



Taxonomic notes on the cricket subfamilies Nemobiinae and Trigonidiinae (Orthoptera: Gryllidae) from islands and coasts of the Pacific and Indian Oceans

Таксономические заметки о сверчках подсемейств Nemobiinae и Trigonidiinae (Orthoptera: Gryllidae) с островов и побережий Тихого и Индийского океанов

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Abstract. Several taxa of Nemobiinae and Trigonidiinae from some islands and coasts of Pacific Ocean and Andaman Sea (Indian Ocean) are considered. The tribes Marinemobiini Gorochov, 1985 and Burcini Gorochov, 1986 are briefly redescribed, and the tribes Nemobiini Saussure, 1877 and Pteronemobiini Vickery, 1973 are also discussed. Some genera of Marinemobiini (*Marinemobius* Gorochov, 1985, *Apteronomobius* Chopard, 1929 and *Parapteronomobius* Furukawa, 1970) as well as type species of *Apteronomobius* (*A. longipes* Chopard, 1929) are redescribed; *Marinemobius* and *Parapteronomobius* are restored from synonyms of *Apteronomobius* and *Caconemobius* Kirby, 1906, respectively (with the suggestion of three new combinations for the specific names); *Eumarinemobius sundaicus* **gen. et sp. nov.** is described from the Malay Peninsula and nearest islands, and former *Apteronomobius darwini* Otte et Alexander, 1983 is supposedly included in this genus (as *E. darwini* **comb. nov.**); *Parapteronomobius sazanami kunashir* **subsp. nov.** is described from the Kuril Islands. The tribe Burcini is restored from synonyms of Thetellini Otte et Alexander, 1983, and its following taxa are redescribed or described as new for the science: *Burcus* Gorochov, 1986 which is also restored from synonyms of *Thetella* Otte et Alexander, 1983; *B. trilobulatus* **sp. nov.** from Thailand; *B. t. bunaken* **subsp. nov.** from Indonesia; *Paraburcus* **gen. nov.** for *Thetella elegans* Kobayashi, 1983 (= *P. elegans* **comb. nov.**); *Neoburcus tarutao* **gen. et sp. nov.** from Thailand. The unavailable tribal name Thetellini is considered as a possible synonym of Nemobiini, and its type genus and species (*Thetella* and *Th. oonoomba* Otte et Alexander, 1983 from Australia) as well as some other genera from Pacific islands must be preliminary placed in this tribe, but the genus *Caledonina* Desutter-Grandcolas, 2016 from New Caledonia probably belongs to Pteronemobiini. Two generic names of Hawaiian Trigonidiinae (*Zudella* Gorochov, 1988 and *Nudilla* Gorochov, 1988) are restored from subgenera and synonyms of *Trigonidium* Rambur, 1838, respectively: the genus *Zudella* includes numerous Hawaiian species erroneously placed in *Trigonidium* (they are listed here); the genus *Nudilla* is here synonymised with *Laupala* Otte, 1994, **syn. nov.**, and the neotype for *Nudilla* type species (*Trigonidium pacificum* Scudder, 1869) is here designated, as well as a new replacement specific name (*N. danieli* **nom. nov.**) is here given for the secondary homonym *Laupala pacifica* Otte, 1994. Also 169 new combinations for specific names in the two latter genera are proposed; *T. kolekole* Otte, 1994, **syn. nov.** and *L. cerasina* Otte, 1994, **syn. nov.** are synonymised with *Z. hawaiiensis* Gorochov, 1986 and *N. pacifica* (Scudder, 1869), respectively.

Резюме. Рассмотрено несколько таксонов Nemobiinae и Trigonidiinae с некоторых островов и побережий Тихого океана и Андаманского моря (Индийский океан). Кратко переописаны трибы Marinemobiini Gorochov, 1985 и Burcini Gorochov, 1986, а также обсуждены трибы Nemobiini Saussure, 1877 и Pteronemobiini Vickery, 1973. Переописаны ряд родов Marinemobiini (*Marinemobius* Gorochov, 1985, *Apteronemobius* Chopard, 1929 и *Parapteronemobius* Furukawa, 1970) и типовой вид *Apteronemobius* (*A. longipes* Chopard, 1929); *Marinemobius* и *Parapteronemobius* восстановлены из синонимов *Apteronemobius* и *Caconemobius* Kirby, 1906, соответственно (с предложением трех новых комбинаций для видовых названий); с Малайского полуострова и ближайших островов описан *Eumarinemobius sundaicus* **gen. et sp. nov.**, и в этот же род предположительно включен бывший *Apteronemobius darwini* Otte et Alexander, 1983 (как *E. darwini* **comb. nov.**); с Курильских островов описан *Parapteronemobius sazanami kunashir* **subsp. nov.** Триба Burcini восстановлена из синонимов Thetellini Otte et Alexander, 1983, и следующие таксоны переописаны или описаны как новые для науки: *Burcus* Gorochov, 1986, который также восстановлен из синонимов *Thetella* Otte et Alexander, 1983; *B. trilobulatus* **sp. nov.** из Таиланда; *B. t. bunaken* **subsp. nov.** из Индонезии; *Paraburcus* **gen. nov.** для *Thetella elegans* Kobayashi, 1983 (= *P. elegans* **comb. nov.**); *Neoburcus tarutao* **gen. et sp. nov.** из Таиланда. Не соответствующее критериям пригодности трибальное название Thetellini рассматривается как возможный синоним Nemobiini, а его типовые род и вид (*Thetella* и *Th. oonoomba* Otte et Alexander, 1983 из Австралии) как и некоторые другие роды с островов Тихого океана следует предварительно поместить в эту же трибу, но род *Caledonia* Desutter-Grandcolas, 2016 из Новой Каледонии, вероятно, принадлежит к Pteronemobiini. Два родовых названия гавайских Trigonidiinae (*Zudella* Gorochov, 1988 и *Nudilla* Gorochov, 1988) восстановлены из подродов и синонимов *Trigonidium* Rambur, 1838, соответственно: род *Zudella* включает многочисленные гавайские виды, ошибочно помещенные в *Trigonidium* (они перечислены здесь); род *Nudilla* синонимизирован с *Laupala* Otte, 1994, **syn. nov.**, и обозначен неотип для типового вида *Nudilla* (*Trigonidium pacificum* Scudder, 1869), а также дано новое замещающее название (*N. danieli* **nom. nov.**) для вторичного омонима *Laupala pacifica* Otte, 1994. Кроме того, предложено 169 новых комбинаций для названий видов в двух последних родах, а *T. kolekole* Otte, 1994, **syn. nov.** и *L. cerasina* Otte, 1994, **syn. nov.** синонимизированы с *Z. hawaiiensis* Gorochov, 1986 и *N. pacifica* (Scudder), соответственно.

Key words: taxonomy, islands, coasts, Pacific Ocean, Indian Ocean, crickets, Orthoptera, Gryllidae, Nemobiinae, Trigonidiinae, new taxa

Ключевые слова: таксономия, острова, побережья, Тихий океан, Индийский океан, сверчки, Orthoptera, Gryllidae, Nemobiinae, Trigonidiinae, новые таксоны

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Introduction

The two related subfamilies Nemobiinae and Trigonidiinae are distributed in the tropical or subtropical regions. In mangrove swamps and sand beaches of the Pacific and Indian Oceans as well as among bank rocks on many islands and continental coasts, the Nemobiinae is mainly presented by several rather widely distributed genera and species. These nemobiines lack hind wings and cannot fly; their penetrations into different islands may be explained by drift on tree trunks and/or by random human transportation, but first of these hypotheses is problematic due to the absence of any connection of these crickets with trees.

Taxonomic position of some of these nemobiines is rather confused. Otte & Alexander (1983) offered the tribe Thetellini including one new genus (*Thetella*) with two new species (type species *Th. oonoomba*, and *Th. tarnis*) described in the same book. But this tribal name is unavailable, because it was introduced not in accordance with the principal requirements of the International Code of Zoological Nomenclature. Moreover, these two species belong to different genera and evidently to different tribes. Later (Gorochov, 1986a) one of these species (*Th. tarnis*) was included in a new tribe and new genus (Burcini and *Burcus*), and a second species of *Burcus* was described. However, Otte (1994a, 1994b) disagreed with this opinion

and synonymised all these Gorochov's names with Thetellini, *Thetella* and *Th. tarnis*, respectively. Previously, Otte et al. (1987) synonymised the generic names *Bullita* Gorochov, 1986 and *Paora* Gorochov, 1986, proposed for New Caledonian crickets, with the genera *Bobilla* Otte et Alexander, 1983 and *Apteronemobius* Chopard, 1929, respectively. All these synonyms are **erroneous**. *Bullita* and *Paora* were restored from synonyms by Desutter-Grandcolas (1997, 2016), but restoration of Burcini, *Burcus* and *B. koblovae* Gorochov, 1986 as well as additional information on these and some other taxa of Nemobiinae are given here.

The Trigonidiinae practically lacks genera specialised to live in sea banks and similar landscapes, but has numerous phytophylous and often endemic genera characteristic as for different ecotones as for forests. This subfamily on the above-mentioned territories is studied even more poorly than Nemobiinae. However, the fauna of Trigonidiinae in Hawaiian Islands is more or less studied (Otte, 1994a), but generic belonging of majority of its species is also controversial and requests clarification.

The material considered here (including types of new species) is deposited in the following collections: Zoological Institute, Russian Academy of Sciences, St Petersburg (ZIN); Zoological Reference Collection, Lee Kong Chian Natural History Museum (former Raffles Museum of Biodiversity Research), National University of Singapore (ZRC); Natural History Museum, London (NHM). The International Code of Zoological Nomenclature (International Commission..., 2012) and Internet catalogue Orthoptera Species File Online (Cigliano et al., 2018) are cited below as "the Code" and "OSF", respectively.

Taxonomic part

Subfamily **Nemobiinae** Saussure, 1877

Tribe **Marinemobiini** Gorochov, 1985

Apteronemobiini Ichikawa, Murai & Honda, 2000: 287, **syn. nov.**

Diagnosis. Small to almost medium-sized crickets with usually spotted (but sometimes more or less unicolorous) body and without wings in both sexes (Figs 1–3, 5–8, 11). Fore tibia without tympana; hind tibia with non-glandular spines and spurs: 2–3 outer and 1–3 inner dorsal spines, and

five apical spurs (ventral inner spur absent, but two other inner spurs long, and middle one shorter than dorsal one; three outer spurs short, shorter than inner spurs, but middle outer spur distinctly longer than two nearest spurs). Male genitalia with clearly developed endoparameres and their apodemes (these apodemes long and narrow) (Figs 12–17, 26–43).

Included genera. *Apteronemobius* Chopard, 1929; *Parapteronemobius* Furukawa, 1970, **gen. dist.**; *Marinemobius* Gorochov, 1985; *Eumarinemobius* Gorochov et Tan, **gen. nov.**; and probably *Caconemobius* Kirby, 1906.

Comparison. This tribe is similar to Burcini Gorochov, 1986 in the structure of apical spurs of hind tibia but distinguished from the latter tribe by the male genitalia with clearly developed endoparameres and their apodemes. From Grylliscini Gorochov, 1986, this tribe differs in the same characters of male genitalia and five (not six) apical spurs on the hind tibia; from Nemobiini, Lisotrachelini Hubbel, 1938 and Pteronemobiini Vickery, 1973, in the latter character (i.e. smaller number of these spurs); and additionally from Pteronemobiini (one of these spurs may be absent in some species of this tribe also), in the absence of glandular spines on the male hind tibia.

Remarks. The tribe Marinemobiini was renamed into Apteronemobiini probably due to the erroneous synonymisation of the names of their type genera (Ichikawa et al., 2000). But later the older tribal name was supported without any information on synonymy (Storozhenko, 2004; OSF).

Genus **Marinemobius** Gorochov, 1985, **gen. dist.**

Type species *Apteronemobius asahinai* Yamasaki, 1979.

Diagnosis. Small crickets with spotted colouration (Figs 1–3). Head roundly triangular in front, with space between antennal cavities almost equal to scape in width; ocelli developed but rather small. Pronotum moderately transverse, with roundly angular anteroventral and widely rounded posteroventral corners of lateral lobes, and with ventral edge of these lobes somewhat oblique (posterior half of these lobes lower than anterior one). Wings completely absent. Legs moderately long and thin, without tympana but with thickened hind femur; hind tibia with three outer and two

inner long dorsal spines and with five apical spurs (see diagnosis for *Marinemobiini*); hind basitarsus with only a pair of apical spurs and one small outer subapical denticle. Anal plate triangular but with rounded distal part and transverse fold (concavity) on dorsum of this plate; male genital plate barely longer than anal one and with truncate but somewhat convex posterior part (Fig. 4); female genital plate small, transverse, and narrowing to widely and rather deeply notched apical part having distinct narrow additional median notch (Fig. 111). Male genitalia: epiphallus and rami short (rami fused with epiphallus); a pair of partly sclerotised distal epiphallic lobes separated from each other by rather deep and narrow notch (distal parts of these lobes almost in contact with each other); each of these lobes with rather large (elongate) and well sclerotised plate fused (almost articulated) with endoparamere and medial projection of ectoparameral sclerite; each ectoparamere almost completely sclerotised and with one [?] or two very distinct distal hooks; ventral part of genitalia with two pairs of membranous lobules between anterior halves of ectoparameres (ventrolateral lobules wider than almost finger-like dorsomedial lobules); rachis absent or changed into above-mentioned dorsomedial lobules [?]; endoparameral sclerites non-bifurcated posteriorly and not fused with each other; formula short (small), located between a pair of larger and almost transverse plate-like sclerites (Figs 12, 26–33).

Included species. Type species; possibly one additional (undescribed) species from Japan [Ichikawa et al. (2000: figs 18g, 18h) published two cursory pictures of the male genitalia for their “*A. asahinai*”; in the both pictures, these genitalia are similar to those of *M. asahinai* but with each ectoparamere having one posterior hook only (Fig. 34); thus, these genitalia may belong to an undescribed species].

Remarks. The generic name *Marinemobius* was synonymised with *Apteronemobius* Chopard, 1929 by Ichikawa et al. (2000), because these authors considered that the male genitalia in these genera are “fundamentally the same”. But in reality, their male genitalia are very dissimilar and having different method of fixation in the female genital chamber during copulation: in rest position, ectoparameral hooks are directed aside and

partly backwards, and distal epiphallic lobes are almost in contact with each other (Figs 26–28); but in erected position, these hooks are turned medially and downwards, and the latter lobes are directed partly aside (Figs 29–31) and probably forming an anchor-like fixing device. The male genitalia of the other genera of *Marinemobiini* have not such sclerotised structures which may allow them to have this type of fixing device. More concrete differences of *Marinemobius* from these genera are here listed after their diagnoses.

Marinemobius asahinai (Yamasaki, 1979)
(Figs 1–4, 12, 26–33, 111, 112)

Material examined. China: 3 males, *Hainan I.*, environs of Sanya City, bank of sea near mangrove swamp (under stones), 18.XI.1959, A. Strelkov (ZIN). **Philippines:** 10 males, 10 females, *Busuanga I.*, mangrove swamp on coast near Coron Town, at night, 21–23. II.2004, A. Gorochov (ZIN).

Remarks. This species was well described from Japan (Yamasaki, 1979: Ryukyu Islands) and recorded from China (Gorochov, 1985a: Hainan Island). Here it is recorded also from the Philippines. It is necessary to note that, judging by Yamasaki’s picture (Fig. 33), males from the type locality have hooks of ectoparameres clearly stouter (shorter and wider) than in males studied here (Figs 26, 27, 29, 32) and may belong to another subspecies of this species.

Genus ***Eumarinemobius***
Gorochov et Tan, **gen. nov.**

Type species *Eumarinemobius sundaicus* Gorochov et Tan, **sp. nov.**

Diagnosis. General appearance similar to that of *Marinemobius* (Figs 6–8, 44–46), but male genital plate with narrower distal part (Fig. 9), and female genital plate with a pair of small but distinct tubercles around narrow additional median notch (Fig. 113). Male genitalia: epiphallus as in *Marinemobius*, but its distal epiphallic lobes almost completely in contact with each other; each this lobe partly semisclerotised in posterior part, and having ventromedial semisclerotised ribbon fused (almost articulated) with posteromedial arm of endoparamere but not fused or articulated with ectoparamere; each ectoparamere part-

ly sclerotised, i.e. with sclerotised lateral surface and membranous medial part having a few lobules (subapical lobule wider, apical lobule thinner and directed medially, and medial lobule spine-like with somewhat widened base; these lobules from membranous to semisclerotised); rachis absent or changed into small membranous tubercle near posterior apex of formula; endoparameral sclerites bifurcated posteriorly, with posteromedial arms fused with distal epiphallic lobes, and with posterolateral arms reaching ectoparameres; formula very long and well sclerotised, located between a pair of rather narrow and almost longitudinal plate-like sclerites (Figs 14, 35–37).

