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REVIEW OF THE CRICKET GENUS *AGRYLLUS* (ORTHOPTERA: GRYLLIDAE, GRYLLINAE)

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Summary. The genus *Agryllus* Gorochov, 1994 is revised except for one problematic species from Indonesia. One species, *A. excultus* Gorochov, 1994 from Vietnam, is here redescribed; *A. magnigenitalis* He et Gorochov, **sp. n.**, *A. hemiapterus* Gorochov, **sp. n.** and *A. siam* Gorochov, **sp. n.** are described from China, Laos and Thailand, respectively. A key to the Chinese and Indochinese species of *Agryllus* is provided.

Key words: Orthoptera, Gryllidae, *Agryllus*, taxonomy, new species, key, South-East Asia.

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Резюме. Ревизован род *Agryllus* Gorochov, 1994, за исключением одного проблематичного вида из Индонезии. Переописан *A. excultus* Gorochov, 1994 из Вьетнама; описаны *A. magnigenitalis* He et Gorochov, **sp. n.** из Китая, *A. hemiapterus* Gorochov, **sp. n.** из Лаоса и *A. siam* Gorochov, **sp. n.** из Таиланда. Составлена определительная таблица китайских и индокитайских видов рода *Agryllus*.

INTRODUCTION

The genus *Agryllus* Gorochov, 1994 was established for two species: *A. excultus* Gorochov, 1994 from Vietnam and *Cophogryllus euzonus* Saussure, 1877 from Java (Gorochov, 1994). However, the latter species was included in this genus provisionally, because it was described from a single female, and its male genitalia were unstudied (Saussure, 1877); males of this species are unknown up to now. Recently, some additional material on *Agryllus* from Vietnam, China, Laos and Thailand has appeared. In this material, three new species were discovered, and they are described below.

The material studied (including type specimens) is deposited at Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZIN) and East China Normal University, Shanghai (ECNU). All the specimens are dry and pinned, with the male genitalia in glycerine preparations. The photographs of specimens and their parts were made using Leica M216 stereomicroscope and Canon G9 camera.

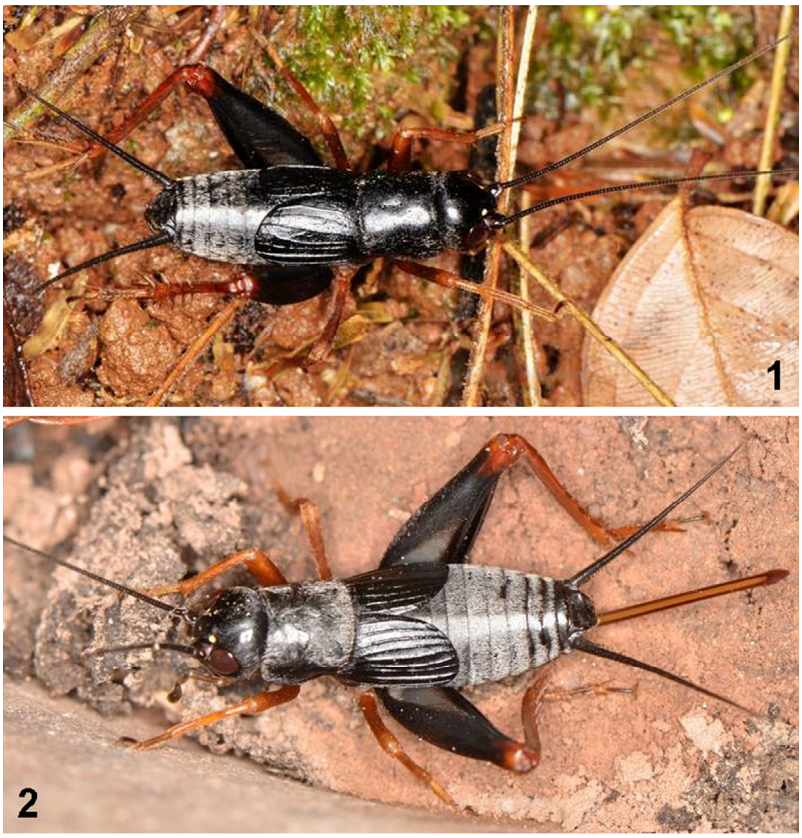
TAXONOMY

Tribe Gryllini

Genus *Agryllus* Gorochov, 1994

Type species: *Agryllus excultus* Gorochov, 1994, by original designation.

