

## Systematic position of the former genus *Tympanogryllus* Gorochov, 2001 (Orthoptera: Gryllidae: Gryllinae) with description of a new species from the Papuan Region

### Систематическое положение бывшего рода *Tympanogryllus* Gorochov (Orthoptera: Gryllidae: Gryllinae) и новый вид из Папуасской области

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**Ключевые слова:** систематика, Orthoptera, Gryllidae, Gryllinae, *Tympanogryllus*, Новая Гвинея.

**Abstract.** The former genus *Tympanogryllus* Gorochov, 2001 including species from New Guinea and Solomon Islands is placed in the widely distributed genus *Phonarellus* Gorochov, 1983 as a subgenus *Tympanogryllus* **stat. n.**, on the basis of characters of a new species from Papua New Guinea, *Ph. (T.) primitivus* **sp. n.**, possessing male tegmina transitional between those of the species of the *Tympanogryllus* and the other subgenera of the *Phonarellus*. Strong stridulatory apparatus in *Tympanogryllus* could developed for provision of better penetration of the song sound throughout a soil layer covering the song burrow of this species as it was shown for *Ph. (T.) cyclopterus* (Gorochov, 2001) in a course of the natural observations in Indonesian part of New Guinea.

**Резюме.** Бывший род *Tympanogryllus* Gorochov, 2001, включающий несколько видов с Новой Гвинеи и Соломоновых островов, здесь помещён в широко распространённый род *Phonarellus* Gorochov, 1983 как его подрод *Tympanogryllus* **stat. n.** Это мнение основано на новом виде этого подрода из Папуа-Новой Гвинеи – *Ph. (T.) primitivus* **sp. n.**, поскольку надкрылья его самца промежуточные между таковыми других видов *Tympanogryllus* и других подродов *Phonarellus*: у первого подрода эти надкрылья имеют заметно более крупный и более сильный стридуляционный аппарат, чем у других подродов этого рода. Оригинальные наблюдения за образом жизни *Ph. (T.) cyclopterus* (Gorochov, 2001) из индонезийской части Новой Гвинеи показали, что более сильный стридуляционный аппарат в надкрыльях *Tympanogryllus* мог развиваться для лучшего проникновения звука призывной песни сквозь почвенный слой, покрывающий певчую нору этого вида.

## Introduction

The genus *Tympanogryllus* Gorochov, 2001 (Figs 1–7) was established for two New Guinean species with an unusually wide male dorsal tegminal field containing a large stridulatory apparatus most part of which is occupied by strongly S-shaped oblique veins: *T. tympanopterus* Gorochov, 2001 (type species) and *T. cyclopterus* Gorochov, 2001. This apparatus is very different from that of the genus *Phonarellus* Gorochov, 1983 widely distributed in Africa, Asia and possibly Australia, but the male genitalia of these New Guinean species are very similar to those of the both subgenera of *Phonarellus*. This was the reason that Gorochov [2001] noted the close relationship of these genera and even the possibility of including *Tympanogryllus* in the genus *Phonarellus* as its subgenus. Later an additional species, *T. solomonicus* Gorochov, 2005 was described from Guadalcanal Island (Solomon Islands). The latter species differs from the both previous species in the male dorsal tegminal field distinctly narrower and with a smaller stridulatory apparatus having less numerous oblique veins [Gorochov, 2005]. The new species described below has the male tegmina more or less similar to those of the latter species, i.e. also intermediate between such tegmina in *Phonarellus* and other *Tympanogryllus* representatives (Figs 1, 5–7). And these data allow me to include the latter taxon in the genus *Phonarellus* as one of its subgenera.

The studied material, including the type of one new species described here, is deposited at the Zoological Institute, Russian Academy of Sciences, Saint Petersburg (ZIN). All the specimens examined are dry and pinned. The illustrations were made using a Leica M216 stereomicroscope and a DFC290 digital camera.