Included species (in original binomen). Type species; probably *Apteronemobius darwini* Otte et Alexander, 1983 from Australia.

Comparison. The new genus is clearly distinguished from *Marinemobius* in the following characters of male genitalia: distal epiphallic lobes are membranous with semisclerotised posterior parts connected with endoparameres only (without large elongate sclerites connected with endoparameres and ectoparameres); ectoparameres are partly membranous and with three membranous or semisclerotised lobules (not almost completely sclerotised and with two hooks); endoparameres are distally bifurcated (*vs.* non-bifurcated); formula is very long and well sclerotised (*vs.* small and semisclerotised); plate-like sclerites longitudinal (not transverse) and distinctly narrower. Such genitalia probably have another type of fixation in the female genital chamber during copulation (than in *Marinemobius*). From *Apteronemobius*, *Parapteronemobius* and possibly *Caconemobius*, the new genus differs in the distal epiphallic lobes partly semisclerotised, each ectoparamere having three smaller and more membranous lobules, development of long and very distinct formula, each endoparamere bifurcated, and absence of rachis (or very small size of rachis) or long medial membranous lobules between ectoparameres.

Etymology. The name is composed of the Ancient Greek prefix εὐ- and the generic name *Marinemobius*; gender masculine.

Eumarinemobius sundaicus

Gorochov et Tan, **sp. nov.**

(Figs 6–9, 14, 35–37, 44–46, 113, 114)

Holotype. Male, **Thailand**, *Krabi Prov.*, bank of Andaman Sea (Indian Ocean) near Ao Nang Vill. (not far from Krabi Town), mangrove swamp near sand beach at night, 17–19.VII.1996, A. Gorochov (ZIN).

Paratypes. **Thailand:** 8 males, 6 females, same data as for holotype (ZIN); 2 males, 1 female, *Tarutao I.* in Andaman Sea (Indian Ocean), sea bank at night, 14–19.XI.2014, A. Gorochov, M. Berezin, E. Tkatsheva (ZIN). **Malaysia:** 9 males, 7 females, *Sarawak State* (Borneo), Bako National Park not far from Kuching City, sand sea beach among rocks and near mangrove swamp, at night, 18–22.II.2012, A. Gorochov, V. Berezin, E. Tkatsheva, I. Kamskov (ZIN); 1 male (PT.17.27), 3 females (PT.17.28–30), *Pahang State*, *Tioman I.* (Pacific Ocean) near Malay Peninsula, Kampung Paya, *Bruguiera* mangroves during low tide, 2.78808°N, 104.12262°E, 34.4 m a.s.l. ± 6.2, 6.IV.2017 (09.30 hours), M.K. Tan, S.T. Toh (ZRC). **Singapore:** 3 males, 3 females, Pasir Ris Park, back mangroves during low tide, near mounds of mud lobster (*Thalassina anomala*), 1.37808°N, 103.95040°E, 3.7 m a.s.l. ± 7.3, 10.V.2017 (17.20 hours), M.K. Tan (ZRC).

Description. Male (holotype). Colouration of body distinctly spotted: dorsum of head greyish brown with almost dark brown transverse band along hind edge and short longitudinal median stripe behind median ocellus, short yellowish stripe along dorsal edge of each eye, and small dark brown spot around each lateral ocellus; antennae greyish brown but having whitish scapes (dorsomedial parts of scapes with light brown to greyish brown marks); rest of head whitish but having rather wide vertical median dark brown stripe from rostral apex to middle of labrum (this stripe with a pair of short whitish lines along medial edges of antennal cavities) and short vertical dark stripe on epicranium under each eye as well as slightly darkened apical part of maxillary palpus; pronotum whitish with rather numerous brown to dark brown small marks on disc and dark brown lateral lobes (these lobes also with narrow whitish stripe along each ventral edge); legs whitish with a few light brown to brown longitudinal

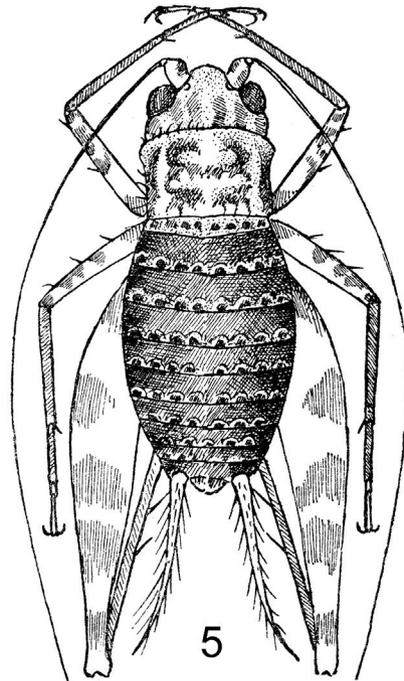
Figs 1–11. *Marinemobiini*, male. **1–4**, *Marinemobius asahinai* (Yam.) from Philippines; **5**, *Apteronemobius longipes* Chop. [after Chopard, 1929 (modified)]; **6–9**, *Eumarinemobius sundaicus* **sp. nov.**, holotype; **10, 11**, *Parapteronemobius sazanami kunashir* **subsp. nov.**, holotype. Head in front (1, 6, 11); head with pronotum from side (2, 7); body from above (3, 5, 8); genital plate from below (4, 9, 10).



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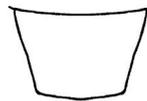
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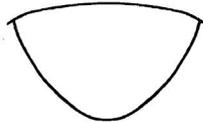


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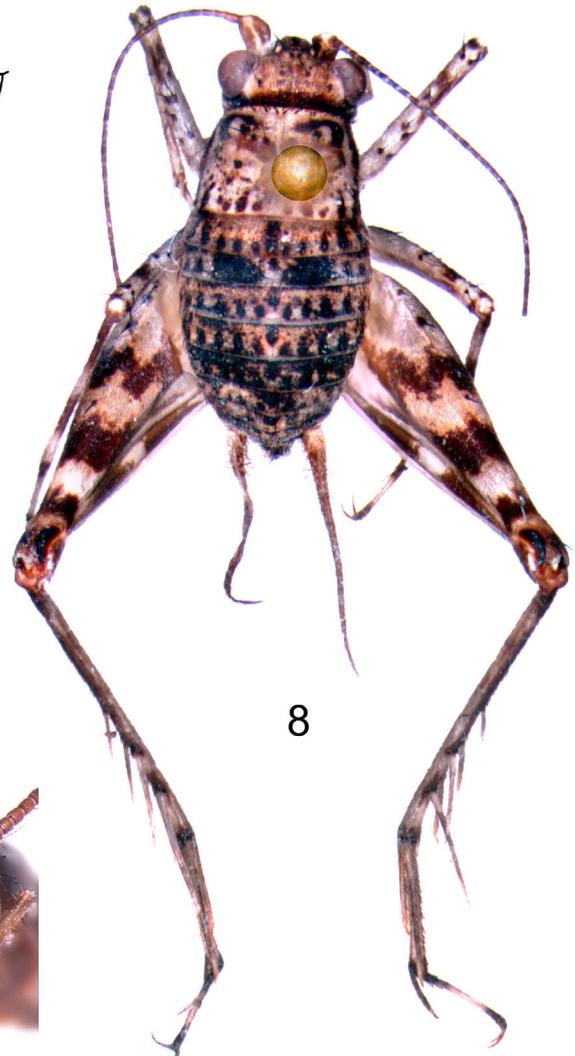


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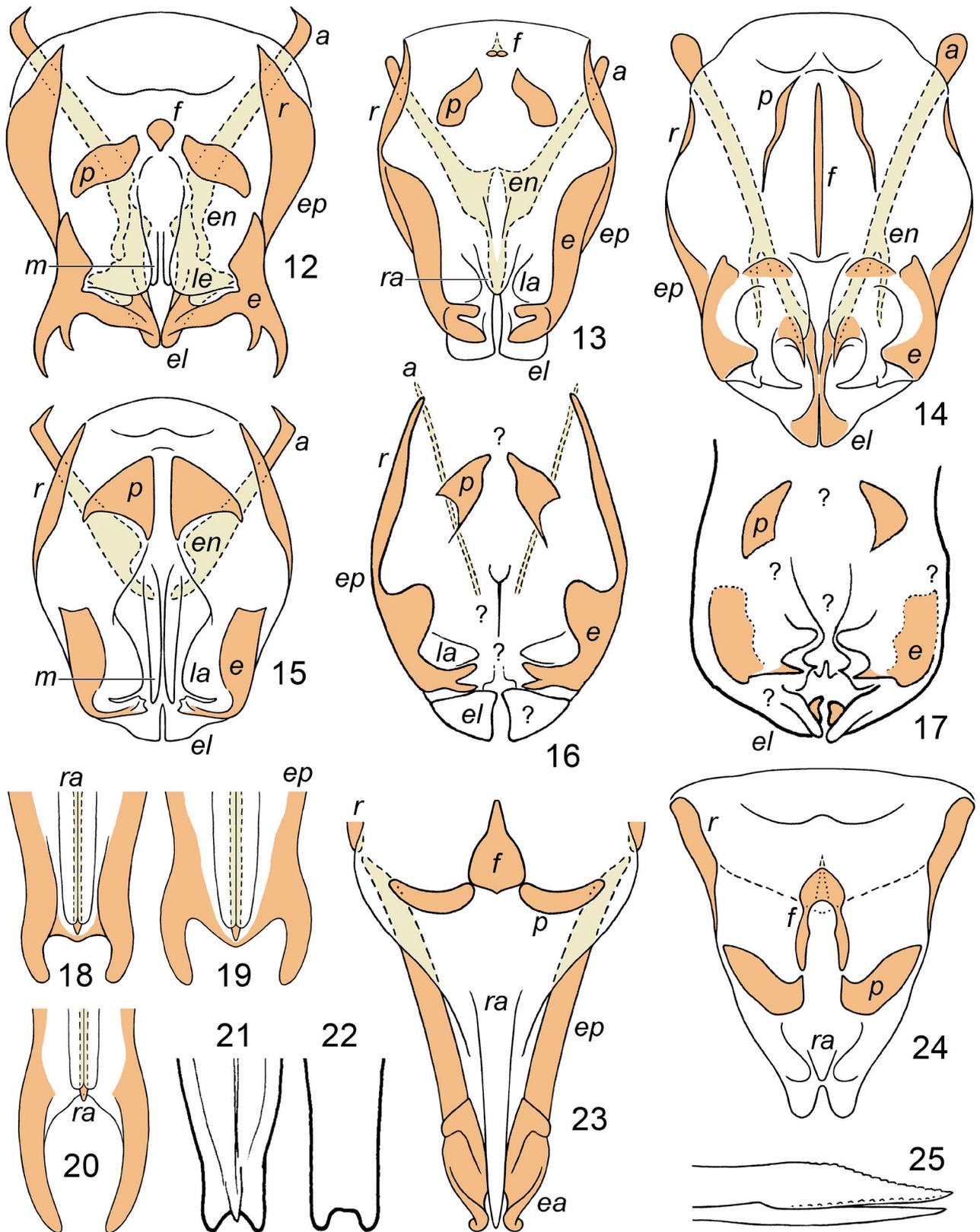
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stripes and small spots on fore and middle legs, with contrastingly spotted hind femur, with hind tibia having dark stripe along proximal two thirds of dorsal part as well as dark subapical and apical spots (spines and spurs of this tibia partly darkened), and hind tarsus with apical and subapical darkening; meso- and metanotum yellowish with numerous small brown marks along posterior edge of metanotum; rest terites and anal plate dark brown with numerous yellowish areas and spots on tergites; venter of body whitish with darkish anterior edges of abdominal sternites as well as greyish brown lateral, posterior and median parts of genital plate; cerci greyish brown with yellowish bases (Figs 6–8). Structure of body similar to that of *M. asahinai* but genital plate with narrower distal part (Fig. 9) and genitalia very different (see generic diagnosis); distal epiphallic lobes not very short and rather narrow in profile; each ectoparamere with subapical and spine-like lobules semisclerotised, and with apical lobule membranous and having small membranous tubercle near base of this lobule; formula and plate-like sclerites rather long (Figs 14, 35–37).

Variations. Colouration sometimes barely darker or slightly lighter (Figs 44); small membranous ectoparameral tubercle indistinct in some males from Krabi Province but semimembranous or semisclerotised in males from Tarutao Island; genitalia of males from Sarawak State with formula clearly wider than in holotype and other males.

Female. General appearance (Figs 45, 46) as in males, but dorsum of head often mostly yellowish, and anal plate light greyish brown with dark lateral and posterior areas; genital plate as in Fig. 113, whitish; ovipositor light brown, rather long and almost straight, with distal part as in Fig. 114.

Length in mm. Body: male 5–7.2, female 5.2–7.8; pronotum: male 1.2–1.7, female 1.4–1.9; hind femora: male 5–6, female 5.7–6.8; ovipositor 4.7–5.8.

Comparison. The new species differs from *E. darwini* **comb. nov.** in the following characters of male genitalia (for comparison see Figs 14, 17, 37, 38): distal epiphallic lobes are longer and narrower in the profile; ectoparameres are with membranous apical lobules (in *E. darwini*, these lobules are spine-like and sclerotised); plate-like sclerites longer; formula clearly sclerotised and very well visible, but the latter structure is not pictured by Otte & Alexander (1983), and it is a main reason for some doubts in belonging of *E. darwini* to *Eumarinemobius*.

Etymology. This species is named after the Sundaland, a former large land which united some recent territories (Greater Sunda Islands except for Sulawesi, Malay Peninsula) where this species is distributed.

Remarks. In Tioman Island and Singapore Island, *E. sundaicus* **sp. nov.** was found in *Bru-guiera* and *Rhizophora* mangroves; here it inhabits fine sands, probably hiding among stilt roots. Possibly this species was mentioned by Murphy (1973) who wrote that it can run on water surface (as many other nemobiines) and possibly feeds on algae found on these sands.

Genus *Apteronemobius* Chopard, 1929

Type species *Apteronemobius longipes* Chopard, 1929.

Diagnosis. General appearance similar to that of *Marinemobius* and *Eumarinemobius* (including absence of wings and tympana; Fig. 5), but hind

Figs 12–25. Marinemobiini and Burcini. **12**, *Marinemobius asahinai* (Yam.); **13**, *Apteronemobius longipes* Chop.; **14**, *Eumarinemobius sundaicus* **sp. nov.**; **15**, *Parapteronemobius sazanami kunashir* **subsp. nov.**; **16**, *Caconemobius varius* Gurney et Rentz; **17**, *E. darwini* (Otte et Alex.); **18**, *Burcus trilobulatus bunaken* **subsp. nov.**; **19**, *B. t. trilobulatus* **subsp. nov.**; **20**, *B. koblovae* Gor.; **21**, **22**, *B. tarnis* (Otte et Alex.); **23**, *Paraburcus elegans* (Kobayashi); **24**, *Neoburcus tarutao* **sp. nov.**; **25**, *A. longipes*. Male genitalia (12–17, 24), their distal part (18–22) and their distal two thirds (23) from below (12–20, 23, 24, schematically: more or less sclerotised parts marked in **brown**; but same parts visible through membranes, in **light yellowish grey**); distal part of ovipositor from side (25). [16, after Gurney & Rentz (1978), modified; 17, 21, 22, after Otte & Alexander (1983), modified]. Abbreviations: *a*, apodeme of endoparamere; *e*, ectoparamere; *ea*, distal epiphallic part articulated with epiphallic sclerite; *el*, distal epiphallic lobe; *en*, endoparamere visible through membranes; *ep*, epiphallus; *f*, formula; *la*, lateral membranous lobe of medial ectoparameral half; *le*, same membranous lobe, and sclerotised part of distal epiphallic lobe visible through it; *m*, medial membranous lobule between ectoparameres; *p*, plate-like sclerite; *r*, ramus; *ra*, rachis.

tibia with two pairs of dorsal spines only (apical spurs of this tibia also as in these genera), and male genitalia with following differences: distal epiphallic lobes non-sclerotised; ectoparamere having sclerotised lateral surface, one wide membranous subapical lobule, and two rather large semisclerotised apical lobules turned medially and fused with sclerotised ectoparameral part; rachis moderately large, membranous (almost finger-like) but dorsally more or less sclerotised; this sclerotised part fused with non-bifurcated endoparameres (endoparameral apodemes typical of this tribe: long and thin); formula very small, located before plate-like sclerites but not between them, with small unpaired anterior apodeme (Figs 13, 39, 40).