DIAGNOSIS. Body more or less medium-sized for Gryllinae, with shining (almost not pubescent) head, tegmina and sometimes tergites, and with more distinctly pubescent rest of body. Colouration of most part of head, tergites, tegmina, hind femora, abdominal sternites and apex of abdomen very dark (from dark brown to black) but with small brown to very light markings on head, yellowish transverse band on metanotum, large whitish or light grey area on inner proximal and middle parts of hind femora (this area sometimes absent or reduced), and light brown apical part of these femora; venter of thorax, fore and middle legs, as well as hind coxae, tibiae and tarsi also light brown (sometimes with slightly darkened areas) (Figs 1–6, 33, 34). Head almost semiglobular, approximately as wide as pronotum, with rather low



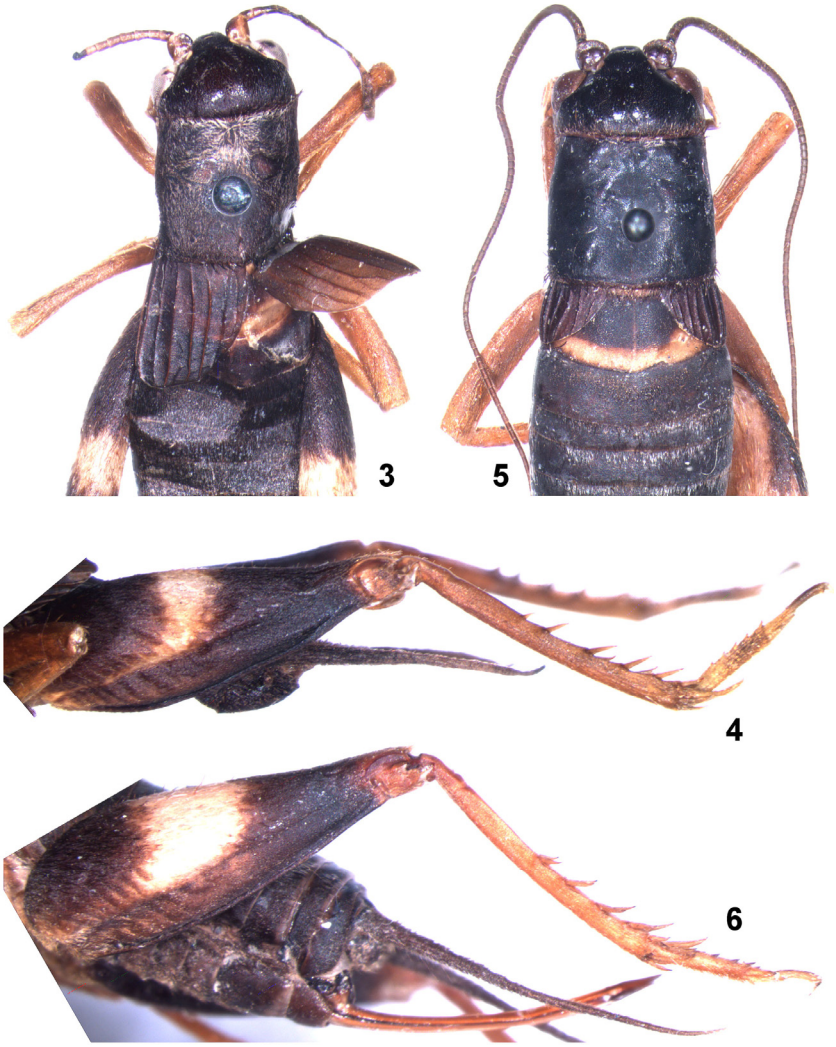
Figs 1, 2. *Agryllus magnigenitalis* sp. n. in living condition: 1 – male; 2 – female. (Photographs by Zhang Tao).