## *Phonarellus* Gorochov, 1983

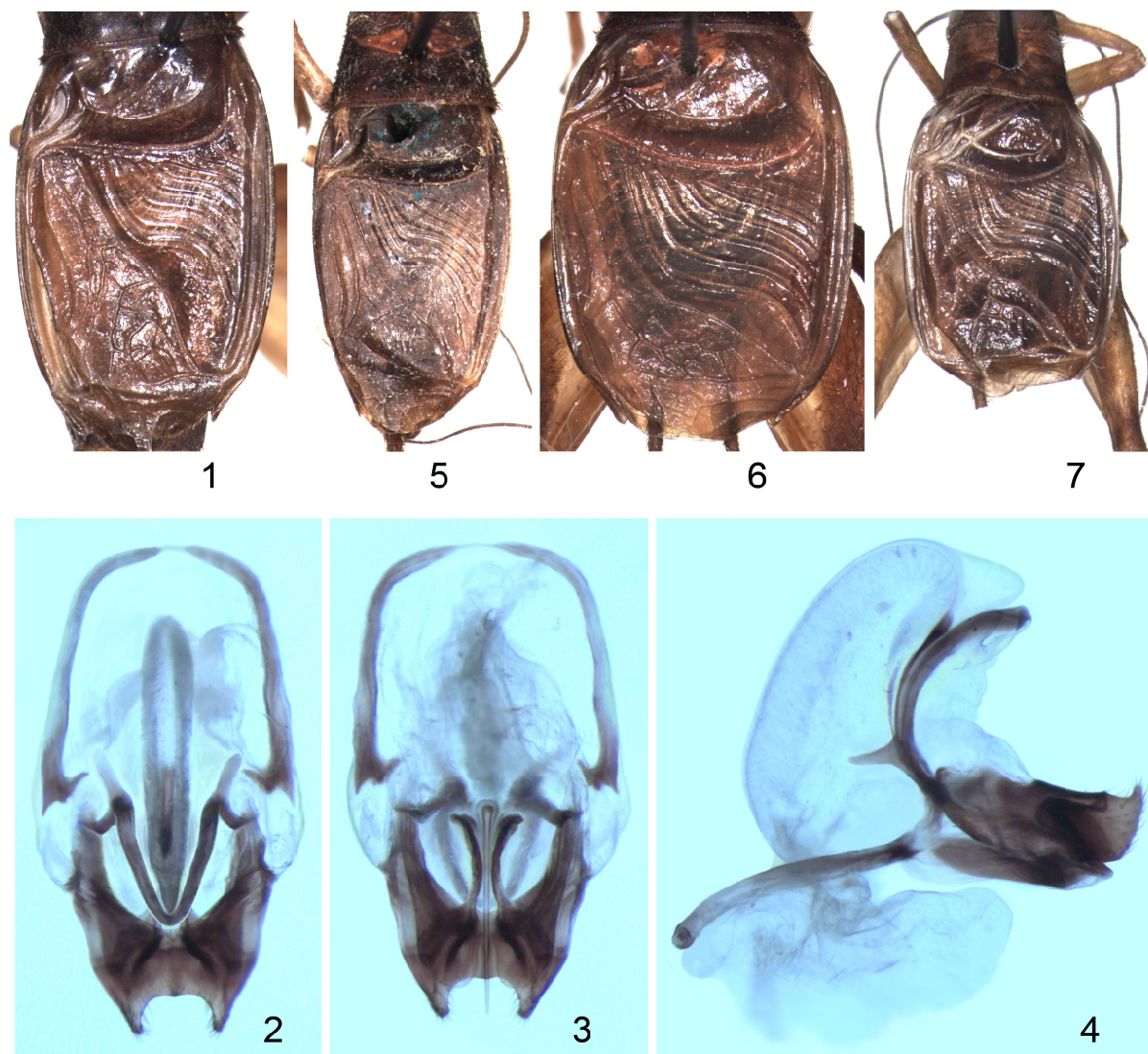
Type species: *Gymnogryllus minor* Chopard, 1959 = *Phonarellus minor* (Chopard, 1959)

**Note.** This genus belongs to the subtribe Brachytrupina of the tribe Gryllini and is characterized mainly by the male genitalia with a simple structure of their parts (Figs 2–4): the epiphallus is more or less semitubular but almost quadratic in the dorsal view or slightly elongate; its posteromedian notch is rather large but lacking any distinct posteromedian projection; the anteromedian epiphallic notch is distinctly larger

than previous notch; the distal epiphallic parts are almost vertically truncate and with small angular dorsoapical projections directed more or less upwards; the ectoparameres are rather simple for Brachytrupina, as each of them has two moderately narrow membranous areas completely outlined by the sclerotized and partly ribbon-like parts which fused with each other, and each mesal lobe lacks any distinct apical spine directed backwards and located in the place of the fusion of its apex with the rest of the ectoparameral sclerite (Figs 8, 9); each endoparamere is narrow, arcuate, with a small apodeme in middle part, and without large dorsal apodeme; the sacculus is rather small or moderately large, without any sclerotized dorsomedian stripe before the virga (= rachis) base; this virga is arcuate in the profile, moderately long and thin (almost ribbon-like) as well as gradually narrowing to almost acute apex.