Included species. Type species only.

Comparison. *Apteronomobius* differs from *Marinemobius* and *Eumarinemobius* in less numerous dorsal spines of the hind tibia (two inner and two outer spines instead two inner and three outer spines) as well as non-sclerotised distal epiphallic lobules, in the presence of rather large rachis and two semisclerotised apical lobules on each ectoparamere, in the fusion of endoparameres with the sclerotised part of rachis, and in the location of formula before (not between) the plate-like sclerites. From *Parapteronomobius*, this genus differs in the same characters of ectoparameres, in the absence of long membranous lobules between ectoparameres, in the plate-like sclerites smaller, and in the presence of distinct rachis and formula.

Remarks. There are a few species from Hawaiian Islands, included in the genus *Caconemobius*, and having a variable number of dorsal spines on the hind tibia and all the known genital characters as in *Apteronomobius* (including the presence of two rather large apical lobules on each ectoparamere; for comparison see Figs 13 and 16): *C. varius* Gurney et Rentz, 1978, *C. fori* Gurney et Rentz, 1978, possibly *C. howarthi* Gurney et Rentz, 1978 (Gurney & Rentz, 1978: figs 38, 39, 42, 43, 46,

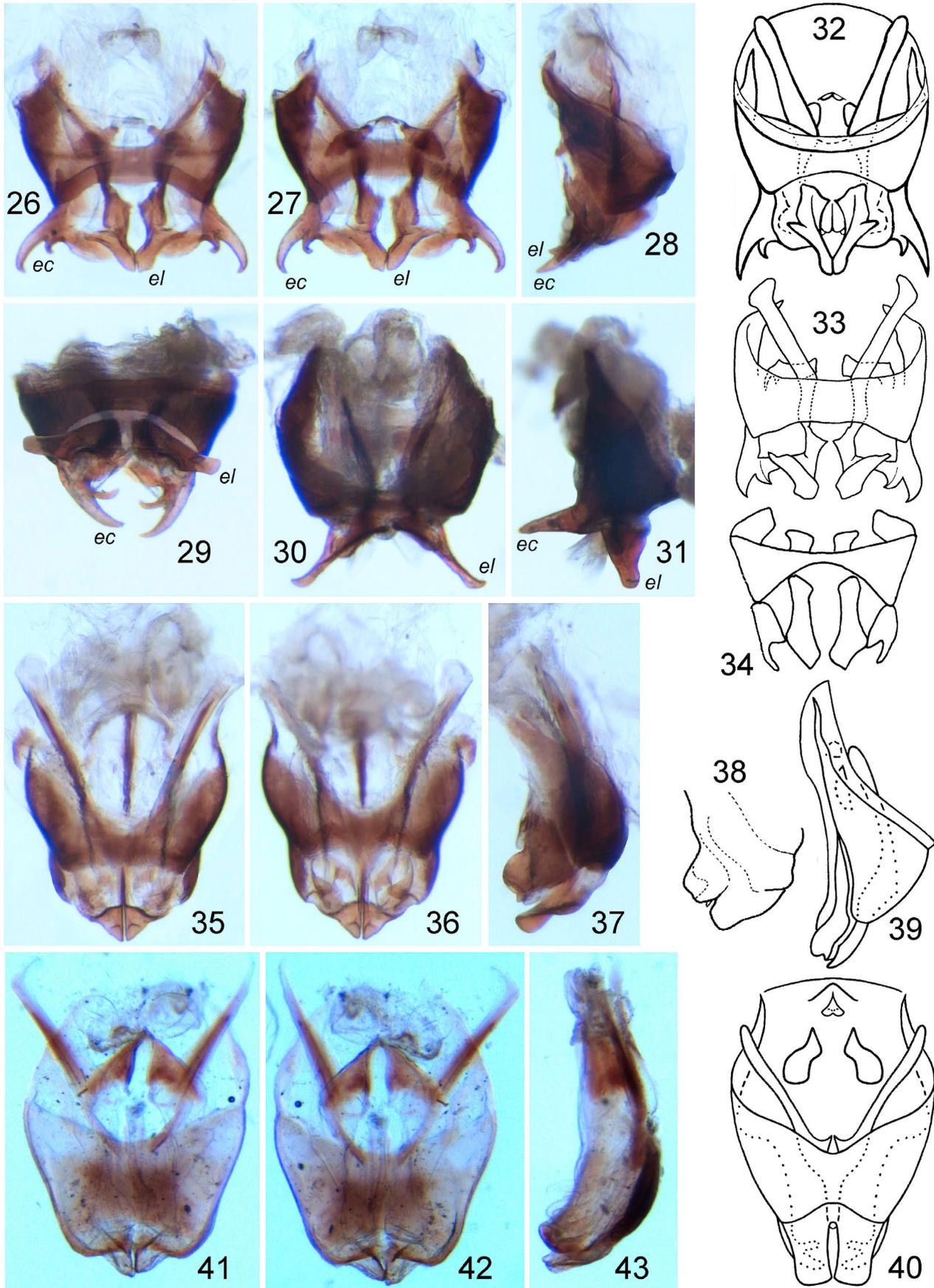
47). However, some of important genital characters are not described and not illustrated as in this publication as in later one (Gurney & Rentz, 1978; Otte, 1994a), and differences of these species from *Apteronomobius* are unclear.

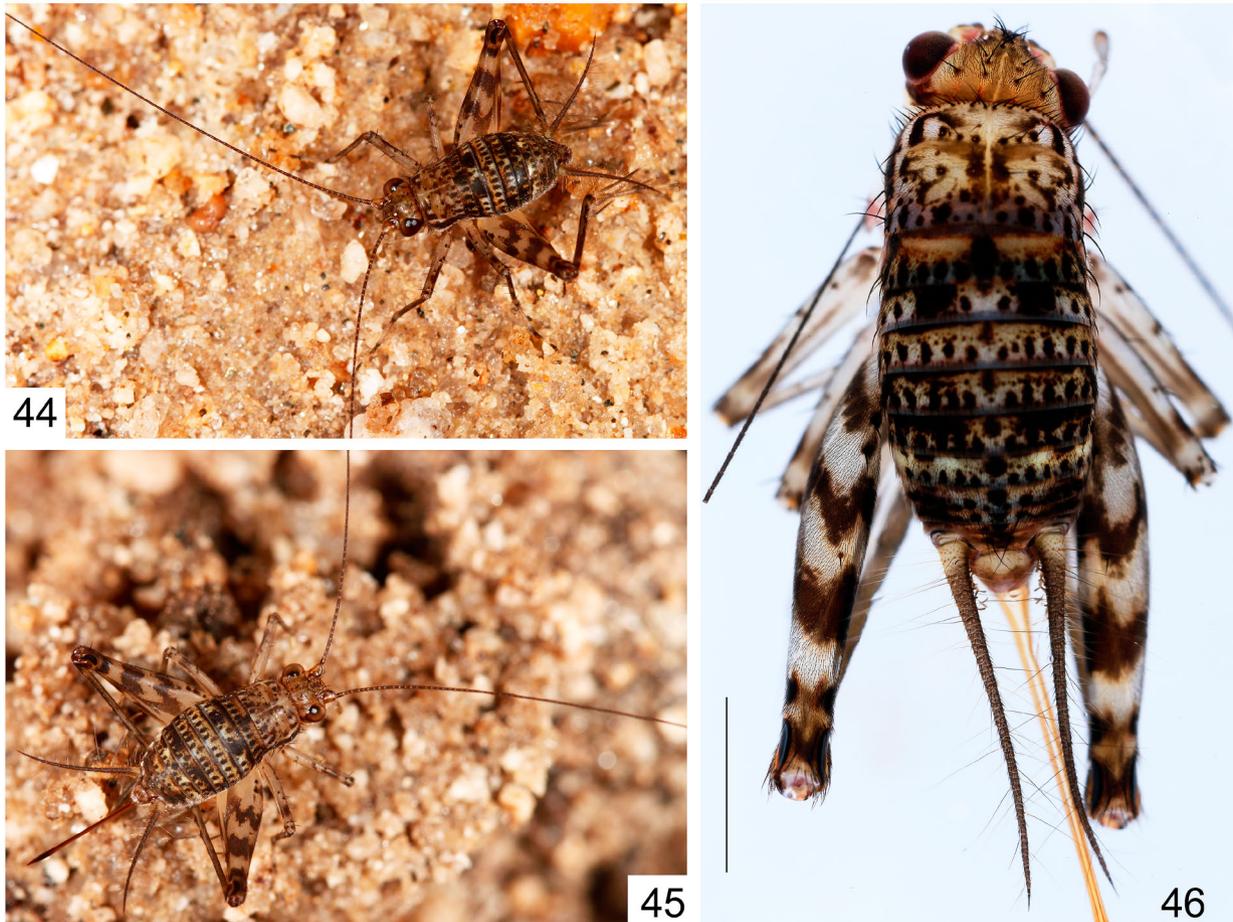
***Apteronomobius longipes* Chopard, 1929**
(Figs 5, 13, 25, 39, 40, 115)

Material examined. Oceania: 1 male (lectotype, here designated), "Feb. 1924 Apia, Upolu Samoan Is. Buxton & Hopkins", Brit. Mus. 1929-172", "*Apteronomobius longipes* Chop. type ♂ L. Chopard, det.", "*Apteronomobius longipes* Chopard Syntype det. John Huxley, 1972" (NHM); 1 female (paralectotype, here designated), "syntype", "Samoan Is. Apia Upolu 16.V.24. B.A. Buxton and G.H. Hopkins", "*Apteronomobius longipes* Chop. L. Chopard, det.", "*Apteronomobius longipes* Chopard Syntype det. John Huxley, 1972" (NHM).

Brief redescription. Male (lectotype). Body colouration yellowish with following pattern: dorsum of head light brown; anterior part of head with a pair of spots around lateral ocelli, vertical median band running almost from rostral apex to apex of labrum, three vertical lines between these spots and band as well as between this band and median ocellus, and a pair of oblique stripes running from lower parts of eyes to lateral parts of clypeus dark greyish brown; each lateral part of head with greyish brown spot behind eye; antennae brown with light brown scapes; pronotum light brown with small darkish marks on disc and dark brown lateral lobes (these lobes with narrow lighter stripes along their anterior, posterior and ventral edges); other tergites greyish brown with rather small lighter spots; legs with brown to light brown spots; anal and genital plate brown; cerci light brown (Fig. 5). Head roundly triangular in front, with space between antennal cavities slightly narrower than scape; pronotum moderately transverse; wings and tympana completely absent;

Figs 26–43. *Marinemobiini*, male genitalia. **26–33**, *Marinemobius asahinai* (Yam.) from Philippines (26–31), Hainan I. (32) and Japan (33); **34**, *M.* sp. from Japan; **35–37**, *Eumarinemobius sundaicus* sp. nov., holotype; **38**, *E. darwini* (Otte et Alex.); **39, 40**, *Apteronomobius longipes* Chop., lectotype; **41–43**, *Parapteronomobius sazanami kunashir* subsp. nov., paratype. Genitalia in rest position from above (26, 32–35, 40, 41), from below (27, 36, 42) and from side (28, 37, 39, 43); genitalia in erected position from behind (29), from above (30) and from side (31); distal part of genitalia from side (38). [32, 33, 34, 38, after Gorochov (1985a), Yamasaki (1979), Ichikawa et al. (2000) and Otte & Alexander (1983), respectively (modified)].





Figs 44–46. *Eumarinemobius sundaicus* sp. nov. from Tioman I. **44, 45**, living male and female, respectively; **46**, female in alcohol from above.

hind tibia with one subapical (most distal) inner dorsal spine long, and with one more proximal inner dorsal spine as well as two outer dorsal spines rather short; genitalia as in Figs 13, 39, 40.

Female. Colouration and external structure of body almost as in male, but colouration barely darker; genital plate brown, smaller than anal plate, almost without narrow additional median notch and tubercles around it (Fig. 115); ovipositor light brown, almost straight, with distal part of dorsal valves barely serrulated along dorsal and ventral edges (Fig. 25).

Length in mm. Body: male 4.7, female 5.3; pronotum: male 1.2, female 1.4; hind femora: male 4.5, female 5; hind tibiae: male 3.6, female 4; ovipositor 5.1.

Remarks. Chopard (1929) described this species from 16 specimens: two of them (male and female) were indicated by him as “types” collected

“on trunks of mangrove”; others, as “paratypes”. Thus, all his type specimens are syntypes, and one of them (male with the data given above, in the paragraph *Material examined*) is here designated as lectotype; all the other syntypes are here designated as paralectotypes.

Genus *Parapteronemobius*
Furukawa, 1970, **gen. dist.**

Type species *Parapteronemobius sazanami* Furukawa, 1970.

Diagnosis. General appearance somewhat distinguished from that of *Marinemobius*, *Eumarinemobius* and *Apteronomobius* by larger body and more uniform colouration (Fig. 11), but structure of body parts rather similar to that of these genera. However, ocelli barely distinct or practically absent, space between antennal cavities almost

equal to scape in width, hind femora slightly thinner than in these genera, hind tibia with all dorsal spines rather short (these spines varied in number), and male genital plate triangular but with rounded apex (Fig. 10). Male genitalia with short epiphallus having membranous or semimembranous apical lobes separated from each other by very narrow and moderately deep notch but almost pressed together; ectoparamere with lateral surface sclerotised, and with medial part having two large membranous lobules (subapical lobule wide and without sclerotizations; apical lobule narrow, curved medially, having three very small membranous tubercles at apex and narrow and more or less semisclerotised posterior area fused with sclerotised part of ectoparamere); rachis and formula indistinct, but median part of genital venter with a pair of very long and rather thin membranous lobules between ectoparameres (possibly these lobules originating from rachis); endoparameres non-bifurcated and ending not far from bases of these lobules (but with apodemes as in above-mentioned genera); plate-like sclerites very large (Figs 15, 41–43).

Included species (in original binomen). Type species; *P. daitoensis* Oshiro, 1986; *P. takarai* Oshiro, 1990; *P. akusekiensis* Oshiro, 1990 (synonym of *P. takarai* in accordance to OSF); *Caconemobius dibrachiatus* Ma & Zhang, 2015; *C. nisatoi* Ishikawa, 2017; and *C. saitoi* Ishikawa, 2017. One species (*C. dibrachiatus*) is described from China, but all the others, from Japan.

Comparison. *Parapteronemobius* differs from *Marinemobius* in the colouration more uniform, male genital plate not truncate posteriorly, and male genitalia having their ectoparameres less sclerotised and different in the shape and function, plate-like sclerites larger, and formula indistinct (*vs.* developed); from *Eumarinemobius*, in the same characters of body colouration, male genital plate, plate-like sclerites and formula in the male genitalia, as well as in the presence of a pair of long membranous lobules between ectoparameres; from *Apteronomobius*, in the same characters of colouration, presence of a pair of long membranous lobules between ectoparameres, absence of formula and rachis, ectoparamere non-bifurcated apically (*i.e.* lacking two characteristic apical lobules), and plate-like sclerites larger. Differences of *Parapteronemobius* from *Caconemobius* are unclear, because type species of *Caconemobius*

is **nomen dubium**, and the other representatives included in this genus by some other authors (see OSF) may be divided into two groups with somewhat different male genitalia.

Remarks. The genus *Parapteronemobius* was recently synonymised with *Caconemobius* (Ichikawa, 1999). However, type species of *Caconemobius*, *Paranemobius schauinslandi* Alfken, 1901, was described from a female collected in Molokai Island (Hawaiian Islands) with the following description of armament of its hind tibia: “End of hind tibia has 3 thorns, 1 outer and 2 inner” (translation cited after Gurney & Rentz, 1978). If Alfken (1901) wrote about apical spurs only, these characters are not in accordance to all the genera of *Marinemobiini*. Possibly, these data are erroneous, or this author wrote about dorsal spines only, but type of this species is lost and no one species from Molokai Island which may be tentatively determined as this species for neotype designation (Gurney & Rentz, 1978; Otte, 1994a; OSF). Moreover, one group of species included in *Caconemobius* in these publications is similar to *Apteronomobius* in having two apical ectoparameral lobules turned medially: *C. varius*, *C. fori* and possibly *C. howarthi* (all from Hawaiian Islands). Another group of such species has the male genitalia very similar to those of *Parapteronemobius*: *P. daitoensis*, *P. takarai*, *P. akusekiensis*, *P. dibrachiatus* **comb. nov.**, *P. nisatoi* **comb. nov.** and *P. saitoi* **comb. nov.** (all from Japan and China). And all the other Hawaiian representatives of “*Caconemobius*” are with the male genitalia undescribed or almost undescribed. Thus, before more exact decision on type species of *Caconemobius*, it may be better to consider this genus as **nomen dubium** and to put “its” representatives in the genera *Apteronomobius* and *Parapteronemobius* (*i.e.* it is reasonable to restore the latter genus from synonyms of *Caconemobius*).

