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CRICKETS OF THE SUBFAMILY PHALORIINAE (ORTHOPTERA: GRYLLIDAE) FROM MALACCA, SULAWESI AND MOLUCCAS

A. V. Gorochov

Zoological Institute of the Russian Academy of Sciences, Universitetskaya Emb. 1, 199034, Saint Petersburg, Russia;
e-mail: orthopt@zin.ru

ABSTRACT

Trellius (*Protrellius*) *michaili* sp. nov., *T. (P.) helverseni tioman* subsp. nov., *T. (P.) elenae* sp. nov. and *Sumatloria juara* sp. nov. from Malacca, *Phaloria* (*Sulaweloria* subgen. nov.) *doloduo* sp. nov., *Ph. (Papuloria) lindu* sp. nov., *Tremellia minahassa* sp. nov. and *Strophiola tangkoko* sp. nov. from Sulawesi, *Ph. (P.) halmahera* sp. nov., *Ph. (P.) ternate* sp. nov. and *Pseudotrigonidium* (*Pseudotrigonidium*) *grigori* sp. nov. from Molucca Islands (Halmahera I. and Ternate I.) are described. Distribution of this subfamily and of some its genera and subgenera is clarified.

Key words: Gryllidae, Indonesia, Malacca, Malaysia, Molucca Islands, new taxa, Orthoptera, Phaloriinae, Sulawesi

СВЕРЧКИ ПОДСЕМЕЙСТВА PHALORIINAE (ORTHOPTERA: GRYLLIDAE) ИЗ МАЛАККИ, СУЛАВЕСИ И МОЛУККСКИХ ОСТРОВОВ

A. В. Горохов

Зоологический институт Российской академии наук, Университетская наб. 1, 199034, Санкт-Петербург, Россия;
e-mail: orthopt@zin.ru

РЕЗЮМЕ

Описываются *Trellius* (*Protrellius*) *michaili* sp. nov., *T. (P.) helverseni tioman* subsp. nov., *T. (P.) elenae* sp. nov. и *Sumatloria juara* sp. nov. из Малакки, *Phaloria* (*Sulaweloria* subgen. nov.) *doloduo* sp. nov., *Ph. (Papuloria) lindu* sp. nov., *Tremellia minahassa* sp. nov. и *Strophiola tangkoko* sp. nov. из Сулавеси, *Ph. (P.) halmahera* sp. nov., *Ph. (P.) ternate* sp. nov. и *Pseudotrigonidium* (*Pseudotrigonidium*) *grigori* sp. nov. с Молуккских о-вов (о. Хальмахера и о. Тернате). Уточняется распространение подсемейства Phaloriinae и некоторых его родов и подродов.

Ключевые слова: Gryllidae, Индонезия, Малакка, Малайзия, Молуккские острова, новые таксоны, Orthoptera, Phaloriinae, Сулавеси

INTRODUCTION

The subfamily Phaloriinae is distributed in tropical forests of Africa, South-East Asia, Australia and numerous islands between them (Seychelles, Ryukyu, Philippines, Andaman and Sonde Islands, New Guinea and nearest islands, and islands in Oceania from Solomon Islands to Fiji and New Caledonia). In Africa, this subfamily is presented by the more primi-

tive tribe Subtiloriini Gorochov, 2003 having simple structure of ovipositor apical part (without drilling teeth), and in the other listed territories, by the tribe Phaloriini Gorochov, 1985 with clearly drilling apical part of ovipositor (Gorochov 2003, 2010). The latter tribe includes nine genera, and some of them (*Phaloria* Stål, 1877; *Pseudotrigonidium* Chopard, 1915; *Trellius* Gorochov, 1988) are divided into subgenera (Gorochov 1992, 1996, 1999, 2003).

The genus *Trellius* is characteristic of Indochina and Sonde Islands, and includes six subgenera having more or less local distribution: *Trellius* s. str. (Northern and Central Indochina), *Neotrellius* Gorochov, 1992 (Northern Indochina), *Protrellius* Gorochov, 1996 (Central and Southern Malacca, Sonde Islands), *Vescelotrellius* Gorochov, 1999 (Northern and Central Malacca), *Zatrellius* Gorochov, 1999 (Andaman Islands and Southern Indochina excepting Malacca) and *Diatrellius* Gorochov, 2003 (Southern Indochina excepting Malacca). The genus *Phaloria* is distributed from Philippines to Australia and Fiji (but one species occurs in Seychelles, Sumatra and Java), and consists of three subgenera: *Phaloria* s. str., *Papuloria* Gorochov, 1996 (the composition of these two subgenera remains poorly understood) and *Trelloria* Gorochov, 1996 (Bismarck Archipelago and Solomon Islands). The genus *Pseudotrigonidium* is distributed from Java to Solomon Islands, New Caledonia and Australia, and contains two subgenera occupying well separated areas: *Pseudotrigonidium* s. str. (from Papuan region to Oceania and Australia) and *Tripsegonium* Gorochov, 1996 (Java).