and rounded (in profile) rostrum; scape equal to space between antennal cavities or insignificantly wider; eyes rather large; ocelli located in shape of transverse triangle (lateral ocelli round and rather large, almost twice larger than transverse median ocellus); clypeal suture barely and roundly angular; mouthparts normal (unspecialized), with moderately long maxillary palpi (their apical segment approximately as long as height of eye). Pronotum moderately high, with rounded borders between disc and lateral lobes; pronotal disc barely narrowing to head or having parallel lateral edges, with slightly concave anterior and slightly convex posterior edges (disc somewhat longer than wide; Figs 3, 5, 33), and with oblique posteroventral edge of lateral lobes (Fig. 10, 34). Legs typical of Gryllinae; however, they not very short and moderately slender (quite not digging) but with normally thickened (for jumps) hind femora; tympana absent; hind tibiae slightly shorter than hind femora (Figs 1, 2, 4, 6, 33, 34), with 4 pairs of moderately short dorsal spines and 2 inner apical spurs distinctly longer than 4 other apical spurs (but a pair of ventral apical spurs and dorsal outer spur short, clearly shorter than other spines and spurs of these tibiae). Tegmina strongly or moderately shortened, in both sexes almost identical, without stridulatory apparatus, with numerous and almost parallel longitudinal veins in dorsal and lateral fields, and without cross-veins (Figs 1–3, 5, 11, 33, 34); hind wings absent. Metanotum and abdominal tergites similar in structure; anal plate unspecialized, similar in male and female, typical of Gryllinae in shape; male genital plate distinctly larger than anal one, almost cup-like (its width and length more or less equal), with rather widely rounded distal part; female genital plate distinctly smaller, triangular but with widely truncated (weakly and roundly notched) apical part having posterolateral corners rounded. Male genitalia with rather short epiphallus having wide anterior lobe curved upwards and somewhat backwards as well as a pair of posterior lobes elongate and more or less bifurcated in profile (dorsal projection of these lobes clearly longer than ventral projection and with distinct setae on ventral surface; Figs 7–9, 15–32, 35–37); ectoparameres not long (clearly not reaching apices of latter lobes), partly membranous, with elongate anterior part, with short and widened posterior part, and with mesal lobe rather small and located mainly near posterior part of ectoparamere (Figs 8, 16, 19, 22, 25, 28, 31, 36); endoparameres thin, arcuate, with dorsal (medial) parts fused with each other and forming unpaired angular structure directed backwards and sometimes having distinct unpaired apodeme at apex of this angular structure (Figs 7, 9, 15, 17, 18, 20, 21, 23); rachis (guiding rod) more or less short and virga-like but not very thin; sacculus (spermatophore sac) rather small and shallow, almost completely membranous but with small transverse sclerite in its anterior part; rami rather long and mostly thin (Figs 7–9, 15–32, 35–37). Ovipositor rather long (Figs 2, 6), with slightly widened and dorsoventrally flattened short distal part; this part with very small denticles situated laterally on upper valves and with acute apical part (Figs 13, 14).

SPECIES INCLUDED. *Agryllus excultus* Gorochov, 1994, *A. magnigenitalis* sp. n., *A. hemiapterus* sp. n., *A. siam* sp. n., and probably *C. euzonus* Saussure, 1877. The latter species, described in the genus *Cophogryllus* Saussure, 1877 from Java without more exact geographical data, has its general habitus, including a whitish middle area on the hind femur, as in some other representatives of *Agryllus*, but tegmina and ovipositor of Saussure's species are much shorter and may belong to a nymph; Saussure, 1877: pl. XIII, figs 1, 1a).

COMPARISON. This genus is related and more or less similar to *Acanthoplistus* Saussure, 1877, *Mimicogryllus* Gorochov, 1994 and *Squamigryllus* Gorochov, 2001, but it differs from the first two genera in the absence of tympana and any stridulatory apparatus in the male tegmina as well as shortened tegmina and the absence of hind wings; from *Acanthoplistus*, it is distinguished also by the absence of any carina between the pronotal lobe and disc; from *Mimicogryllus*, by a globular (not flattened) shape of the head, much wider space between the antennal cavities, the pronotum less strongly narrowing to the head, and less thin legs; from

Squamigryllus, by the same character of pronotum as from *Acanthoplistus* and a clearly narrower space between the antennal cavities; and from all these genera, in the following features of male genitalia: anterior epiphallic lobe is curved upwards-backwards, posterior part of ectoparameres is not semitubular, and mesal lobe of ectoparameres is short (from *Acanthoplistus*); ectoparameres are longer, and rachis is much thinner (from *Mimicogryllus*); ectoparameres are distinctly smaller, and rachis is much shorter and lacking a rather large anterior widening (from *Squamigryllus*) (for comparison see Gorochov, 2001: figs 218–227).



Figs 3–6. *Agryllus*: 3, 4 – *A. excultus* Gor., male; 5, 6 – *A. hemiapterus* sp. n., male (5) and female (6). Body without posterior part from above (3, 5); hind femur from side (4); hind femur and distal part of abdomen from side (6).

Key to Chinese and Indochinese species of *Agryllus*

1. Tegmina larger, reaching 2nd–5th abdominal tergites and with medial parts slightly or distinctly overlapping each other in resting position (Figs 1–3, 33, 34) 2
– Tegmina smaller, reaching posterior part of metanotum or anterior part of 1st abdominal tergite and not contacting with each other in resting position (Fig. 5) .... *A. hemiapterus* **sp. n.**
2. Hind femur dark with whitish or light grey band in middle portion (Figs 4, 6, 12, 33, 34) 3
– Hind femur mostly uniformly dark, i. e. without any light mark in middle portion (Figs 1, 2) .. .. *A. magnigenitalis* **sp. n.**
3. Tegmina shorter, reaching 2nd–3rd abdominal tergites (Fig. 3); male genitalia with rather strongly bifurcated posterolateral lobes of epiphallus in profile (Fig. 9) ..... *A. excultus*
– Tegmina longer, reaching 5th abdominal tergite (Figs 33, 34); posterolateral lobes of epiphallus in male genitalia almost not bifurcated in profile (each of these lobes with small ventral notch only; Fig. 23) ..... *A. siam* **sp. n.**