The genus contains three subgenera: *Phonarellus* (*Phonarellus*) from Afghanistan and South-East Asia; *Sema-*

*phorellus* Gorochov, 1983 from Africa; *Tympanogryllus* **stat. n.** from Papuan Region with *Ph. (T.) tympanopterus* **comb. n.**, *Ph. (T.) cyclopterus* **comb. n.**, *Ph. (T.) solomonicus* **comb. n.** and one new species. The Australian genus *Daintria* Otte, 1994 (= *Stenocephalus* Otte et Alexander, 1983, homonym) may also belong to this genus and even be synonymous with *Phonarellus* (*Phonarellus*), but its male genitalia are undescribed and insufficiently depicted [Otte, Alexander, 1983]. *Phonarellus* and *Semaphorellus* differ from one another mainly in the ovipositor structure: in *Phonarellus* s. str., the ovipositor is rather long, normally developed; in *Semaphorellus*, it is strongly shortened. But in *Tympanogryllus*, female is unknown, and this subgenus is distinguished from the both previous subgenera mainly by the male tegminal stridulatory apparatus, which is larger and with a distinctly larger area occupied by more numerous (8–11) oblique veins (Figs 1, 5–7); whereas the other subgenera have only 3–5 such veins.



Figs 1–7. *Phonarellus* (*Tympanogryllus*): 1–4 — *Ph. (T.) primitivus* sp.n.; 5 — *Ph. (T.) solomonicus* Gor.; 6 — *Ph. (T.) tympanopterus* Gor.; 7 — *Ph. (T.) cyclopterus* Gor. Dorsal field of right male tegmen from above (1, 5–7); male genitalia from from above (2), from below (3) and from side (4).

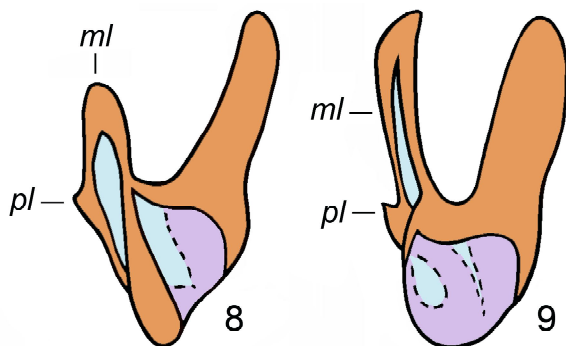
Рис. 1–7. *Phonarellus* (*Tympanogryllus*): 1–4 — *Ph. (T.) primitivus* sp.n.; 5 — *Ph. (T.) solomonicus* Gor.; 6 — *Ph. (T.) tympanopterus* Gor.; 7 — *Ph. (T.) cyclopterus* Gor. Дорсальное поле правого надкрылья самца сверху (1, 5–7); гениталии самца сверху (2), снизу (3) и сбоку (4).

*Phonarellus (Tympangryllus) primitivus*  
Gorochov, sp.n.

Figs 1–4.

**Material.** *Holotype.* ♂: Papua — New Guinea, New Guinea Island, Bismarck Range in Madang Prov.?, «Bismarckgebirge, Madang, Landegi» (ZIN).

**Description.** Male (holotype). Body rather large for this genus. Coloration brown with yellowish lateral ocelli, almost dark brown labrum and most part of pronotum, and more or less light brown following parts: median ocellus, middle portions of mandibles, all known segments of antennae (distal antennal portions missing), a pair of transverse spots on middle part of pronotal disc, most part of fore coxa, all segments of middle and hind legs (but hind femur with slightly darker distal portion and slightly lighter most part of inner surface), two distal thirds of dorsal tegminal field, most part of lateral tegminal field (latter field semitransparent with almost completely transparent band along costal margin), all sternites, and basal portion of each cercus. External structure of body typical of *Tympangryllus*, but with some characteristic features: head partly shining, semiglobular but clearly higher than wide, and with small ocelli in corners of very transverse triangle and moderately wide rostrum between antennal cavities (this rostrum almost twice as wide as scape); pronotum densely pubescent (but this pubescence short), insignificantly wider than long, rather high, with more or less parallel lateral sides and almost straight ventral edges of lateral lobes; legs moderately strong, with elongated-oval tympanum only on outer surface of fore tibia and five dorsal spines (except for apical spurs) on both sides of hind tibia as well as numerous distinct denticles on rather long hind basitarsus; tegmina reaching eighth abdominal tergite and completely covering shortened hind wings; dorsal tegminal field rather narrow for this genus, with seven oblique veins (these veins occupying less half of this field) and roundly angular but somewhat longitudinal mirror which almost twice as long as apical area after mirror