Parapteronemobius sazanami kunashir

Gorochov, **subsp. nov.**

(Figs 10, 11, 15, 41–43, 116, 117)

Holotype. Male, **Russia**, *Kuril Is., Kunashir I.*, environs of Alekhino Vill., bank of Okhotsk Sea, on large stone near hot spring at night, 6–12.VIII.1984, A. Gorochov (ZIN).

Paratypes. 17 males, 9 females, same data as for holotype (ZIN).

Description. Male (holotype). Body colouration almost uniformly dark brown but with slightly lighter (greyish brown) clypeus, labrum, palpi and proximal parts of antennae (Fig. 11), and with almost uniformly light greyish brown legs and thoracic sternites. Head almost round in front (Fig. 11); pronotum distinctly transverse (almost 1.5 times as wide as long), with anterior part slightly narrowing to head, with posterior part also barely narrowing to pterothorax, and with lateral lobes rather low (their ventral part almost as in *Marinemobius*); fore and middle legs with a pair of short ventroapical spurs on each tibia; hind femur moderately thin (somewhat less thickened than in all genera of *Marinemobiini* previously considered here); hind tibia having three pairs of rather short dorsal spines and five apical spurs (these spurs approximately as in above-mentioned genera, but longest dorsal inner spur reaching distal quarter of hind basitarsus); anal plate widely rounded in posterior half and almost flat; genital plate somewhat transverse (Fig. 10); genitalia as in Figs 15, 41–43.

Variations. Almost half of paratypes similar to holotype in armament of hind tibia, but in other half of them, number of dorsal spines on this tibia varied: 2–6 outer spines and 1–5 inner spines (such specimens often with three pairs of dorsal spines on opposite hind leg).

Female. Colouration and structure of body as in males; genital plate with large (rather deep and wide) and almost angular posteromedian notch (this plate often with small or very small additional median notch; Fig. 116); ovipositor straight, barely shorter than hind femur, and with distal part as in Fig. 117.

Length in mm. Body: male 9–11, female 10–11.5; pronotum: male 1.8–2, female 1.9–2.1; hind femora: male 6.2–6.5, female 6.6–7; ovipositor 6–6.5.

Comparison. The new subspecies differs from nominotypical one in the pronotum more transverse, male genital plate wider, female genital plate with distinctly larger posteromedian notch (for comparison see Figs 116 and 118), and ovipositor somewhat shorter (in *P. s. sazanami*, ovipositor

is slightly longer than hind femur). From all the other congeners, *P. s. kunashir* is distinguished by the body colouration darker and almost uniform, distal epiphallic lobes less protruding beyond ectoparameres, or ovipositor relatively longer.

Etymology. The new subspecies is named after the Kunashir Island.

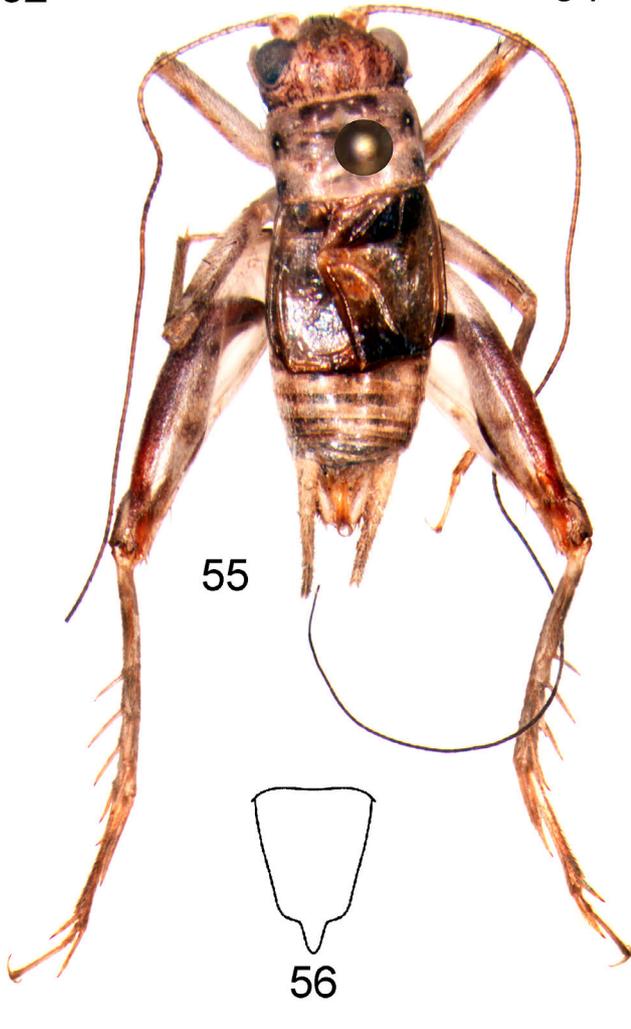
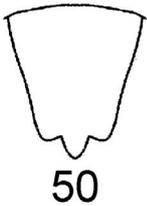
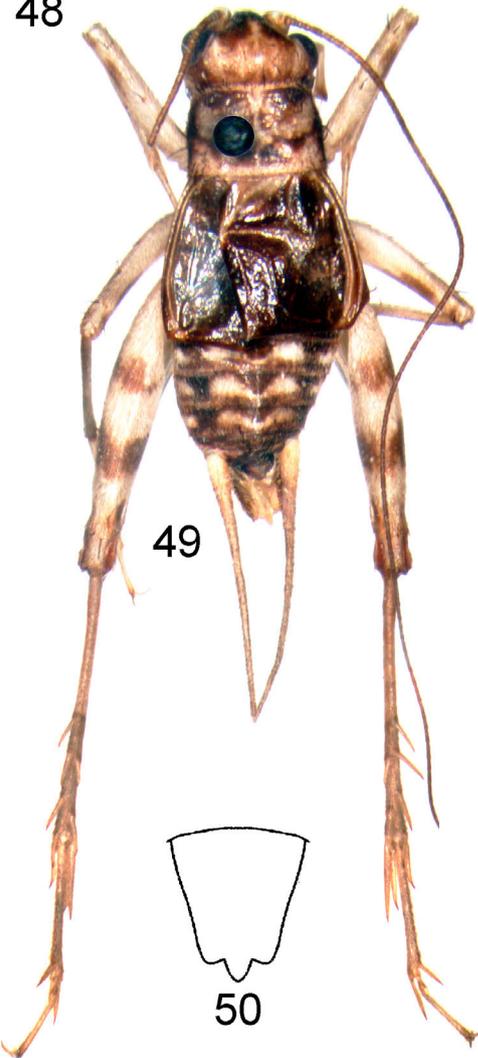
Remarks. The nominotypical subspecies was originally described as a species from two localities situated rather far from Kuril Islands (Furukawa, 1970: Honshu and Kyushu Islands), and later it was recorded from Kunashir Island (Gorochov, 1985b: partly on base of this material) and Korea (Kim & Kim, 2010). However, Furukawa's description contains some problems: (1) the pronotum of *P. sazanami* is pictured by Furukawa (1970: fig. 17) as having its length and width almost equal to each other, but in all the other representatives included in this genus, pronotum is distinctly transverse; (2) *P. sazanami* hind leg, according to Furukawa, has the following characters: "Apex of tibia is provided with 3 spines externally ... and also 3 spines internally" [the latter character is also not in accordance to all the members of *Parapteronemobius* and *Marinemobiini*, but possibly Furukawa identified and depicted the outer ventral spur twice: correctly (fig. 27) and as inner ventral one (fig. 28)]; (3) number of dorsal spines on this tibia was not indicated by Furukawa, but the latter pictures show that there are two outer spines and at least two inner spines; (4) the shape of female genital plate given by this author is also very different from that of all the known taxa of *Marinemobiini* (see Figs 111, 113, 115, 116 and 118). If first and forth of these characters are correct, the new subspecies may be a separate species determined by Gorochov (1985b) as *P. sazanami*.

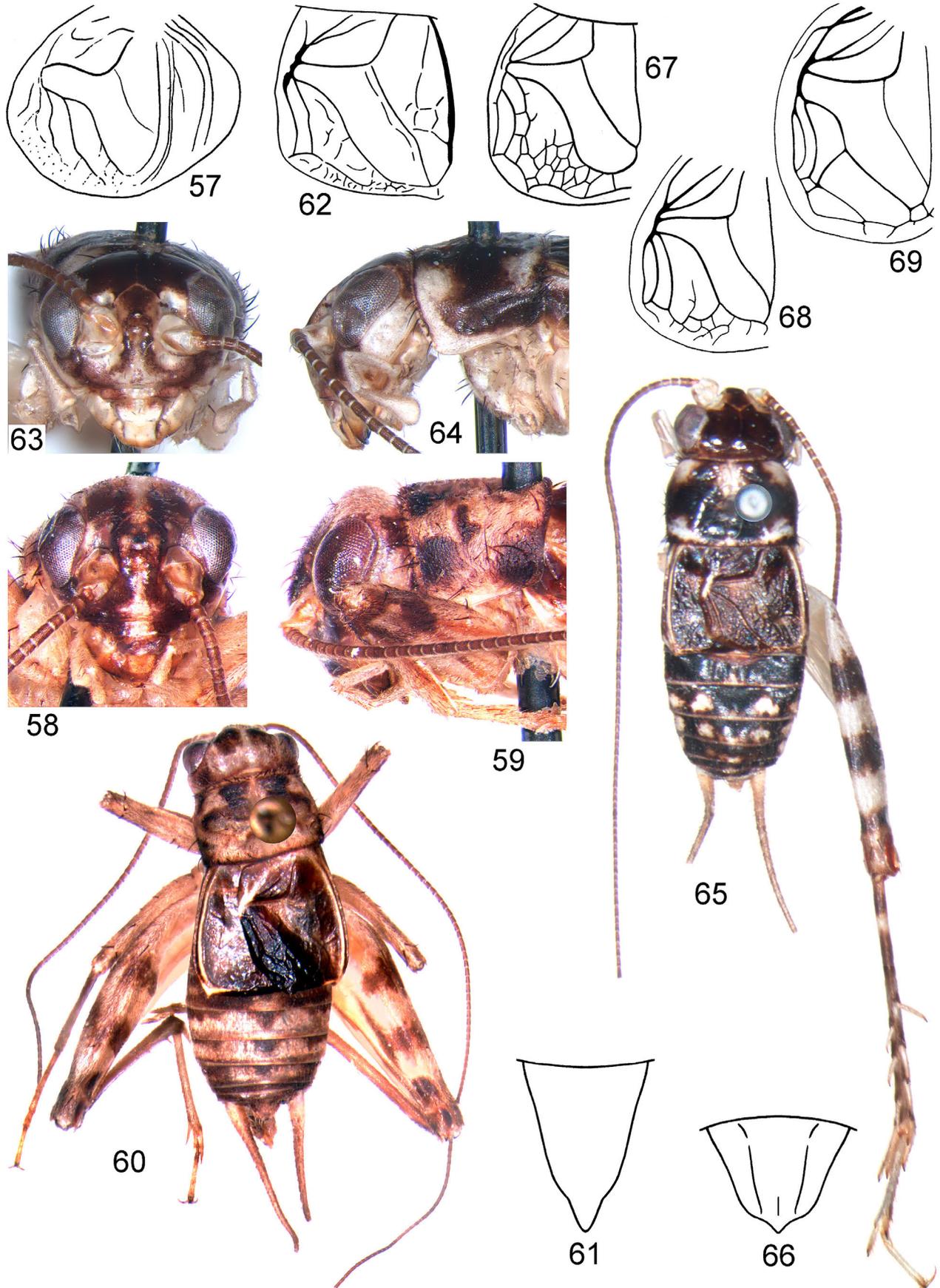
Also Furukawa (1970) indicated that *P. sazanami* "denies every food (including dried shrimp) except fresh crab meat".

Tribe **Burcini** Gorochov, 1986, **trib. dist.**

Diagnosis. Tegmina shortened (more or less truncate posteriorly) in male (Figs 49, 55, 60, 65,

Figs 47–56. *Burcus* Gor., male. 47–50, *B. trilobulatus* sp. nov., holotype; 51, 52, *B. t. bunaken* subsp. nov., holotype; 53–56, *B. koblovae* Gor., holotype (53, 54) and specimen from Cambodia (55, 56). Head in front (47, 51, 53); head with pronotum from side (48, 52, 54); body from above (49, 55); genital plate from below (50, 56).





70, 71) and sometimes in female, but often female (Fig. 72) and sometimes male without tegmina; stridulatory apparatus in male tegmina developed (Figs 57, 62, 67, 68) or lost; hind wings usually absent. Fore tibia with outer tympanum and often with traces of inner one, but sometimes both tympana absent; hind tibia with non-glandular spines and spurs: three outer dorsal spines, 2–3 inner ones, and five apical spurs (these spurs similar to those of *Marinemobiini* in structure). Male genitalia without endoparameres, their apodemes and movable ectoparameres (Figs 23, 24, 74–107).

Included genera. *Paranemobius* Saussure, 1877; *Burcus* Gorochov, 1986; *Paraburcus* Gorochov, **gen. nov.**; *Neoburcus* Gorochov, **gen. nov.**; and probably *Speonemobius* Chopard, 1924 and *Taiwanemobius* Yang et Chang, 1996.

Comparison. This tribe is similar to *Marinemobiini* in the absence of ventral inner apical spur on the hind tibia and probably closely related to the latter tribe; possibly also, these tribes are synapomorphic with the subfamily *Trigonidiinae* in relation to this character (i.e. it is impossible to exclude that the subfamily *Nemobiinae* is a paraphyletic taxon, ancestral to *Trigonidiinae*; Gorochov, 1986b, 1995). This character distinguishes these tribes from *Grylliscini*, *Lissotrachelini*, *Nemobiini*, and from the most representatives of *Pteronemobiini*. However, main difference of *Burcini* from *Marinemobiini*, *Nemobiini*, *Pteronemobiini* and *Lissotrachelini* is the complete absence of endoparameres and their apodemes in *Burcini* and presence of these structures in the four latter tribes (their endoparameral apodemes are in shape of more or less long and narrow ribbons); it is necessary to indicate that these apodemes are most important sclerotised structures in the male genitalia of most part of *Ensifera*: from *Grylloidea* to *Hagloidea*, *Stenopelmatoidea* and *Tettigonioidea* (Gorochov, 2015: “apodema principale”). From *Grylliscini*, the *Burcini* additionally differs in the absence of movable (articulated) ectoparameres;

however, endoparameres and their apodemes in *Grylliscini* are also (but independently) lost.

Remarks. This tribe was erroneously synonymised with *Thetellini* Otte et Alexander, 1983 by Otte (1994b). *Burcini* is considered here as a distinct tribe, while the “tribe *Thetellini* Otte et Alexander, 1983” is unavailable name possibly also belonging to another tribe; see remarks under the genus *Burcus* and tribe *Nemobiini*.

Genus *Burcus* Gorochov, 1986, **gen. dist.**

Type species *Burcus koblovae* Gorochov, 1986.

Diagnosis. Head almost globular, with rather large eyes and very small ocelli (Figs 47, 48, 51–54). Pronotum more or less similar to that of *Marinemobiini* but always transverse. Male tegmina reaching approximately middle of abdomen (Figs 49, 55, 70, 71); their stridulatory apparatus well developed, with moderately long diagonal vein and rather short and somewhat irregular chords as well as rather wide area between lateral chord and nearest medial chord, and without mirror (distal part of dorsal tegminal field with area having cellular venation instead mirror; Figs 67, 68); female tegmina absent (Fig. 72). Fore tibia with elongate outer tympanum and traces of inner tympanum (these traces looking as slight and narrow longitudinal groove); hind femur moderately thickened (adapted for jumping); hind tibia with three outer and two inner dorsal spines as well as five apical spurs (proportions of their lengths similar to those of *Marinemobiini*). Anal plate almost triangular but with rounded apex and more or less transverse dorsal concavity; male genital plate distinctly longer than previous plate, with three small apical lobules (median lobule almost denticle-like, directed backwards/upwards, and clearly longer than rounded lateral lobules; Figs 50, 56). Male genitalia characteristic: epiphallus almost completely sclerotised, very long and rather thin, curved upwards in profile, widened basally (Figs

Figs 57–69. *Burcini* and *Nemobiini*, male. **57–61**, *Paraburcus elegans* (Kobayashi) from Japan (57) and from Thailand (58–61); **62–66**, *Neoburcus tarutao* sp. nov.; **67**, *Burcus koblovae* Gor., holotype; **68**, *Burcus tarnis* (Otte et Alex.); **69**, *Thetella oonoomba* Otte et Alex. Right tegmen (57) and its dorsal field (62, 67–69); head in front (58, 63); head with pronotum from side (59, 64); body from above (60, 65); genital plate from below (61, 66). [57, after Kobayashi, 1983 (modified); 67, after Gorochov, 1986a (modified); 68, 69, after Otte & Alexander, 1983 (modified)].