***Agryllus excultus* Gorochov, 1994**
Figs 3, 4, 7–14, 24–26

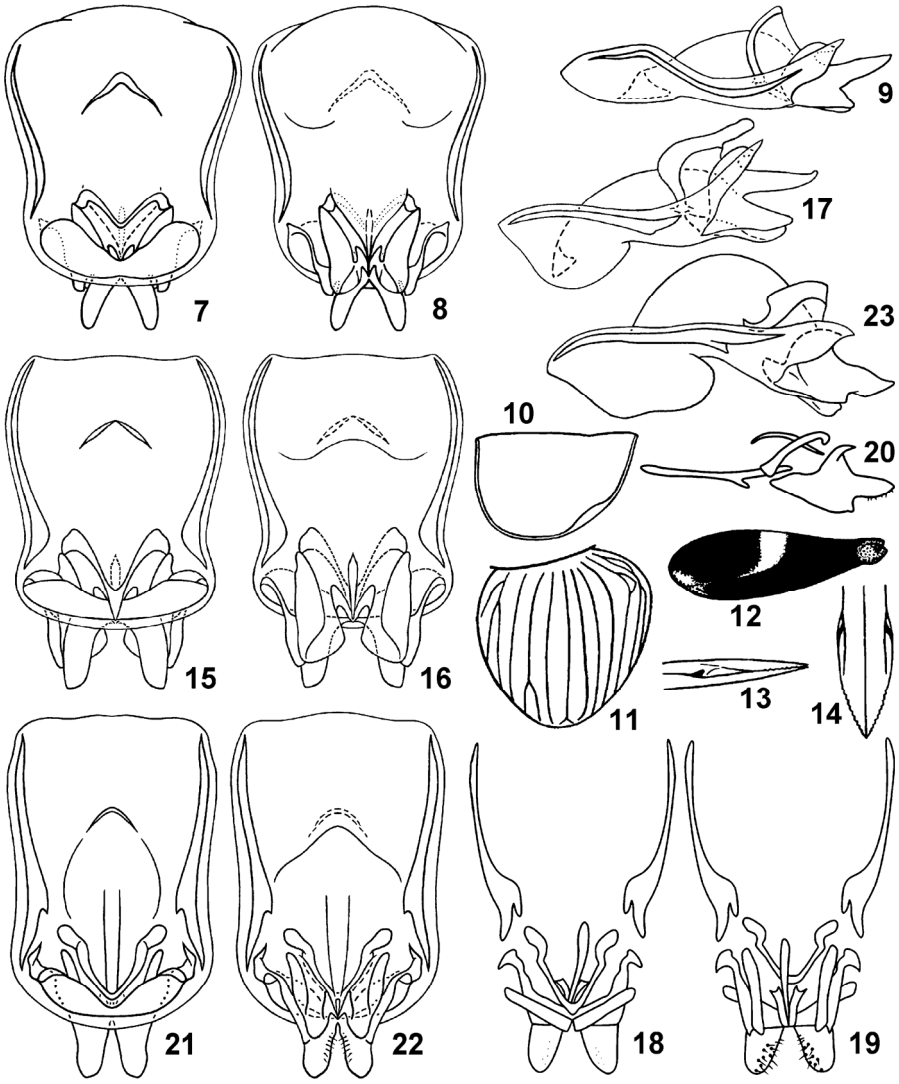
MATERIAL EXAMINED. **Vietnam**: Gia Lai Prov., Thai Nguyen Plateau, ~20 km N of Kannack Town, environs of Buon Luoi Vill., 800 m, primary forest, 3–11.XI 1993, 1 ♂ (holotype), coll. A. Gorochov (ZIN); Southern Vietnam, 1 ♀ (paratype) (ZIN); 12 ♂, 9 ♀, same locality as for holotype but 24.III–10.V 1995, A. Gorochov (ZIN). Most specimens collected on forest floor among dry leaves at night with flashlight; holotype collected as small nymph, with imaginal moult IV 1994.

REDESCRIPTION. MALE (holotype). Head very dark brown with greyish eyes, whitish ocelli, brown most part of clypeus and mandibles, yellowish labrum (but with brown dorsomedian spot), light brown palpi, and almost yellowish rest of mouthparts; thoracic tergites, tegmina and abdomen also very dark brown but with wide yellowish transverse band on metanotum; sternites of pro- and mesothorax light brown, but metathoracic sternite almost brown; legs also light brown with hind femora blackish but having light brown apical part, almost whitish large area on inner proximal and middle parts, light brown to yellowish small proximal outer spot, and brown outer area between latter spot and large whitish or light greyish area (Figs 3, 4). Pronotum and abdominal tergites slightly pubescent. Tegmina reaching posterior part of 2nd abdominal tergite, slightly narrowing to more or less rounded apex, with 6 longitudinal veins in dorsal and 5–6 such veins in lateral fields; all these veins in shape of low keels, and some of them with short additional branches (Figs 3, 11). Genitalia with anterior epiphallic lobe (curved upwards-backwards) having lateral parts rather wide (long), and with posterior epiphallic lobes having widely angular notches between them (in dorsal view) and between dorsal and ventral projections of each lobe in profile (dorsal projection approximately 1.5 times as long as ventral one; Figs 7–9, 24–26); mesal lobe not completely separated from ectoparamere and with narrowly angular anterior apex (Fig. 8); endoparameres with median angular structure rather short, not reaching anterior edge of epiphallus (Figs 7, 9); rami almost completely thin and without medial projections (Figs 7–9, 24–26).