The new finds from Malacca, Sulawesi and Moluccas clarify some peculiarities of distribution of this subfamily: the genus *Sumatoria* Gorochov, 2003 is recorded for the first time from Malacca; the genus *Phaloria* and its subgenus *Papuloria* as well as the genus *Tremellia* Stål, 1877 are indicated for the first time in Sulawesi (a most western locality of *Papuloria* and a most southern locality of *Tremellia*); the Phaloriinae, genus *Phaloria* and its subgenus *Papuloria* are recorded for the first time from Halmahera I. and Ternate I., and the genus *Pseudotrigonidium* as well as its nominotypical subgenus, from Halmahera I. (a most western locality of the latter subgenus).

MATERIAL AND METHODS

The specimens described here were collected at night on the leaves of bushes or small trees in good forest mainly near small rivers or brooks. Brief information about mode of life of Phaloriinae is given in one of previous papers on these crickets (Gorochov 2010). However it is necessary to note that some representatives of the genus *Phaloria* and possibly all the species of the genera *Tremellia* and *Pseudotrigonidium* are less connected with water, as their hind tibial spines and spurs are not very long and not strongly

pubescent (in the majority of the other representatives of Phaloriinae, these spines and spurs are very long and strongly pubescent – an adaptation to jumps on water surface).

The material considered here are collected during expeditions of the author with his colleagues and friends from Moscow Zoo and some other Moscow institutions to Malaysia and Indonesia. All this material (including types) is deposited at the Zoological Institute of the Russian Academy of Sciences, Saint Petersburg. The specimens are dry and pinned. The preparations of male genitalia are worked up by KOH solution and deposited in glycerin. The photographs were made by Leica M216.

SYSTEMATICS

Family Gryllidae Laicharting, 1781

Subfamily Phaloriinae Gorochov, 1985

Tribe Phaloriini Gorochov, 1985

Genus *Trellius* Gorochov, 1988

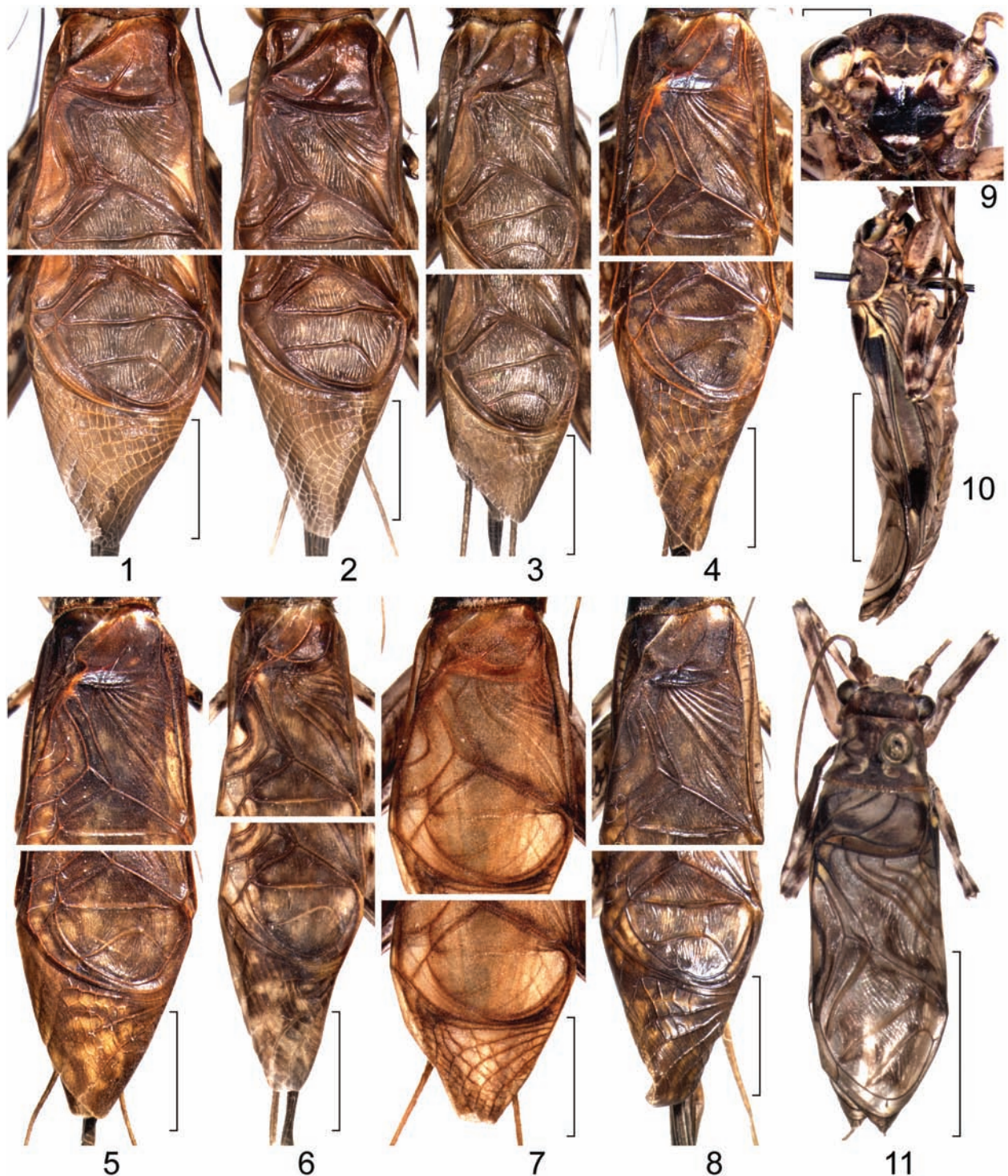
Trellius (*Protrellius*) *michaili* sp. nov.