Figs 8–9. *Phonarellus*, scheme of left ectoparamere of male genitalia from below and slightly medially: 8 — *Ph. (Sema-phorellus) mistshenkoi* Gor.; 9 — *Ph. (Tympangryllus) primitivus* sp.n. Explanations and abbreviations: brown color, sclerotized parts; blue color, membranous parts; lilac color, sclerotized parts visible through membrane; ml — mesal lobe; pl — place of fusion of mesal lobe apex with posterodorsal sclerite of ectoparamere.

Рис. 8–9. *Phonarellus*, схема левого эктопарамера гениталий самца снизу и слегка изнутри: 8 — *Ph. (Sema-phorellus) mistshenkoi* Gor.; 9 — *Ph. (Tympangryllus) primitivus* sp.n. Объяснения и сокращения: коричневый цвет — склеротизованные части; голубой цвет — мембранозные части; фиолетовый цвет — склеротизованные части, видимые сквозь мембрану; ml — средняя лопасть; pl — место слияния вершины средней лопасти с задневерхним склеритом эктопарамера.

(Fig. 1); lateral tegminal field with only 6–7 longitudinal veins; anal and genital plates rounded, but anal plate almost as wide as long, and genital plate somewhat elongate and almost twice longer than anal one. Genitalia (Figs 2–4) also more or less typical of this genus but with following differences: epiphallus distinguished from that of *Ph. (T.) tympanopterus* and *Ph. (T.) solomonicus* by presence of very small ventromedian tubercle barely visible in dorsal view, from that of *Ph. (T.) solomonicus* by widely rounded (not almost angular) posteromedian notch, and from that of *Ph. (T.) cyclopterus* (having similar ventromedian tubercle) and *Ph. (T.) tympanopterus* by somewhat longer anterolateral lobes; ectoparameres and their mesal lobes longer than in these species, except for *Ph. (T.) solomonicus*; endoparameres and sacculus distinctly higher, and with apodeme of sacculus near endoparameral apices larger (but these structures partly missing in latter congener).

Female unknown.

Length in mm. Body 16.5; pronotum 3.5; tegmina 9.2; hind femora 11.

**Comparison.** The new species differs from *Ph. (T.) tympanopterus* in the male pronotum less widened posteriorly, and the male tegmina with a clearly narrower dorsal field having less numerous oblique veins and a longitudinal (not transverse) mirror (Figs 1, 6); from *Ph. (T.) cyclopterus* in the same characters as well as a distinctly larger body (Figs 1, 7); from *Ph. (T.) solomonicus* also in the same characters, except for the pronotal and tegminal shapes which are more or less similar in the both latter and new species (Figs 1, 5); and from all these congeners in the characters of the male genitalia listed above, in the description.

*Phonarellus (Tympangryllus) cyclopterus*  
(Gorochov, 2001)

Fig. 7.

**Material.** *Holotype.* ♂: Indonesia, New Guinea Island, Cyclop Mts in environs of Jayapura City, -500 m, primary forest, at night, 17–19.XI.2004, A. Gorochov (ZIN).

**Note.** The male considered is very similar to the males from the type material collected also in the Cyclop Mts [Gorochov, 2001]. However, it is slightly smaller and with a somewhat less oblique mirror in the tegminal stridulatory apparatus (Fig. 7). This specimen was collected during its calling song. He was inside a special burrow, completely covered with a thin layer of soil, and was obtained with the help of a quick movement of a shovel in the place from which his song was heard. If other species of this genus have a similar type of song burrow, then perhaps the strengthening of the stridulatory apparatus in *Tympangryllus* evolved for better passage of the song sound through the soil layer.

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