VARIABILITY. Head, pronotum, tegmina and abdominal tergites often mostly black; ocelli sometimes yellowish; distal part of maxillary palpi sometimes almost brown; whitish band on hind femur from clearly larger (almost 1.5 times as wide as that in holotype) to distinctly smaller (approximately half of that in holotype); tegmina sometimes reaching anterior part of 3rd abdominal tergite; number of their veins insignificantly varied.

FEMALE. Colouration and structure of body as in male. Hind femur approximately 1.1 times as long as ovipositor; ovipositor light brown, straight and with distal part as in Figs 13, 14.

MEASUREMENTS (length in mm). Body: ♂ 11.5–13.5, ♀ 12–14.5; pronotum: ♂ 3–3.3, ♀ 3.3–3.8; tegmina: ♂ 3.4–3.8, ♀ 3.5–4; hind femora: ♂ 8.5–9.5, ♀ 9.2–10.5; hind tibiae: ♂ 6.5–7.2, ♀ 6.7–7.6; ovipositor 8.5–9.3.



Figs 7–23. *Agryllus* (schematically): 7–14 – *A. excultus* Gor.; 15–17 – *A. hemiapterus* sp. n.; 18–20 – *A. magnigenitalis* sp. n.; 21–23 – *A. siam* sp. n. Male genitalia from above (7, 15, 18, 21), from below (8, 16, 19, 22) and from side (9, 17, 20, 23); pronotum from side (10); right tegmen (11); hind femur from side (12); distal part of ovipositor from side (13) and from above (14). (Figs 7–14, after Gorochov (1994) with corrections).

***Agryllus magnigenitalis* He et Gorochov, sp. n.**
Figs 1, 2, 18–20, 30–32

TYPE MATERIAL. Holotype – ♂, **China**: Yunnan Prov., Xishuangbanna, 1.V 2015, Zhu Xiaoyu (ECNU). Paratypes: 2 ♀, same data as for holotype (ECNU).

DESCRIPTION. MALE (holotype). Colouration and structure of body similar to those of *A. excultus* but with following characteristic features: head, thoracic tergites, tegmina and abdomen mostly black, approximately as in some paratypes of *A. excultus*; legs light brown with orange tinge and black most part of hind femora (whitish or light greyish area in middle and inner proximal parts of hind femora absent, but this inner part less darkened, and apical part of these femora as other legs in colour; Fig. 1); tegmina very similar to those of *A. excultus* but reaching middle part of 5th abdominal tergite, with 7 longitudinal veins in dorsal and 6 such veins in lateral fields (Fig. 1); genitalia with anterior epiphallic lobe (curved upwards-backwards) having lateral parts rather narrow (short), with dorsal projection of posterior epiphallic lobes wider than in *A. excultus* (Figs 18, 30), with ventral projection of these lobes very short (much shorter than in *A. excultus*) and having almost rectangular notch between it and dorsal projection in profile (Figs 20, 32); mesal lobes larger, completely separated from ectoparameres and with almost truncate anterior apex (Figs 19, 31); endoparameres with median angular structure somewhat longer than in *A. excultus* (reaching anterior edge of epiphallus) and having small median apodeme (Figs 18, 20, 30, 32); rami rather strongly widened in posterior third and with short medial projections directed backwards (Figs 18–20, 30–32).

FEMALE. General appearance as in male, but tegmina reaching middle part of 4th abdominal tergite. Abdominal apex almost indistinguishable from that of female of *A. excultus*, but ovipositor practically equal to hind femur in length (Fig. 2).