74–76, 81, 82, 84–86, 89–91, 94, 95), and with a pair of elongate anteroventral projections directed forwards (Figs 75, 83, 86, 90, 94); rami short, almost fused with epiphallus; rachis long and thin, membranous but with narrow sclerotised median ribbon; apical part of rachis invisible or barely visible from above, because it often covered with posteromedian epiphallic lobule (Figs 18–22, 77–80, 87, 88, 92, 93); formula in shape of very narrow stripe fused with sclerotised ribbon of rachis; plate-like sclerites also narrow and long, located near formula; valvae semimembranous (their integument barely thickened), in shape of rather small and elongate lobes; endoparameres and their apodemes as well as apodeme of formula absent (Figs 74, 75, 81, 83, 89, 90, 94).

Included species (in original binomen). Type species; *Thetella tarnis* Otte et Alexander, 1983; and *B. trilobulatus* Gorochov, **sp. nov.**

Comparison. The genus *Burcus* is clearly distinguished from all the other genera of Burcini by the following combination of characters: tegmina are with a stridulatory apparatus in male and absent in female; male tegmina lack mirror; epiphallus is almost completely sclerotised, very long, thin, curved upwards in the profile, with a pair of anteroventral projections directed forwards, and without apical articulated structures; rachis has sclerotised median stripe fused with stripe-like formula; this formula lacks apodeme; plate-like sclerites are distinctly longitudinal.

Remarks. This genus was erroneously synonymised with *Thetella* Otte et Alexander, 1983 (Otte, 1994b). However, its type species (*Th. oonoomba* Otte et Alexander, 1983 from Australia) has six apical spurs on the hind tibia, a well-developed mirror in the male tegmen (Fig. 69), small tegmina in female, and clearly shorter and more straight epiphallus (Figs 108–110) (these genitalia are undescribed and insufficiently pictured, i.e. any information on structure of endoparameres, endoparameral apodemes and valvae is absent; Otte & Alexander, 1983: Fig. 147C). These characters indicate that *Th. oonoomba* and *Thetella* more probably belong to the tribe Nemobiini than to Burcini (see below). Also, it is useful to note that the method of fixation of male genitalia in the female genital chamber in *Burcus* is different than that in majority of other genera but prob-

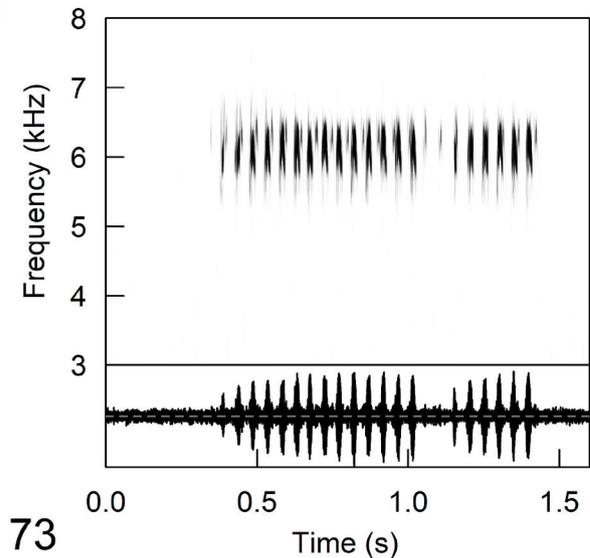
ably similar to that of *Paranemobius* and possibly *Paraburcus* **gen. nov.**: valvae in these three genera (Figs 75, 90, 94, 96, 98, 101) are with more or less thickened integument, and evidently able to bend forwards (during copulation, these erected and bent valvae together with the rest parts of genitalia may form an anchor-like fixation in the female genital chamber; see Figs 96, 97 and 98, 99).

***Burcus trilobulatus* Gorochov, sp. nov.**
(Figs 19, 47–50, 87–91, 121)

Holotype. Male, **Thailand, Krabi Prov.**, bank of Andaman Sea (Indian Ocean) near Ao Nang Vill. (not far from Krabi Town), sand beach with rocks at night, 17–19.VII.1996, A. Gorochov (ZIN).

Paratypes. 12 males, 5 females, same data as for holotype (ZIN).

Description. Male (holotype). Body yellowish white, but with following pattern: head with rostral area, a pair of large dorsal spots near it, a pair of oblique stripes between eyes and lateral parts of clypeus, and one small median spot near clypeal suture brown, with areas on posterior part of vertex as well as spot on ventromedial part of each scape light brown, and with antennal flagellum from light brown (proximally) to greyish brown (distally and in middle part) (Fig. 47); pronotum with disc having several brown to light brown spots and with lateral lobes brown but having yellowish stripe along each ventral edge (Fig. 48); tegmina with brown dorsal field having lateral half semitransparent and proximal part whitish, with light brown lateral field, and with two longitudinal veins along lateral edge of dorsal field whitish (short vein near medial end of stridulatory vein also whitish; Fig. 49); legs with a few light brown spots on femora and with one such spot on proximal part of fore tibia; abdominal tergites brown with rather numerous light brown spots; anal plate also brown; genital plate with a few darkish marks only; cerci light yellowish grey with almost whitish bases (Fig. 49). Head roundly triangular in front, with space between antennal cavities almost equal to width of scape (Fig. 47); pronotum moderately transverse, slightly widening to pterothorax, with ventral edges of lateral lobes almost straight and more or less parallel to their dorsal edges (Fig. 48); tegmina reaching middle of fifth abdominal tergite, with almost truncate posterior



Figs 70–73. *Burcus koblovae* Gor. from Tioman I. 70–72, living males (70, 71) and female (72); 73, spectrogram (top) and oscillogram (bottom) of male calling song.

parts (Fig. 49), and with stridulatory apparatus similar to that of *B. koblovae* and *B. tarnis* (Figs 67, 68) but having additional crossvein between diagonal vein and lateral chord; legs with three “spinules” on hind basitarsus: a pair of elongate apical spurs and one short dorsal denticle between them; genital plate as in Fig. 50. Genitalia also similar to those of latter congeners, but epiphallus with distal part lacking low dorsal convexity in profile and with apex having three distinct lobules: a pair of lateral lobules shorter than in *B. koblovae* and longer than in *B. tarnis*, and one median lobule rather wide and almost angular (this lobule slightly shorter than previous lobules but clearly visible in profile) (see Figs 19, 87–91).

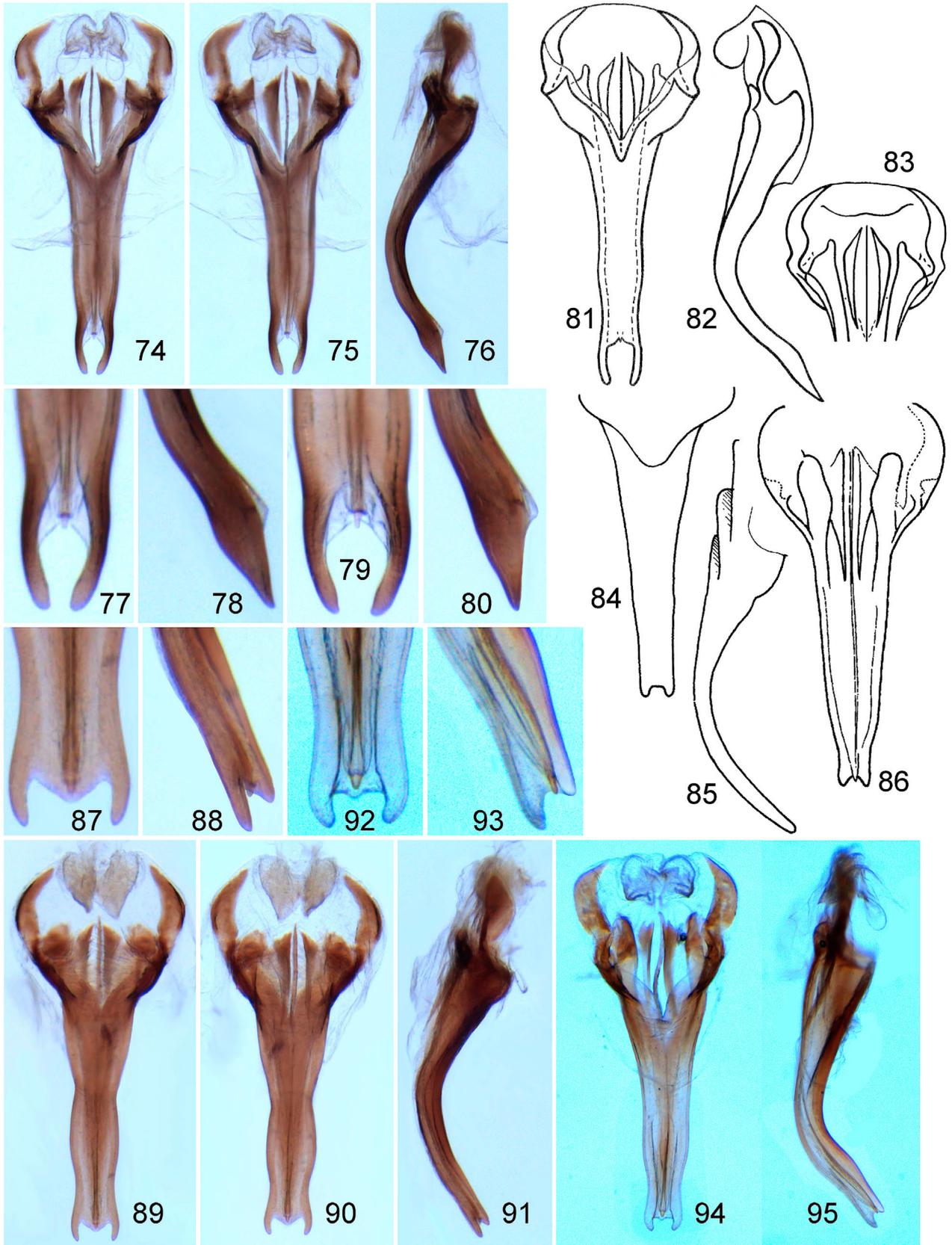
Variations. Other males from insignificantly darker to slightly lighter, but lateral pronotal

lobes always darkened; additional crossvein between diagonal vein and chords in tegmina often absent.

Female. General appearance as in males, but body completely apterous, mesonotum brown with light lateral areas and longitudinal median stripe, and metanotum yellowish with a few brown to light brown spots; genital plate almost indistinguishable from that in female of *B. koblovae* (Fig. 120); ovipositor almost straight and with distal part as in Fig. 121.

Length in mm. Body: male 6.5–8, female 6–7.5; pronotum: male 1.3–1.5, female 1.4–1.6; tegmina, male 2.2–2.5; hind femora: male 4.8–5.2, female 5–5.3; ovipositor 4.2–4.6.

Comparison. The new species is clearly distinguished from *B. koblovae* by the above-mentioned



characters of male genitalia. From *B. tarnis*, the new species differs in the presence of a rather large and angular median lobule at the epiphallic apex which is well visible in the profile (see Figs 19, 21, 22, 87–91, 84–86).

Etymology. The new species is named “trilobulatus” because of the shape of its epiphallic apex.

***Burcus trilobulatus bunaken* Gorochov, subsp. nov.**
(Figs 18, 51, 52, 92–95, 122, 123)

Holotype. Male, **Indonesia**, *Sulawesi Utara Prov., Bunaken I.* near Manado City on Sulawesi, Bunaken National Marine Park, on sand sea beach near mangrove swamp in evening, 18–25.II.2011, A. Gorochov (ZIN).

Paratypes. 4 males, 1 female, same data as for holotype (ZIN).

Description. Male (holotype). Colouration and structure of body very similar to that of nominotypical subspecies but with following differences: epicranium less contrastingly coloured (Figs 51, 52); antennae almost uniformly light greyish brown; pronotum with disc lighter and less contrastingly coloured, and with lateral lobes almost uniformly light brown (only a few small and barely darkened spots developed; Fig. 52); tegmina light brown with most part of dorsal field semitransparent, and with distal part of this field almost brown; legs and abdomen with more or less smaller and lighter darkened marks as well as with clearly larger light areas on abdominal tergites; tegmina reaching base of fifth abdominal tergite, without additional crossvein between diagonal vein and lateral chord; genitalia with epiphallus somewhat more angularly (less arcuately) curved in profile, as well as with distal part having low dorsal convexity and shorter posteromedian lobule (Figs 18, 92–95).

Variations. Some males without darkening on pronotal lateral lobes and almost without darkened spots on dorsum behind rostral apex; two veins located along lateral edge of dorsal tegminal

field often yellowish; lateral tegminal field sometimes also yellowish.

Female. General appearance as in males but with structure of body parts almost as in female of *B. t. trilobulatus*, except for pronotum sometimes having lateral lobes with rather large brown spots, and for genital plate usually having slightly more angular apical lobules and deeper posteromedian notch (Fig. 122); ovipositor as in Fig. 123.

Length in mm. Body: male 7–8.5, female 7–8; pronotum: male 1.6–1.8, female 1.7–1.8; tegmina, male 2.3–2.6; hind femora: male 5–5.5, female 5–5.4; ovipositor 4–4.5.

Comparison. The new subspecies, living on the Pacific coast, differs from *B. t. trilobulatus* (coast of the Indian Ocean) in the lighter colouration of pronotal lateral lobes and in some small characters of the male genitalia listed above (in the description of *B. t. bunaken subsp. nov.*). From *B. koblovae* and *B. tarnis* with also Pacific distribution, *B. t. bunaken* is distinguished by the same genital characters as the nominotypical subspecies.

Etymology. The new subspecies is named after the Bunaken Island.

***Burcus koblovae* Gorochov, 1986, sp. dist.**
(Figs 20, 53–56, 67, 70–83, 119, 120)

Material examined. **Oceania:** 1 male (holotype), “Society Is., Tahiti, 4.8.25, L.E. Cheesman, B. M. 1925-464”, “*Speonemobius tigrinus* Sss., L. Chopard det.”, “*Speonemobius tigrinus* (Saussure), det. B.C. Townsend, 1981”, “received by ZIN in exchange” (ZIN); 1 female (paratype), same data as for holotype but without Chopard’s determination (ZIN). **Indonesia:** 14 males, 11 females, *Togean [= Togian] Is.* in Gulf of Tomini in Sulawesi, 1–10.IV.2017, M. Berezin (ZIN). **Cambodia:** 11 males, 6 females, *Campot Prov.*, environs of Sihanoukville City [= Kampong Som] near sea, 14–21.II.1998, A. Gorochov (ZIN); 4 males, 3 females, *Kokhta I.* in Siam Bay not far from Sihanoukville City, sea coast (on sand beach at night), 25–26.IX.2003, A. Gorochov, M. Berezin (ZIN). **Malaysia:** 8 males (PT.17.19-22, 38-41), 6 females (PT.17.23-26, 42, 43), *Pahang State, Tioman I.* (Pacific

Figs 74–95. *Burcus* Gor., male. **74–83**, *B. koblovae* Gor., specimens from Cambodia (74–78) and Togean Islands (79, 80) as well as holotype (81–83); **84–86**, *B. tarnis* (Otte et Alex.); **87–91**, *B. trilobulatus* sp. nov., holotype; **92–95**, *B. t. bunaken subsp. nov.*, holotype. Genitalia from above (74, 81, 89), from below (75, 86, 90, 94) and from side (76, 82, 85, 91, 95); posterior part of genitalia from below (77, 79, 87, 92) and from side (78, 80, 88, 93); anterior (83) and posterior (84) halves of genitalia from below (83) and from above (84). [81–83, after Gorochov, 1986a; 84–86, after Otte & Alexander, 1983].

Ocean) near Malay Peninsula, Kampung Paya, sandy shore during low tide, 2.79004°N, 104.12232°E, 5.5 m a.s.l. ± 5.7, 6.IV.2017 (0.00 hours and 23.47 hours), M.K. Tan, S.T. Toh (ZRC).

