondary forest in evening, in same conditions, 14–20 May 2013, A. Gorochov, M. Berezin, E. Tkatsheva.

Description. *Male* (nov.). General appearance somewhat similar to that of *M. ephippium* and *M. canorus* sp. nov., but body distinctly smaller, and coloration other (Figs 34, 35): head yellowish to light brown with reddish tinge, whitish ocelli, greyish or greyish brown eyes, short brown stripe on epicranium along clypeal suture, a pair of small brown oblique stripes between antennal cavities, somewhat darkened small areas under eyes, greyish brown antenna with light brown or yellowish scape and pedicel, and light brown or brown mouthparts having brown median spot or light brown lateral spots on

upper half of clypeus, three narrow whitish stripes on lower half of clypeus and sometimes somewhat darkened marks on labrum and on proximal parts of mandibles (palpi in both specimens light brown); pronotum uniformly black but with a pair of small dark reddish brown marks on disc; legs light brown but sometimes with slightly darkened subapical part of hind femur and base of hind tibia as well as some spines and spurs of hind leg; tegmina greyish with semitransparent membranes in stridulatory apparatus, barely darkened basal and apical areas in dorsal field, and greyish brown lateral field having area between R and M as well as short basal stripe along costal edge slightly lighter; rest of body light brown to almost yellowish with greyish brown abdominal tergites, anal plate, paraprocts and cerci (genital plate sometimes with slightly darkened apical part). Shape of head and pronotum similar to that of *M. ephippium* and *M. canorus* sp. nov., but pronotum slightly less widened in posterior part (for comparison see Figs 34 and 42); outer tympanum almost thrice as long as wide and slightly longer than width of fore tibia in tympanal region; inner tympanum much smaller (outer tympanum approximately twice as long and wide as inner one); hind tibia with 5–6 outer and 5–6 inner dorsal spines (these spines rather short and similar to those of *M. canorus* sp. nov. in structure); tegmina reaching abdominal apex, with four oblique veins, with mirror barely longitudinal and having one dividing vein (Fig. 34) but sometimes two such veins, and with 13–15 branches of Sc (three or four distal branches more or less S-shaped and starting from Sc stem; other branches almost straight to somewhat arcuate, but two or three of them starting from proximal half of Sc stem) and sparse crossveins in lateral field; hind wings distinctly not reaching tegminal apices; genitalia as in Figs 36–38 (their ectoparamere rather similar to that of *M. canorus* sp. nov. but with lateral edge more concave than in this species and less concave than in *M. ephippium*, and with posterodorsal sclerite wider than even in *M. ephippium* and without distinct apical lobule; see Figs 22–24 and 25).

Female. Judging by original description (Chopard 1930), holotype (female) from Sarawak State of Malaysia (*Borneo*) almost indistinguishable from above-mentioned males in size, coloration and other non-sexual characters, but its tegmina completely black, with nine longitudinal veins in dorsal field and four branches clearly starting from Sc stem in lateral

field, and with rather short ovipositor (hind femur approximately 2.7 times as long as ovipositor).

Length (mm). Body: male 23–24, female 29; pronotum: male 4.7–5.0, female 4.5; tegmen: male 15.5–17.0, female ?; hind femur: male 14–15, female 16; hind tibia: male 7.3–7.5, female 8; hind basitarsus: male 3.7–4.0, female ?; ovipositor 6.

The measurements of female are given according to Chopard (1930).

Remark. These males were collected inside characteristic burrows consisted of a rather high ground cone, made by these insects, with an almost vertical tunnel running from the top of this cone to an underground cavity, where these males were hiding during their calling song.

ACKNOWLEDGEMENTS

The author is grateful to the collectors of these interesting insects. This study was performed in the frames of the state research project No. 122031100264-8 (Russian Federation).

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