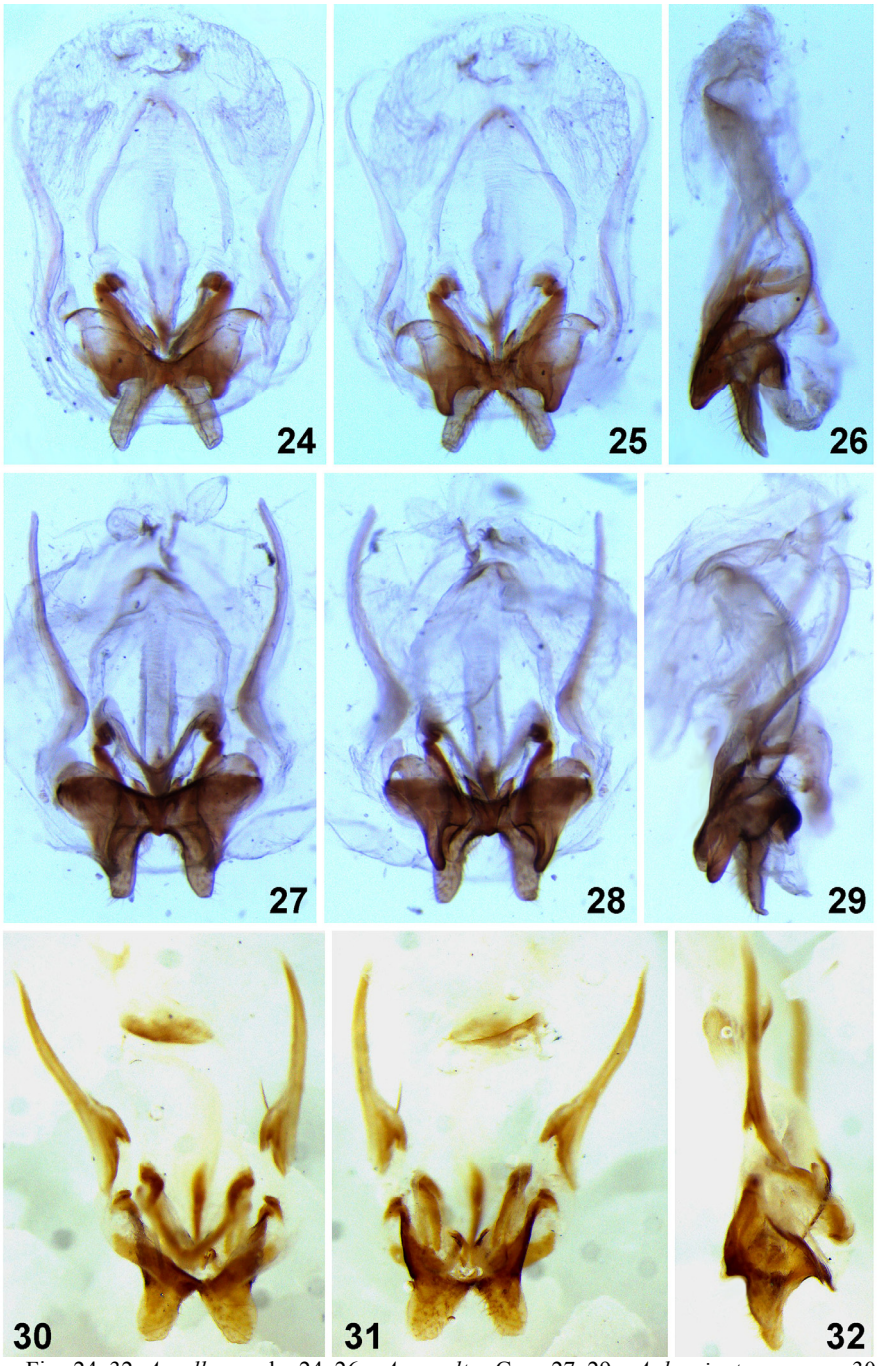
MEASUREMENTS (length in mm). Body: ♂ 13, ♀ 15; pronotum: ♂ 4, ♀ 4; tegmina: ♂ 4.5, ♀ 4.5–5; hind femora: ♂ 10, ♀ 10–11; hind tibiae: ♂ 7, ♀ 8; ovipositor 10–11.

ETYMOLOGY. Species name *magnigenitalis* reflects the presence of expanded posterior epiphallic lobes in male.

***Agryllus hemiapterus* Gorochov, sp. n.**
Figs 5, 6, 15–17, 27–29

TYPE MATERIAL. Holotype – ♂, **Laos**: Champasak Prov., Bolaven Plateau, 14 km SE of Muang Paxong, Ban Houayteuat, 1200 m, 15°4.655′N, 106°16.848′E, "disturb mountain forest, carrion trap", 6.V–14.VI 2008, S. Tarasov (ZIN). Paratypes: 1 ♂, 9 ♀, same data as for holotype (ZIN).