Remarks. This species is similar to *B. trilobulatus* in general appearance and as variable as the latter species in colouration. But these species distinctly differ from each other in the characters listed above, in the description of *B. trilobulatus*.

Otte (1994a) synonymised *B. koblovae* with Australian *B. tarnis*. However, this synonymy is erroneous, because the male genitalia of these congeners are very dissimilar in the structure of epiphallallic distal part: in *B. koblovae*, this part is with long and thin posterolateral lobules and has a characteristic shape in the profile (Figs 20, 74–83); but in *B. tarnis*, the epiphallallic distal part is with much shorter posterolateral lobules and has a different shape in the profile [Figs 21, 22, 84–86: these genitalia are pictured by Otte et Alexander (1983) from three different positions, and all these pictures show the same morphological characters; however, it is practically impossible to do the same mistakes in three different pictures]. Thus, we restore here *B. koblovae* as a distinct species widely distributed in the Pacific coasts. Moreover, Otte's indication of *B. tarnis* for the Hawaiian Islands (Otte, 1994a) must be examined, because we do not know what species of *Burcus* lives in Hawaii.

It is also useful to note that *Nemobius tigrinus* Saussure, 1877 from Tahiti Island, included by Chopard (1967) in the mostly Indo-Malayan genus *Speonemobius* Chopard, 1924, has very different male genitalia (Gorochov, 1986: figs 72, 73) and belongs to the monotypical genus *Tahitinemobius* Gorochov, 1986 from the tribe Nemobiini.

Spectrogram and oscillogram of the male calling song of *B. koblovae* from Tioman Island is given in Fig. 73.

Burcus tarnis (Otte & Alexander, 1983)
(Figs 21, 22, 68, 84–86)

Thetella tarnis Otte & Alexander, 1983: 194.
Burcus tarnis: Gorochov, 1986: 696.

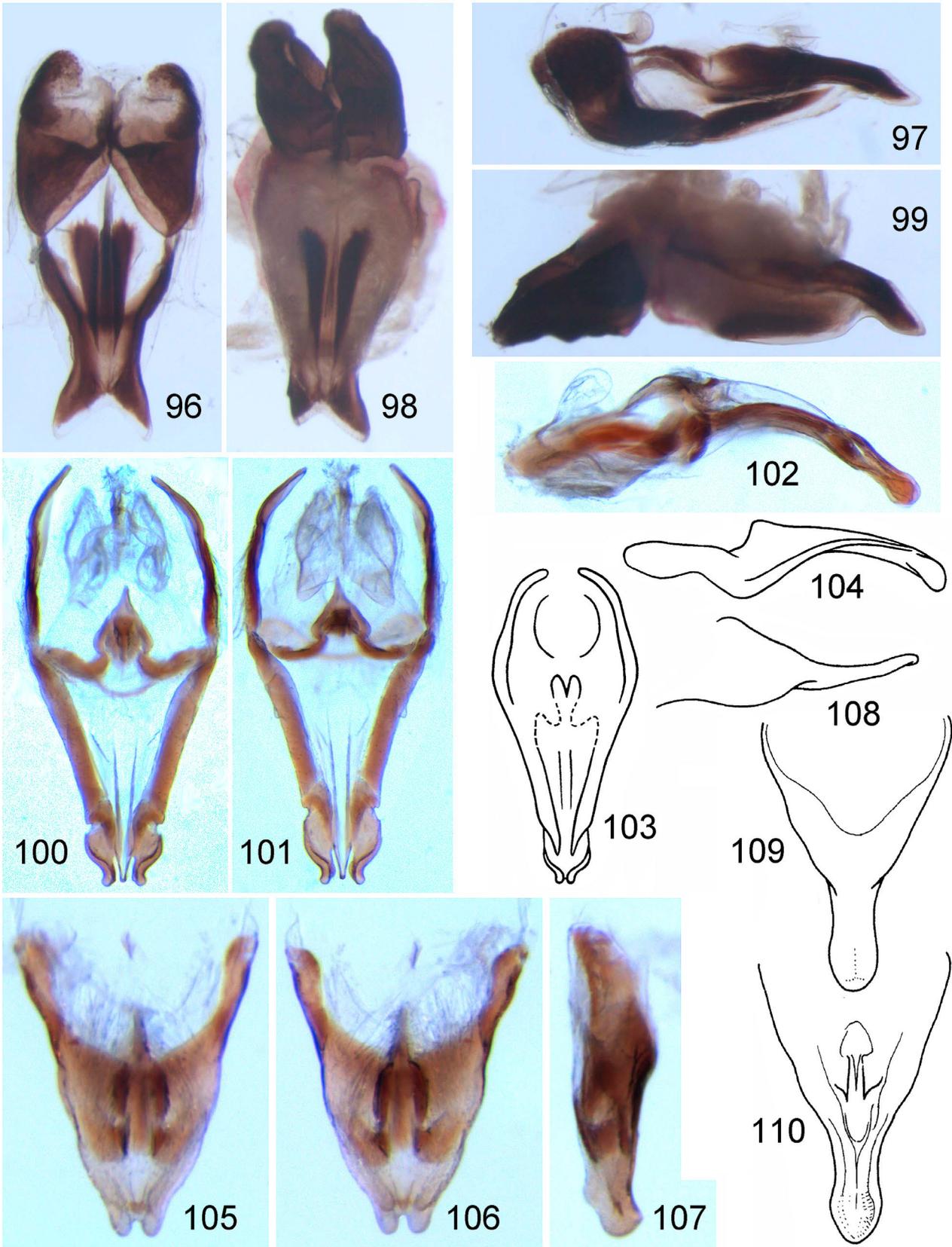
Remarks. This species was described from Queensland (Australia) and originally included in the genus *Thetella* (Otte & Alexander, 1983). However, this genus belongs evidently to Nemobiini, because: its type species (*Th. oonoomba*) has six apical spurs on the hind tibia, its male genitalia are not described but cursory sketched (some important structures, including endoparameres and their apodemes, were not pictured by these authors), and these genitalia are rather different from those of *Burcus* in general shape (see Figs 84–86 and 108–110). From all the other congeners, *B. tarnis* is clearly distinguished by the epiphallallic apex with strongly or moderately shorter posterolateral lobules (see Figs 18–22, 74–95); from *B. trilobulatus*, *B. tarnis* additionally differs in the absence of posteromedian lobule between the above-mentioned epiphallallic lobules (in profile, these three lobules of *B. trilobulatus* look as slight bifurcation of epiphallallic apex; but in *B. tarnis*, this apex are narrowly rounded in profile; see Figs 88, 91, 93, 95 and 85).

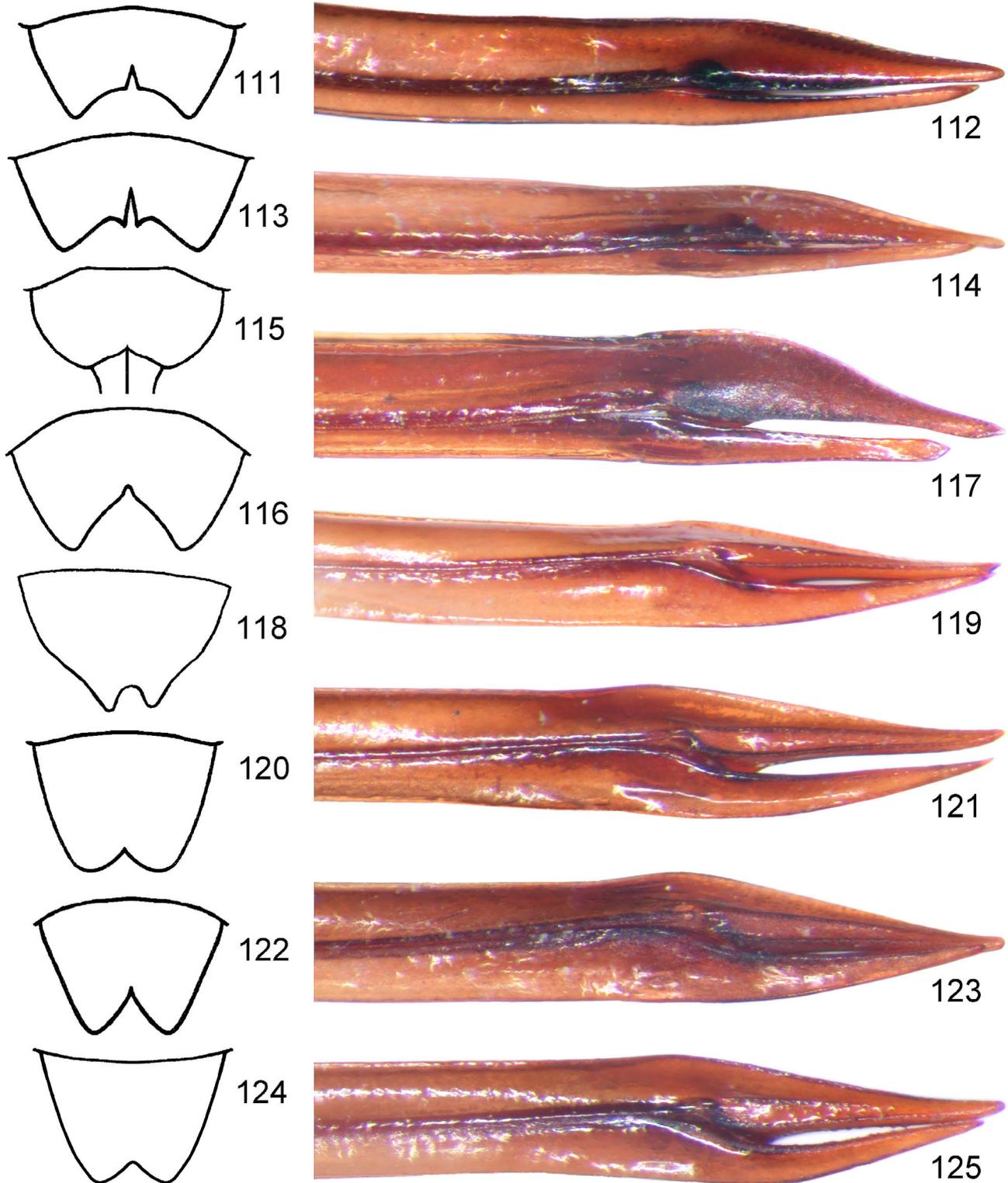
Genus ***Paraburcus*** Gorochov, **gen. nov.**

Type species *Thetella elegans* Kobayashi, 1983.

Diagnosis. External structure of body similar to that of *Burcus* in both sexes, but male tegmina slightly shorter and with somewhat shorter diagonal vein and narrower area between lateral chord and nearest medial chord in stridulatory apparatus (Figs 57–60), fore tibia with similar outer tympanum but without traces of inner one, and male genital plate with less distinct lateral subapical lobules (Fig. 61). Male genitalia with epiphallus more or less similar to that of *Burcus* in general shape (rather thin and basally widened) but less long, curved downwards, partly membranous, and having a pair of articulated structures at apex; rami not fused with epiphallus; rachis also long and rather thin but completely membranous and with distal part more projected behind median epiphallallic part; formula almost triangular (not stripe-like) and with short but distinct unpaired

Figs 96–110. Burcini and Nemobiini, male. **96–99**, *Paranemobius pictus* (Sauss.) from India; **100–104**, *Paraburcus elegans* (Kobayashi) from Thailand (100–102) and from Japan (103, 104); **105–107**, *Neoburcus tarutao* **sp. nov.**; **108–110**, *Thetella oonoomba* Otte et Alex. Genitalia in rest position from below (96, 101, 103, 106, 110), from side (97, 102, 104, 107, 108) and from above (100, 105, 109); genitalia in erected position from below (98) and from side (99). [103, 104, after Kobayashi, 1983 (modified); 108–110, after Otte & Alexander, 1983 (modified)].





Figs 111–125. Marinemobiini and Burcini, female. **111, 112,** *Marinemobius asahinai* (Yam.) from Philippines; **113, 114,** *Eumarinemobius sundaicus* **sp. nov.** from Thailand; **115,** *Apteronemobius longipes* Chop., paralectotype; **116, 117,** *Parapteronemobius sazanami kunashir* **subsp. nov.**; **118,** *P. s. sazanami* Fur.; **119, 120,** *Burcus koblovae* Gor. from Cambodia; **121,** *B. trilobulatus* **sp. nov.**; **122, 123,** *B. t. bunaken* **subsp. nov.**; **124, 125,** *Paraburcus elegans* (Kobayashi) from Thailand. Genital plate from below (111, 113, 115, 116, 118, 120, 122, 124); distal part of ovipositor from side (112, 114, 117, 119, 121, 123, 125). [118, after Furukawa, 1970].

(anterior) apodeme; plate-like sclerites distinctly transverse and almost in contact with formula; traces of endoparameres and their apodemes also absent; valvae almost completely membranous (Figs 23, 100–104).

Included species. Type species only.

Comparison. The new genus is most similar to *Burcus* but distinguished by the male genitalia with the epiphallus somewhat shorter, curved downwards (not upwards), partly membranous and having a pair of articulated structures at the apex, with the distal part of rachis visible behind the median epiphallic part, and with the plate-like sclerites transverse (not longitudinal) and not fused with the epiphallus.

Etymology. The name is composed of the Ancient Greek *ἄρα* and the generic name *Burcus*; gender masculine.

Paraburcus elegans

(Kobayashi, 1983), **comb. nov.**
(Figs 57–61, 100–104, 124, 125)

Thetella elegans Kobayashi, 1983.

Material examined. **Thailand:** 2 males, 3 females, *Trat Prov., Chang I.* in Gulf of Siam, near sea, 5–20.XI.2000, A. Gorochov, L. Anisyutkin (ZIN). **Malaysia:** 1 male, *Sarawak State* (Borneo), environs of Kuching City, Bako National Park, on sand sea beach among rocks in evening, 18–22.II.2012, A. Gorochov, M. Berezin, E. Tkatsheva, I. Kamskov (ZIN).

Remarks. This species was described from the Ryukyu Islands (Kobayashi, 1983) and is here recorded from the Bornean and Thailand coasts of the Pacific Ocean for the first time.

Genus ***Neoburcus*** Gorochov, **gen. nov.**

Type species *Neoburcus tarutao* Gorochov, **sp. nov.**

Diagnosis. External structure of male body similar to that of *Burcus* and *Paraburcus*, but: male tegmina reaching base of fourth abdominal tergite, with widely truncate posterior part and almost without cellular distal area of dorsal field as well as with very long diagonal vein (lateral chord more or less intermediate between those of *Burcus* and *Paraburcus*) (Figs 62–65); fore tibia with similar outer tympanum but without traces of inner one (as in *Paraburcus*); hind tibia with three pairs of dorsal spines and five apical spurs; male genital

plate clearly shorter (Fig. 66), slightly longer than anal plate. Male genitalia with epiphallus moderately short, completely sclerotised in anterior half, almost not curved in profile and gradually narrowing to apical part; this part having a pair of rounded posterolateral lobes and rather narrow notch between them but lacking articulated structures near epiphallic apex; rami short and fused with epiphallus; rachis membranous, moderately short and with apical part invisible from above; formula and plate-like sclerites around it similar to those of *Paraburcus*, but formula with a pair of elongate posterolateral projections, and plate-like sclerites larger; traces of endoparameres and their apodemes also absent; valves completely membranous (Figs 24, 105–107).

Included species. Type species only.