(Figs 1, 12–14, 45, 49)

Etymology. The name is given in honor of entomologist Michail Berezin, Moscow Zoo.

Type material. Holotype – male, MALAYSIA: Pahang State, Fraser's Hill near border with Selangor State, 17–18 km SW of Raub Town, 1000–1300 m, near brook in primary forest, 15–23 April 2010, A. Gorochov, M. Berezin, E. Tkatsheva. Paratypes: 4 males, 2 females, same data.

Description. *Male* (holotype). Coloration brown with following pattern: head with whitish ocelli and membranes of antennal cavities, yellowish median spot on face (between rostrum and clypeus) and a pair of dots near ventromedial edges of antennal cavities, light brown labrum and areas on other mouthparts; legs light brown with brown both large spot on each fore coxa and a few large spots on each femur, tibia and tarsus (but proximal half of hind femur almost only with numerous oblique stripes on dorsolateral part); tegmina with slightly lighter large spots on basal and apical areas of dorsal field and between chords (Fig. 1); lateral tegminal field with light brown venation, almost transparent membranes between Sc branches and yellowish membranes in



Figs 1–11. Male: 1 – *Trellius michaili* sp. nov.; 2 – *T. helverseni tioman* subsp. nov.; 3 – *T. elenae* sp. nov.; 4 – *Phaloria doloduo* sp. nov.; 5 – *Ph. lindu* sp. nov.; 6 – *Ph. halmahera* sp. nov.; 7 – *Tremellia minahassa* sp. nov.; 8 – *Strophiola tangkoko* sp. nov.; 9–11 – *Pseudotriginidium grigoriji* sp. nov. Dorsal field from base to mirror (upper photo) and mirror with apical area (lower photo) of right tegmen (1–8); head in front (9); body without hind legs from side (10) and from above (11). Scale bars: 5 mm for Figs 1–8, 10, 11; 1 mm for Fig. 9.

R–M area; abdomen with yellowish cerci and apex of genital plate as well as with light brown sternites. External structure of body typical of this genus: ocelli rather small, round, almost equal to each other in size, situated in shape of slightly longitudinal triangle; rostrum approximately as wide as scape; pronotum moderately transverse, strongly narrowing to head; fore tibiae with rather large, oval tympanum on each side (inner tympanum slightly larger than outer one); hind tibiae with very long spines and not very numerous small denticles; venation of tegminal dorsal field as in Fig. 1; lateral tegminal field with narrow Sc–R area, distinctly widened middle part of R–M area, and 24–26 branches of Sc; distal part of hind wings distinctly exposed behind tegmina; anal plate simple; genital plate distinctly elongate and with angular apical part. Genitalia (Figs 12–14, 49) similar to those of *T. helverseni* (Heller, 1985) and *T. electus* Gorochov, 1999 in having of comparatively long ectoparameres (*e*) and very long and denticulate hind lateral processes (*p*) of epiphallus (these processes 1.2–1.4 times as long as ectoparameres); however genitalia of new species with only two short spinules (*sp*) on inner side of base of each hind lateral epiphallic process, rather high vertical keel (*k*) near these spinules, a few denticles (*d*) on dorsolateral edge of subbasal part of each ectoparamere, large dorsal spine-like projection (*dp*) situated near these denticles, and large lateral spine-like projection (*lp*) at middle of ectoparamere.