DESCRIPTION. MALE (holotype). Colouration and structure of body similar to those of *A. excultus* and *A. magnigenitalis* sp. n. but with following differences: head and thoracic tergites as in *A. magnigenitalis* sp. n. in colouration, but tegmina and abdomen dark brown (as in holotype of *A. excultus*); colouration of legs without orange tinge and with large whitish area on hind femora (as in some specimens of *A. excultus* with this area largest; Fig. 6); thoracic and anterior abdominal tergites shining (almost without pubescence); tegmina almost round, reaching posterior edge of metanotum, not contacting with each other, with 5–6 longitudinal veins in dorsal and 6 such veins in lateral fields (Fig. 5); genitalia with anterior epiphallic lobe (curved upwards-backwards) more or less intermediate between those of *A. excultus* and *A. magnigenitalis* sp. n. in shape, with dorsal projection of posterior epiphallic lobes almost as in *A. excultus* in width, with notch between these posterior lobes rounded and wider (in anterior part) than in this species (Figs 15, 16, 27, 28), and with ventral projection



Figs 24–32. *Agryllus*, male: 24–26 – *A. excultus* Gor.; 27–29 – *A. hemiapterus* sp. n.; 30–32 – *A. magnigenitalis* sp. n. Genitalia from above (24, 27, 30), from below (25, 28, 31) and from side (26, 29, 32).

of these lobes clearly longer than in *A. excultus* and forming narrower angular notch between this and dorsal projections in profile (Figs 17, 29); ectoparameres distinctly larger than in both previous species and with mesal lobes almost as in *A. excultus* but somewhat larger, having obtuse (intermediate) anterior apex, and completely separated from ectoparameres by rather narrow membranous areas (in *A. magnigenitalis* sp. n., such membranous areas wider; for comparison see Figs 16 and 19); endoparameres with median angular structure longer than in these species and having longer median apodeme directed backwards (these structure and apodeme somewhat projected behind anterior edge of epiphallus; Figs 15, 17, 27, 29); rami intermediate between those of *A. excultus* and *A. magnigenitalis* sp. n. but without clear medial projections (Figs 15–17, 27–29).

VARIABILITY. Second male with abdominal tergites blackish, tegmina reaching anterior part of 1st abdominal tergite, and hind femora lacking whitish or light greyish area on outer side but having small whitish area on dorsal side and large one on inner side (latter area occupying most part of proximal half of inner surface).

FEMALE. General appearance as in male including strong variability in colouration of hind femora (some females with intermediate colouration of these femora, i.e. with small and light greyish area on middle portion of outer femoral surface). Abdominal apex almost indistinguishable from that of females of *A. excultus* and *A. magnigenitalis* sp. n., but hind femur almost 1.2 times as long as ovipositor (Fig. 6).

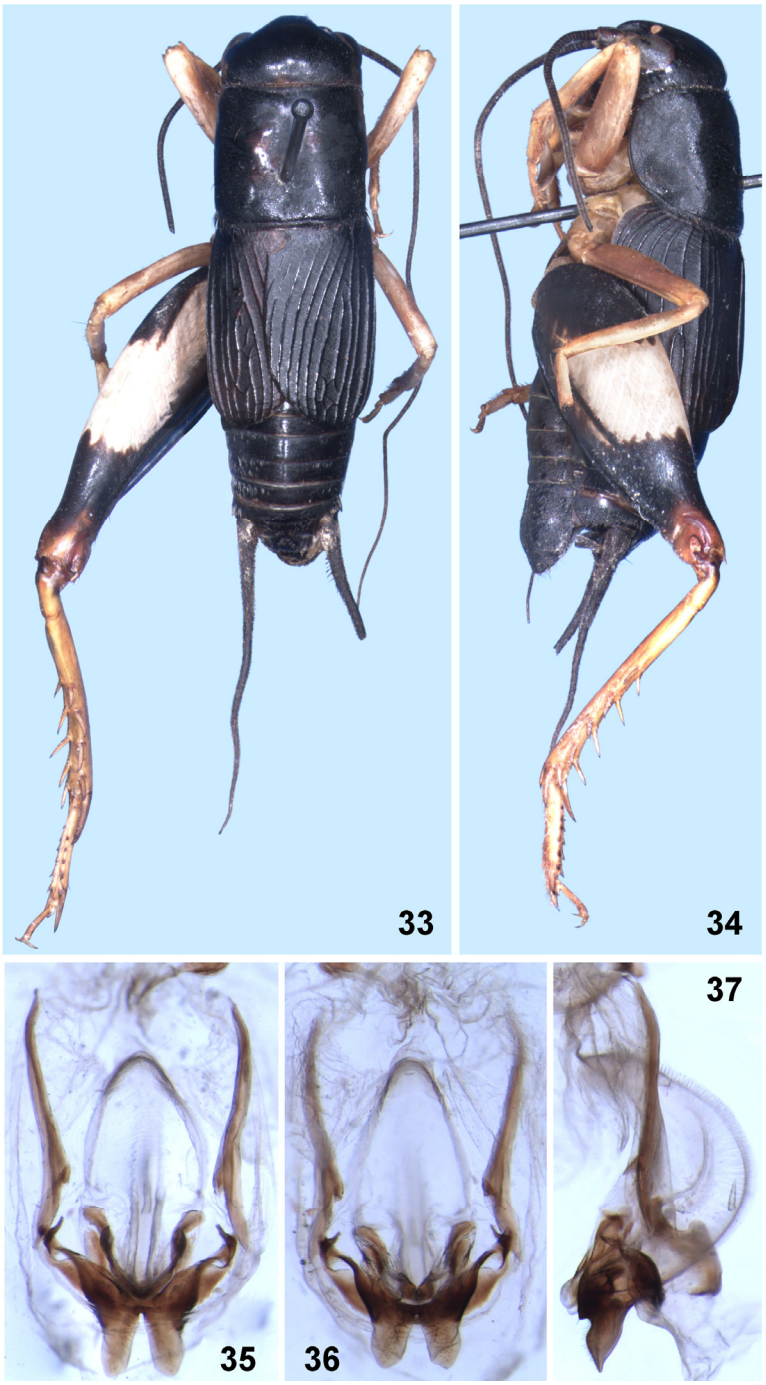
MEASUREMENTS (length in mm). Body: ♂ 13–13.5, ♀ 13–14.5; pronotum: ♂ 2.9–3.1, ♀ 3–3.4; tegmina: ♂ 2–2.5, ♀ 2–2.5; hind femora: ♂ 8.8–9.2, ♀ 8.5–10.2; hind tibiae: ♂ 6.7–7, ♀ 6.3–7.5; ovipositor 7–8.3.