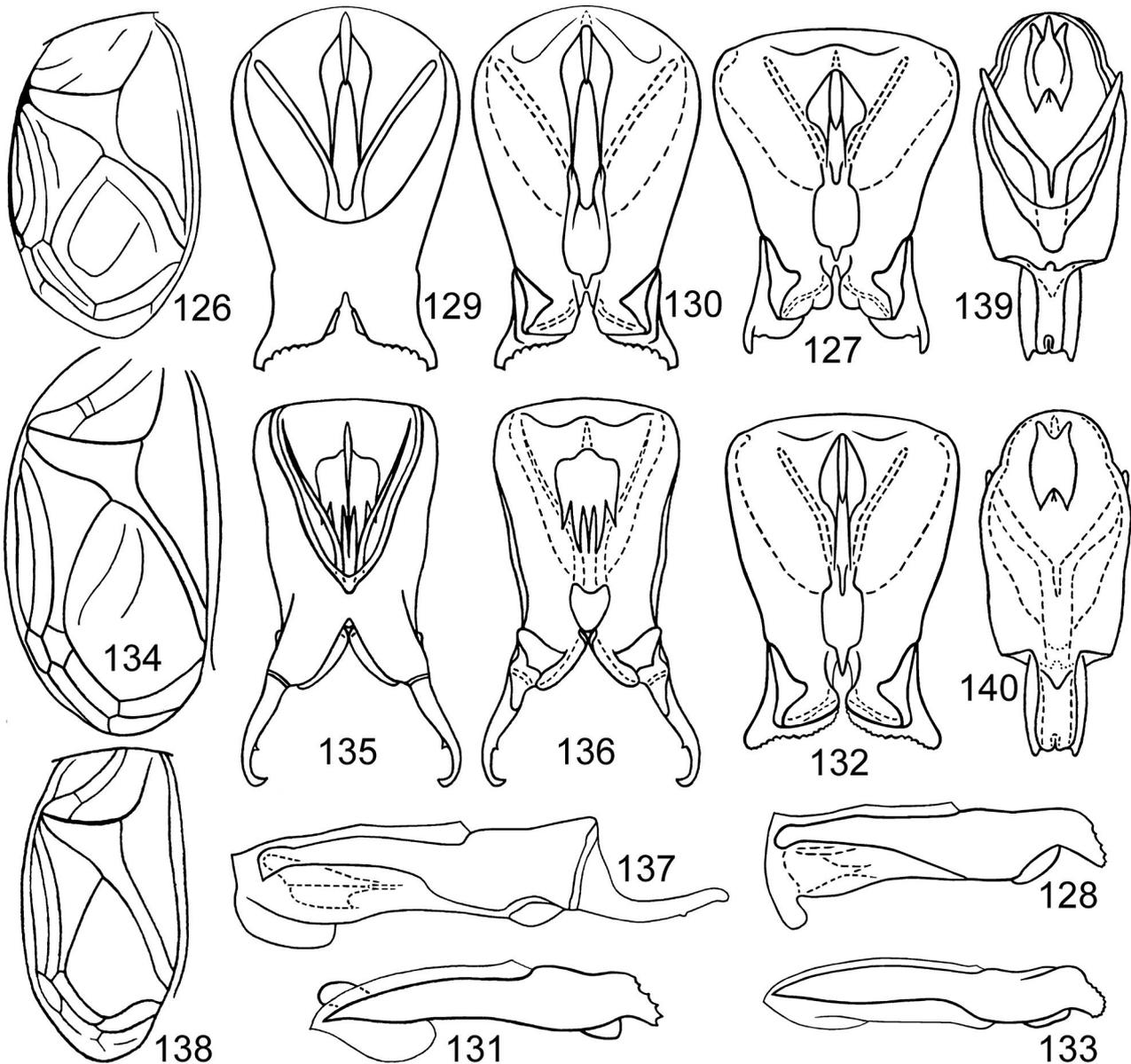
Comparison. The new genus differs from *Burcus* and *Paraburcus* in the presence of three pairs of dorsal spines on the hind tibia, as well as in the male genitalia distinctly shorter but having the epiphallus less curved than in these genera and more similar to that of *Burcus* in the structure (not partly membranous and without articulated parts), and formula structure more similar to that of *Paraburcus* (i.e. its median part not stick-like and with distinct anterior apodeme). From *Speonemobius*, *Neoburcus* is distinguished by the male tegmina without distinct mirror; from *Taiwanemobius*, by the presence of tegmina at least in male, distinctly narrower both epiphallic apical part and its posteromedian notch, and absence of articulated structures near epiphallic apex (Figs 24, 105–107); and from *Paranemobius*, by the presence of stridulatory apparatus in the male tegmina, less long hind tibial spines, and some differences in the male genitalia (see Figs 96, 97 and 106, 107).

Etymology. The name is composed of the Latin prefix *neo-* and the generic name *Burcus*; gender masculine.

Neoburcus tarutao Gorochov, **sp. nov.**
(Figs 24, 62–66, 105–107)

Holotype. Male, **Thailand**, *Tarutao I.* in Andaman Sea, mangrove swamp among rocks near Crocodile Cave (not far from sea) at daytime, 14–19.XI.2014, A. Gorochov, M. Berezin, E. Tkatsheva (ZIN).

Description. Male (holotype). Colouration and structure of body more or less similar to those



Figs 126–140. Trigonidiinae, male. **126–128**, *Trigonidium* (*Paratrigonidium*) *nitidum* (Br.-W.); **129–131**, *T. (Trigonidium)* *cicindeloides* Ramb.; **132, 133**, *T. (Trigonidomorpha)* *sjostedti* (Chop.); **134–137**, *Zudella hawaiiensis* Gor., holotype; **138–140**, *Nudilla pacifica* (Scud.), neotype. Dorsal field of right tegmen (126, 134, 138); genitalia from below (127, 130, 132, 136, 140), from above (129, 135, 139) and from side (128, 131, 133, 137). [127, 128, 130, 131, 134–136, 138–140, after Gorochov, 1985a, 1987, 1988 (modified)].

of previous representatives of Burcini described here, but with some differences. Colouration very contrasting (Figs 63–65): dorsum of epicranium blackish with greyish brown rostral apex, a pair of small whitish spots along dorsal edges of antennal cavities, and thin angular yellowish line between lateral ocelli; lower half of head yellowish to whitish but with a pair of greyish brown oblique stripes under eyes (from genae to lateral parts of

clypeus) and a pair of small arcuate stripes of same color under rostral apex (Fig. 63); antennae greyish brown with yellowish white scape and pedicel as well as thin and numerous rings on flagellum; pronotum blackish with white areas on disc and lateral lobes as in Figs 64, 65; tegmina greyish brown with blackish basal area of dorsal field, whitish both mark near plectrum and longitudinal vein near lateral edge of this field, semitranspar-

ent ventral half of lateral field, and whitish stripe along anterior half of dorsal edge of this field; legs very light with greyish brown spots (with middle and apical spots on fore femur; with middle, apical and small outer subapical ones on middle femur; with six spots on hind femur, but also with one small barely darkened marks on each inner and outer surfaces of this femur; with two spots on each fore and middle tibiae; with more numerous spots on hind tibia which partly fused with each other dorsally; and with somewhat lighter spot in apical part of hind basitarsus); abdominal tergites blackish to dark brown with several yellowish and whitish marks (Fig. 65); anal plate greyish brown; genital plate yellowish with brown lateral parts; rest of body more or less whitish, but majority of abdominal sternites with brown lateral marks and light brown median areas. Head with space between antennal cavities slightly narrower than scape; apical spurs of hind tibia similar to those of *Burcus* and *Paraburcus*, **gen. nov.**; tegminal stridulatory apparatus, genital plate and genitalia as in Figs 24, 62, 66, 105–107.

Female unknown.

Length in mm. Body 7.3; pronotum 1.7; tegmina 2.2; hind femora 5.7.

Etymology. The new species is named after the Tarutao Island where it was collected.

Tribe **Nemobiini** Saussure, 1877

? Thetellini Otte et Alexander, 1983: 193, unavailable name.

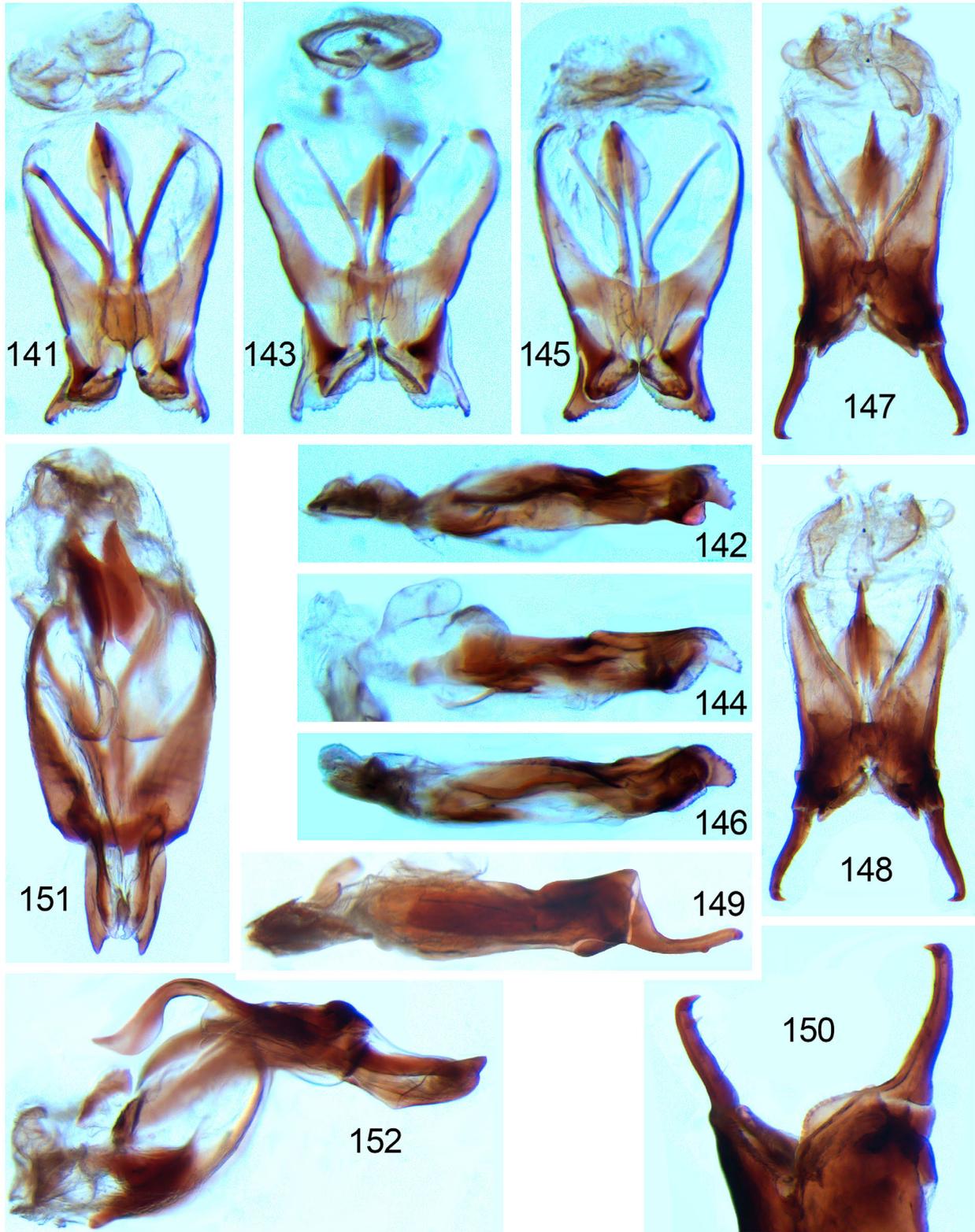
Remarks. The “tribe Thetellini Otte et Alexander, 1983” is unavailable name, because it was introduced without any description, diagnosis or explanation (Otte & Alexander, 1983), but the Code requests: “To be available, every new name published after 1930 must ... be accompanied by a description or definition that states in words characters that are purported to differentiate the taxon, or ... be accompanied by a bibliographic reference to such a published statement” [Article 13.1]; “A family-group name first published after 1930 and before 1961 [!] which does not satisfy the provisions of Article 13.1 is available from its original publication only if it was used as valid before 2000” [Article 13.2.1].

Moreover, these authors included in their “tribe” two very different genera probably belong-

ing to two tribes (*Thetella* and *Apteronemobius*), but what is their general character allowing the authors to unite these genera is unknown. Also, this tribal name may be synonymous with Nemobiini, because *Thetella oonoomba* (type and now sole species of *Thetella*) has six apical spurs on the hind tibia and lacks any glandular spines on the proximal half of this tibia (the latter feature is characteristic of male in Pteronemobiini). Additional study of the male genitalia in this Australian species (these genitalia are insufficiently studied; see remarks on *Burcus* above) may help us to establish the systematic position of *Thetella* more exactly.

Later Otte et al. (1987) added to Thetellini the new genus *Ionemobius* as well as genera *Fikola* Gorochov, 1986 and *Orintia* Gorochov, 1986 from New Caledonia. However, *Ionemobius* with one species only was described without any indication of number of apical spurs on its hind tibia, without description of the male genitalia and with insufficient pictures of these genitalia (most important structures, as in the case of *Th. oonoomba*, were not shown); thus, systematic position of this genus is very unclear. *Fikola* and *Orintia* (each was originally described from one species presented by females only) have their hind tibia with six apical spurs but without glandular spines and may belong to Nemobiini or Grylliscini.

Fikola was originally included in Nemobiini (Gorochov, 1986a) but then synonymised by Desutter-Grandcolas (1997) with *Bullita* from the same tribe; however, this synonym may be incorrect, because the type species of *Bullita* has a stridulatory apparatus in the male tegmina as well as only outer tympanum on the fore tibia, but *Fikola* lacks tympana (Gorochov, 1986a), and therefore its male must be without tegminal stridulatory apparatus or with strongly reduced one. Some species added to *Bullita* are possibly in accordance to the original diagnosis of this genus (Desutter-Grandcolas, 1997: 139 “Tibias I avec un unique tympan, externe [!]”), but the diagnosis of *Bullita* given by Desutter-Grandcolas et al. (2016) contains indication that its fore tibia is “with a wide inner [!] tympanum, without outer [!] tympanum”, and the latter diagnosis is not in accordance to the type specimens of both *Bullita* and *Fikola*. Thus, generic position of some species,



Figs 141–152. Trigonidiinae, male. **141, 142,** *Trigonidium (Trigonidium) cicindeloides* Ramb.; **143, 144,** *T. (Paratrigonidium) nitidum* (Br.-W.); **145, 146,** *T. (Trigonidomorpha) sjostedti* (Chop.); **147–150,** *Zudella hawaiiensis* Gor., paratype (147, 148, 150) and holotype (149); **151, 152,** *Nudilla pacifica* (Scud.), neotype. Genitalia from below (141, 143, 145, 148, 151), from side (142, 144, 146, 149, 152) and from above (147); distal part of genitalia from side and partly above, reversed (150).

described or indicated as representatives of *Bullita*, are in need of examination.

The male genitalia of *Orintia*, originally (tentatively) included in *Lissotrachelini*, were studied by Desutter-Grandcolas et al. (2016) for *O. cornuta* Desutter-Grandcolas, 2016 (a second species of this genus); these genitalia are more similar to those of some other representatives of Nemobiini than to those of Grylliscini or *Lissotrachelus* Brunner-Wattenwyl, 1893.

Tribe **Pteronemobiini** Vickery, 1973

Remarks. This tribe was proposed for the first time by Vickery (1973): "...I consider that they [*Nemobius sylvestris* (Bosc) and "*Pteronemobius fascipes* (Walker)] belong in different tribes, Nemobiini and Pteronemobiini, respectively, based upon absence in the former and presence in the latter of glandular tibial spines on the males". Nevertheless, in the OSF, the authorship of this tribe is defined differently: "Pteronemobiini Otte & Alexander, 1983". It is difficult to say: Vickery's description is in accordance to the Code or not. But Vickery indicated one morphological difference between these tribes at least. Whereas Otte & Alexander (1983) used this tribal name without any indication of its author or authors and without any description, i.e. Pteronemobiini Otte et Alexander, 1983 is unavailable name (see the Code). The authorship of Pteronemobiini belongs to Vickery (1973) but not to Otte & Alexander (1983) as shown by Storozhenko et al. (2015).

Also, it is reasonable to indicate that the genus *Caledonina* Desutter-Grandcolas, 2016 from New Caledonia, having a glandular inner proximal spine on the male tibia but originally not included in Pteronemobiini due to its similarity to Nemobiini in the molecular data (Desutter-Grandcolas et al., 2016), has the male genitalia very similar to those of Pteronemobiini and most probably belongs to this tribe.

Subfamily **Trigonidiinae** Saussure, 1874

Genus ***Zudella*** Gorochov, 1988, **gen. dist.**

Remarks. This genus was described from one new Hawaiian species which have the tegminal stridulatory apparatus and male genitalia dis-

tinctly different from all the other genera of Trigonidiinae (Gorochov, 1988). This author also suggested that most part of Hawaiian crickets, included in the former genus *Paratrigonidium* Brunner-Wattenwyl, 1893 by the previous authors (see Chopard, 1968), belongs to this genus. Such hypothesis became possible, because it was previously established that *Paratrigonidium* type species (*P. nitidum* Brunner-Wattenwyl, 1893 from Southeast Asia) has the male genitalia almost indistinguishable from those of *Trigonidium* Rambur, 1839 and must be placed in the latter genus (Gorochov, 1987); thus, *Paratrigonidium* was included by him in *Trigonidium* s. l. as one of its subgenera.