Variation. Body sometimes hardly lighter or slightly darker (in latter case, face between rostrum and clypeus almost uniformly grayish brown); number of denticles on subbasal part of hind lateral epiphallic processes insignificantly varied from 3 to 5.

Female. General appearance as in male, but coloration almost as in darker males (however with clypeus partly yellowish, dorsum of head and pronotum dark brown, tegminal dorsal field uniformly dark brown, and all membranes of tegminal lateral field semitransparent), pronotum slightly transverse and weakly narrowing to head, dorsal tegminal part much narrower and with 11–12 oblique longitudinal veins and rather sparse crossveins, lateral tegminal field with Sc–R area moderately widened and R–M area narrow, and genital plate shorter (approximately as long as wide) and with widely and roundly notched apex. Ovipositor rather short, with apical part typical of this genus (Fig. 45).

Length (mm). Body: male 14.5–17, female 12–19; body with wings: male 26–28, female 28–29; pro-

notum: male 3–3.2, female 3.2–3.3; tegmina: male 19–21, female 18–19; hind femora: male 14–15, female 15–15.5; inner subapical spine of hind tibiae: male 3.4–3.7, female 3.3–3.5; ovipositor 4.9–5.2.

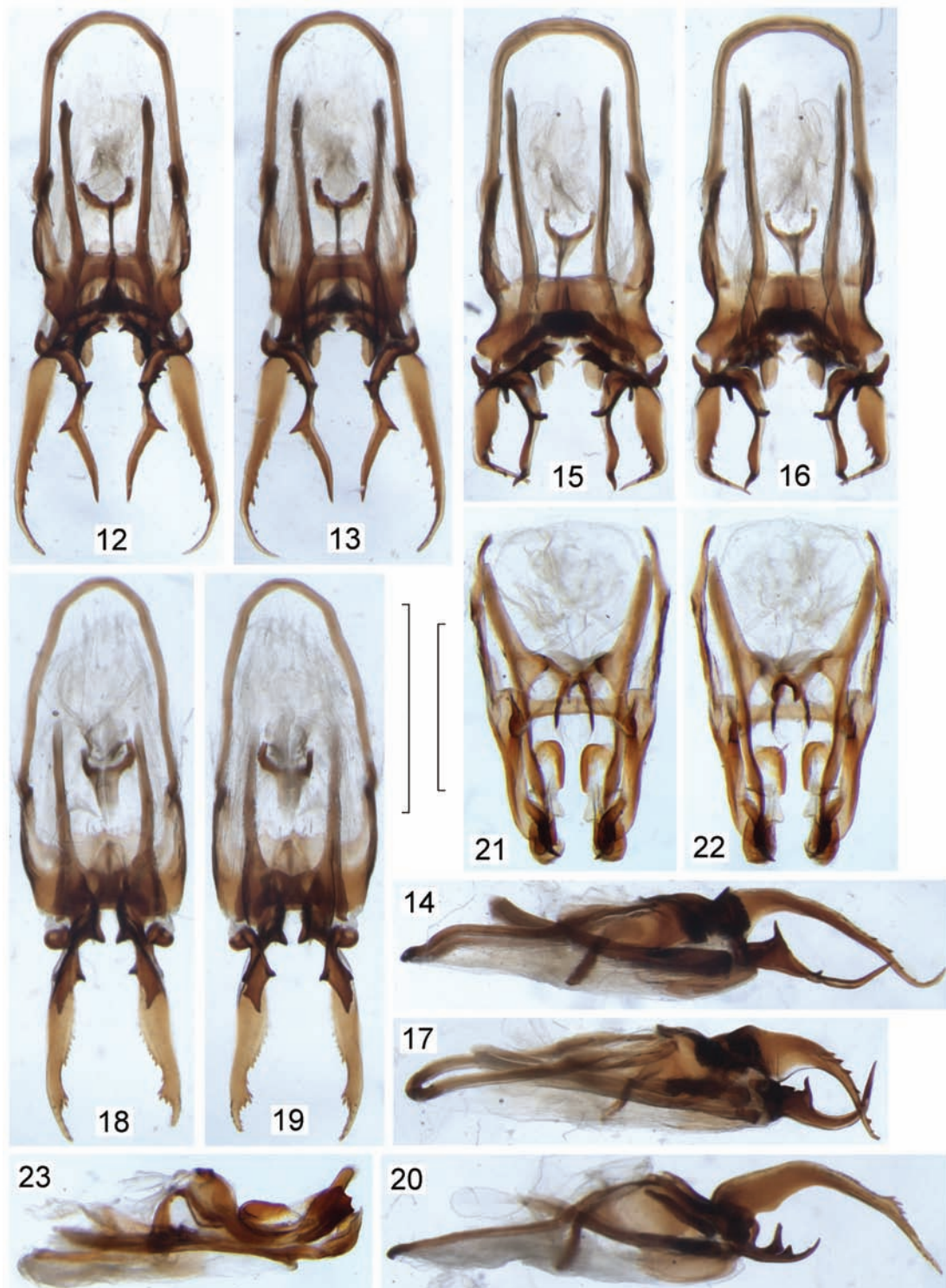
Comparison. The new species is most similar to *T. helverseni* and *T. electus* in the structure of male genitalia; it is distinguished from *T. helverseni* by the presence of short spinules (*sp*) on base of each hind lateral epiphallic process, clearly higher vertical keel (*k*) near these spinules, and presence of a lateral spine-like projection (*lp*) at middle of each ectoparamere and a few denticles (*d*) [instead of one larger and almost spine-like projection (*pr*)] on dorsolateral edge of subbasal part of ectoparamere (for comparison see Figs 49 and 51); from *T. electus*, the new species differs in the presence of only two (not three) spinules (*sp*) on base of each hind lateral epiphallic process, of distinct keel (*k*) near these spinules, and of a few denticles (*d*) [possibly instead of one larger and almost spine-like projection (*pr*?)] on dorsolateral edge of subbasal