COMPARISON. The new species is distinguished from the other congeners by the characters given in the key above, and also by some features of the male genitalia: dorsal projections of posterior epiphallic lobes have wider and rounded (not angular) notch between them; ventral projections of these lobes are much longer than in *A. magnigenitalis* sp. n. and moderately longer than in *A. excultus*; median angular part of endoparameres and its apodeme are distinctly longer; and posterior part of rami is more widened than in *A. excultus* and less widened than in *A. magnigenitalis* sp. n. (from the latter species, *A. hemiapterus* sp. n. differs also in the rami without medial projections).

***Agryllus siam* Gorochov, sp. n.**
Figs 21–23, 33–37

TYPE MATERIAL. Holotype – ♂, **Thailand**: Chiang Mai Prov., Doi Suthep National Park, 2–3.VI 2017, coll. D. Gapon (ZIN).

DESCRIPTION. MALE (holotype). General appearance and structure of genitalia similar to those of *A. magnigenitalis* sp. n.: epicranium, antennal flagellum, tegmen, tergites and other parts of abdomen mostly black; ocelli, maxillae and labium (including palpi), fore and middle legs, hind tibia, and lower parts of thoracic pleurites light brown; scape, rest of mouthparts, thoracic sternites, apical part of hind femur from dark brown to brown; epicranium and all tergites shining; tegmina widely oval, reaching middle part of 5th abdominal tergite, distinctly overlapping each other in resting position, with 10–11 longitudinal veins in dorsal and 9 such veins in lateral fields (Figs 33, 34); genitalia with dorsal projection of posterior epiphallic lobes rather wide (Figs 21, 35), with ventral projection of these lobes very short (Figs 22, 23, 36, 37), with mesal lobes clearly separated from ectoparameres (Figs 22, 36), and with rami having short medial projections directed backwards (Figs 21, 23, 35, 37). However, hind femur (except for its apical part) black with very wide whitish band on their dorsal surface and on most part of their outer and inner surfaces (Figs 33, 34), genitalia



Figs 33–37. *Agryllus siam* sp. n., male: 33, 34, body from above (33) and from side (34); 35–37, genitalia from above (35), from below (36) and from side (37).

with dorsal half of epiphallus distinctly longer than in *A. magnigenitalis* sp. n. (for comparison see Figs 20, 32 and 23, 37), anterior epiphallic lobe (curved upwards-backwards) somewhat wider, ventral edge of dorsal projection of posterior lobes more convex in profile (see Figs 20, 32 and 23, 37), mesal lobes of ectoparameres with roundly angular anterior part (Figs 22, 36), endoparameres with median angular structure almost as in *A. excultus* in shape and lacking distinct median apodeme (Figs 21, 23, 35, 37), rachis very short and less sclerotized (in *A. magnigenitalis* sp. n., rachis probably significantly longer and more sclerotized; see Figs 30–32 and 35–37), and rami with less widened posterior parts (i. e. almost as in *A. hemiandrus* sp. n.; Figs 21, 22, 35, 36).

FEMALE. Unknown.

MEASUREMENTS (length in mm). Body 16; pronotum 3.9; tegmina 5.7; hind femur 10.7; hind tibia 7.6.

COMPARISON. The new species is evidently most related to *A. magnigenitalis* sp. n., because it has the very similar structure of male genitalia (with very short ventral projection of epiphallic posterior lobes). But *A. siam* sp. n. clearly differs from the latter species in the presence of a wide whitish band on the hind femur as well as in some characters of the male genitalia listed in this description.

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