However, Otte (1994a) did not agree with Gorochov and erroneously placed these and many new species of *Zudella* in the genus *Trigonidium*, although he believed that they are not congeneric with *Paratrigonidium* type species (thus, he evidently did not agree with inclusion of *Paratrigonidium* in *Trigonidium* s. l.). Moreover, this author in the same book considered *Trigonidium* and *Trigonidomorpha* as different genera but put the latter genus under "Mogoplistinae" [?]. In the same year, Otte (1994b) restored *Paratrigonidium* as a separate genus as well as included *Zudella* and *Trigonidomorpha* in the genus *Trigonidium* as its subgenera; however, his subgenus *Zudella* had one species only, despite the fact that the original description and illustrations clearly show the close relationship of this species to the other Hawaiian representatives of his "*Trigonidium*".

These Otte's actions made the genus *Trigonidium* practically impossible for any understandable diagnosis, because the male genitalia in type species of *Trigonidium*, *Paratrigonidium* and *Trigonidomorpha* are very similar to each other and clearly having the same type of fixation during copulation (their distal epiphallic lobes are rather simple, short and immovable in relation to the rest epiphallic part, and their ectoparameres, rachis and formula and very similar in the shape; Figs 127–133, 141–146). Thus, these names belong to three subgenera of the same genus having different degrees of reduction of the stridulatory apparatus in the male tegmina: this apparatus is developed (subgenus *Paratrigonidium* **stat. resurr.**), partly reduced (subgenus *Trigonidomorpha* **stat. resurr.**),

and completely absent (*Trigonidium* s. str.). But *Zudella* has the male tegminal stridulatory apparatus different from that of the subgenus *Paratrigonidium* (for comparison see Figs 126 and 134), epiphallus with additional long and movable (articulated) distal processes, ectoparameral sclerites almost transverse (not longitudinal), rachis without apical spine-like lobule (*vs.* with such lobule), and posterior part of formula in the male genitalia very different from that of *Trigonidium* s. l. in shape (see Figs 127–133, 135–137, 141–150).

So, the endemic genus *Zudella* is here restored from subgenera of *Trigonidium* s. l. and contains the following 135 Hawaiian species considered in OSF as belonging to the subgenera *Zudella* and *Trigonidium*:

Zudella hawaiiensis Gorochov, 1988, type species (= *Trigonidium kolekole* Otte, 1994, **syn. nov.**); *Z. acuste* (Otte, 1994), **comb. nov.**; *Z. ahiu* (Otte, 1994), **comb. nov.**; *Z. aka* (Otte, 1994), **comb. nov.**; *Z. akaka* (Otte, 1994), **comb. nov.**; *Z. alina* (Otte, 1994), **comb. nov.**; *Z. alternata* (Perkins, 1899), **comb. nov.**; *Z. anoe* (Otte, 1994), **comb. nov.**; *Z. atroferruginea* (Brunner-Wattenwyl, 1895), **comb. nov.**; *Z. attenuata* (Perkins, 1899), **comb. nov.**; *Z. awawa* (Otte, 1994), **comb. nov.**; *Z. awiwi* (Otte, 1994), **comb. nov.**; *Z. crepitans* (Perkins, 1899), **comb. nov.**; *Z. crusta* (Otte, 1994), **comb. nov.**; *Z. debilis* (Perkins, 1899), **comb. nov.**; *Z. eumeles* (Otte, 1994), **comb. nov.**; *Z. excultatum* (Otte, 1994), **comb. nov.**; *Z. exigua* (Perkins, 1899), **comb. nov.**; *Z. exuberans* (Otte, 1994), **comb. nov.**; *Z. filica* (Perkins, 1899), **comb. nov.**; *Z. flectens* (Otte, 1994), **comb. nov.**; *Z. fortuita* (Otte, 1994), **comb. nov.**; *Z. freycinetiae* (Perkins, 1899), **comb. nov.**; *Z. fritinnia* (Otte, 1994), **comb. nov.**; *Z. grande* (Perkins, 1899), **comb. nov.**; *Z. haawina* (Otte, 1994), **comb. nov.**; *Z. halulu* (Otte, 1994), **comb. nov.**; *Z. hamakua* (Otte, 1994), **comb. nov.**; *Z. hamumu* (Otte, 1994), **comb. nov.**; *Z. hapapa* (Otte, 1994), **comb. nov.**; *Z. haupu* (Otte, 1994), **comb. nov.**; *Z. hehelo* (Otte, 1994), **comb. nov.**; *Z. hoahoa* (Otte, 1994), **comb. nov.**; *Z. hoku* (Otte, 1994), **comb. nov.**; *Z. holomua* (Otte, 1994), **comb. nov.**; *Z. hopo* (Otte, 1994), **comb. nov.**; *Z. huapala* (Otte, 1994), **comb. nov.**; *Z. hyperkona* (Otte, 1994), **comb. nov.**; *Z. iao* (Otte, 1994), **comb. nov.**; *Z. ignava* (Otte, 1994), **comb. nov.**; *Z. illex* (Otte, 1994), **comb. nov.**;

Z. imitans (Otte, 1994), **comb. nov.**; *Z. improba* (Otte, 1994), **comb. nov.**; *Z. incongrua* (Otte, 1994), **comb. nov.**; *Z. iuka* (Otte, 1994), **comb. nov.**; *Z. kaeka* (Otte, 1994), **comb. nov.**; *Z. kahua* (Otte, 1994), **comb. nov.**; *Z. kalopa* (Otte, 1994), **comb. nov.**; *Z. kapiipi* (Otte, 1994), **comb. nov.**; *Z. kau* (Otte, 1994), **comb. nov.**; *Z. kewai* (Otte, 1994), **comb. nov.**; *Z. kohala* (Otte, 1994), **comb. nov.**; *Z. kolea* (Otte, 1994), **comb. nov.**; *Z. kona* (Otte, 1994), **comb. nov.**; *Z. kua* (Otte, 1994), **comb. nov.**; *Z. kukui* (Otte, 1994), **comb. nov.**; *Z. kulana* (Otte, 1994), **comb. nov.**; *Z. kupinai* (Otte, 1994), **comb. nov.**; *Z. kupono* (Otte, 1994), **comb. nov.**; *Z. languida* (Otte, 1994), **comb. nov.**; *Z. laupele* (Otte, 1994), **comb. nov.**; *Z. lena* (Otte, 1994), **comb. nov.**; *Z. ligna* (Otte, 1994), **comb. nov.**; *Z. liula* (Otte, 1994), **comb. nov.**; *Z. mahina* (Otte, 1994), **comb. nov.**; *Z. makani* (Otte, 1994), **comb. nov.**; *Z. makanina* (Otte, 1994), **comb. nov.**; *Z. makapala* (Otte, 1994), **comb. nov.**; *Z. makau* (Otte, 1994), **comb. nov.**; *Z. malanai* (Otte, 1994), **comb. nov.**; *Z. malela* (Otte, 1994), **comb. nov.**; *Z. mana* (Otte, 1994), **comb. nov.**; *Z. manuka* (Carvalho et Otte, 2006), **comb. nov.**; *Z. mauiensis* (Otte, 1994), **comb. nov.**; *Z. mauka* (Otte, 1994), **comb. nov.**; *Z. mokuleia* (Carvalho et Otte, 2006), **comb. nov.**; *Z. molokaiensis* (Perkins, 1899), **comb. nov.**; *Z. nani* (Otte, 1994), **comb. nov.**; *Z. napua* (Carvalho et Otte, 2006), **comb. nov.**; *Z. nele* (Otte, 1994), **comb. nov.**; *Z. neogrande* (Otte, 1994), **comb. nov.**; *Z. neokukui* (Otte, 1994), **comb. nov.**; *Z. neovarians* (Otte, 1994), **comb. nov.**; *Z. novaginta* (Otte, 1994), **comb. nov.**; *Z. novena* (Otte, 1994), **comb. nov.**; *Z. octava* (Otte, 1994), **comb. nov.**; *Z. octonalis* (Otte, 1994), **comb. nov.**; *Z. ohaka* (Otte, 1994), **comb. nov.**; *Z. ola* (Otte, 1994), **comb. nov.**; *Z. olomea* (Otte, 1994), **comb. nov.**; *Z. ookala* (Otte, 1994), **comb. nov.**; *Z. opua* (Otte, 1994), **comb. nov.**; *Z. pahiwa* (Otte, 1994), **comb. nov.**; *Z. palai* (Otte, 1994), **comb. nov.**; *Z. paramana* (Otte, 1994), **comb. nov.**; *Z. paranoe* (Otte, 1994), **comb. nov.**; *Z. paranoho* (Otte, 1994), **comb. nov.**; *Z. paraspilos* (Otte, 1994), **comb. nov.**; *Z. parroctonalis* (Otte, 1994), **comb. nov.**; *Z. pavida* (Otte, 1994), **comb. nov.**; *Z. pipili* (Otte, 1994), **comb. nov.**; *Z. pololu* (Otte, 1994), **comb. nov.**; *Z. proalina* (Otte, 1994), **comb. nov.**; *Z. procrusta* (Otte, 1994), **comb. nov.**; *Z. promana* (Otte,

1994), **comb. nov.**; *Z. pseudokua* (Otte, 1994), **comb. nov.**; *Z. pseudoli* (Otte, 1994), **comb. nov.**; *Z. pseudonoe* (Otte, 1994), **comb. nov.**; *Z. pudica* (Otte, 1994), **comb. nov.**; *Z. puiwa* (Otte, 1994), **comb. nov.**; *Z. puukani* (Otte, 1994), **comb. nov.**; *Z. robusta* (Perkins, 1899), **comb. nov.**; *Z. rosea* (Perkins, 1899), **comb. nov.**; *Z. saltator* (Perkins, 1899), **comb. nov.**; *Z. septima* (Otte, 1994), **comb. nov.**; *Z. sexta* (Otte, 1994), **comb. nov.**; *Z. sibilans* (Otte, 1994), **comb. nov.**; *Z. silvicola* (Otte, 1994), **comb. nov.**; *Z. spilos* (Otte, 1994), **comb. nov.**; *Z. subrosea* (Perkins, 1899), **comb. nov.**; *Z. sylvatica* (Otte, 1994), **comb. nov.**; *Z. triens* (Otte, 1994), **comb. nov.**; *Z. ua* (Otte, 1994), **comb. nov.**; *Z. ulaino* (Otte, 1994), **comb. nov.**; *Z. varians* (Perkins, 1899), **comb. nov.**; *Z. venata* (Otte, 1994), **comb. nov.**; *Z. virens* (Otte, 1994), **comb. nov.**; *Z. viridiscens* (Perkins, 1899), **comb. nov.**; *Z. wahoi* (Otte, 1994), **comb. nov.**; *Z. wai* (Otte, 1994), **comb. nov.**; *Z. waialina* (Otte, 1994), **comb. nov.**; *Z. waikua* (Otte, 1994), **comb. nov.**; *Z. waimea* (Otte, 1994), **comb. nov.**; *Z. wai-puna* (Otte, 1994), **comb. nov.**; and *Z. wiki* (Otte, 1994), **comb. nov.**

Genus *Nudilla* Gorochov, 1988, **gen. dist.**

Laupala Otte, 1994a: 129–130, **syn. nov.**

Remarks. This genus was described in the same paper and for the same reason as *Zudella* (Gorochov, 1988); the description was based on one Hawaiian species, indicated by Perkins (1899) as *Paratrigonidium pacificum* (Scudder, 1869), and accompanied by a few illustrations of the tegminal stridulatory apparatus and very characteristic male genitalia which clearly separate *Nudilla* from all the other genera of Trigonidiinae (Figs 138–140, 151, 152). Otte (1994a) decided that this genus is **nomen dubium**, because *Nudilla* type species (*Trigonidium pacificum*) was insufficiently described, and its type material is lost; this was the reason that he again described this genus but as new one (*Laupala* Otte, 1994). However, he discussed this problem in the paragraph about his *Laupala*, i.e. he evidently understood that his *Laulapa* is a synonym of *Nudilla*. Nevertheless, in his catalogue (Otte, 1994b) *Nudilla* was placed in the “tribe Trigonidiini” as **nomen nudum** [?]. Later Eades (OSF) corrected the latter mistake, but

in this site, *Nudilla* was surprisingly synonymised with the subgenus *Trigonidium* [!].

Really *Nudilla* is a distinct endemic genus, and for its exact fixation, it is necessary to designate a neotype of its type species (this designation is given below). *Laupala* is a junior synonym of *Nudilla*. The following 37 Hawaiian species belong to *Nudilla*:

Nudilla pacifica (Scudder, 1869), type species (= *Laupala cerasina* Otte, 1994, **syn. nov.**); *N. eukolea* (Otte, 1994), **comb. nov.**; *N. eupacifica* (Otte, 1994), **comb. nov.**; *N. fugax* (Otte, 1994), **comb. nov.**; *N. hapapa* (Otte, 1994), **comb. nov.**; *N. hualalai* (Otte, 1994), **comb. nov.**; *N. kai* (Otte, 1994), **comb. nov.**; *N. kanaele* (Otte, 1994), **comb. nov.**; *N. kauaiensis* (Otte, 1994), **comb. nov.**; *N. kohalensis* (Otte, 1994), **comb. nov.**; *N. kokeensis* (Otte, 1994), **comb. nov.**; *N. kolea* (Otte, 1994), **comb. nov.**; *N. koloa* (Otte, 1994), **comb. nov.**; *N. kona* (Otte, 1994), **comb. nov.**; *N. lanaiensis* (Otte, 1994), **comb. nov.**; *N. makaio* (Shaw, 2000), **comb. nov.**; *N. makaweli* (Otte, 1994), **comb. nov.**; *N. media* (Otte, 1994), **comb. nov.**; *N. mediaspisa* (Otte, 1994), **comb. nov.**; *N. melewiki* (Shaw, 2000), **comb. nov.**; *N. molokaiensis* (Otte, 1994), **comb. nov.**; *N. neospisa* (Otte, 1994), **comb. nov.**; *N. nigra* (Otte, 1994), **comb. nov.**; *N. nui* (Otte, 1994), **comb. nov.**; *N. oahuensis* (Otte, 1994), **comb. nov.**; *N. olohena* (Otte, 1994), **comb. nov.**; *N. danieli* **nom. nov.** (= *L. pacifica* Otte, 1994, homonym of type species); *N. paranigra* (Otte, 1994), **comb. nov.**; *N. parapacifica* (Otte, 1994), **comb. nov.**; *N. paraprosea* (Otte, 1994), **comb. nov.**; *N. prosea* (Otte, 1994), **comb. nov.**; *N. pruna* (Otte, 1994), **comb. nov.**; *N. spisa* (Otte, 1994), **comb. nov.**; *N. tantalis* (Otte, 1994), **comb. nov.**; *N. vespertina* (Otte, 1994), **comb. nov.**; *N. waikemoi* (Otte, 1994), **comb. nov.**; and *N. wailua* (Otte, 1994), **comb. nov.**

Nudilla pacifica (Scudder, 1869)
(Figs 138–140, 151, 152)

Trigonidium pacificum Scudder, 1869: 139.

Nudilla pacifica: Gorochov, 1988: 6.

Laupala cerasina Otte, 1994a: 164, **syn. nov.**

Material examined. **Hawaiian Is.:** 1 male (neotype, here designated), “Puna, Hawaii, 2000 ft. Perkins. XII 1896”, “Hawaiian Islands. R.C.L. Perkins.

99.332”, “*Paratrigonidium pacificum* Perkins [!] det. B.C. Townsend, 1981”, “received by ZIN in exchange” (ZIN); 2 females, same data as for neotype but without determination by Townsend (ZIN).

Remarks. This material is a part of the historical series of Perkins, on which the understanding of this species was based in his well-known book on Hawaii (Perkins, 1899). A few specimens of this series were received by ZIN in exchange with NHM (from B. Townsend, former curator of Orthoptera in NHM). These specimens were examined by Gorochov and served as a basis for describing the genus *Nudilla* (Gorochov, 1988). Type material on this species is lost (Otte, 1994a, 1994b; OSF), and there are numerous Hawaiian species which are in accordance with the insufficient description by Scudder; moreover, this material was without exact locality, because Scudder (1869) indicated this locality by the following words: “One female from the Hawaiian Islands”. Thus, for the exact fixation of these names (one species name and one generic name), the above-mentioned male from ZIN is here designated as neotype of Scudder’s species.

In addition, one Hawaiian species described as *Laupala pacifica* Otte, 1994 becomes a secondary homonym of the Scudder’s species after the synonymization of *Laupala* with *Nudilla* and needs a new name. Such a new name, *N. danieli* Gorochov, **nom. nov.** is here proposed in honour of Daniel Otte, the author of this homonym.

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