part of ectoparamere (for comparison see Figs 49 and 50). From *T. siveci* Gorochov, 1996 and *T. suspectus* Gorochov, 1999, the new species differs in the much longer ectoparameres, and from all the other congeners, in the same character in combination with the very long and denticulate hind lateral epiphallic processes, presence of spine-like projections and denticles on ectoparameres, and rather large guiding rod.

***Trellius (Protrellius) helverseni tioman* subsp. nov.**
(Figs 2, 15–17, 51)

Etymology. The name originates from Tioman I.

Type material. Holotype – male, MALAYSIA: Pahang State, Tioman I. not far from Mersing City in Johor State, environs of Juara Vill. (eastern coast), near brook in primary forest, 6–14 April 2010, A. Gorochov, M. Berezin, E. Tkatsheva. Paratypes: 3 males, 2 females, same data.

Description. *Male* (holotype). Coloration and structure of body similar to those of holotype of *T. michaili*, but face of epicranium grayish brown with 11 light brown spots, clypeus partly light, areas between tegminal chords brown, venation of dorsal tegminal field as in Fig. 2, and genitalia very similar to those of *T. helverseni helverseni* stat. nov. However genitalia of new subspecies (Figs 15–17, 51) distinguished from those of nominotypical subspecies by proximal part of median epiphallic sclerite (*m*)



Figs 12–23. *Trellius* Gorochov and *Phaloria* Stål; male: 12–14 – *Trellius michaili* sp. nov.; 15–17 – *T. helverseni tioman* subsp. nov.; 18–20 – *T. elenae* sp. nov.; 21–23 – *Phaloria doloduo* sp. nov. Genitalia from above (12, 15, 18, 21), from below (13, 16, 19, 22), and from side (14, 17, 20, 23). Scale bars 2 mm: longer bar for Figs 12–20; shorter bar for Figs 21–23.

somewhat narrower, medial lobes (*ml*) of proximal part of epiphallus distinctly longer, vertical keel (*k*) on basal part of hind lateral epiphallic processes with small denticles, and area between this keel and inner spinules (*sp*) near it wider.

Variation. Light spots on face of epicranium sometimes partly fused with each other; in one paratype, some of these spots (situated on lateral parts of this face) grayish, almost indistinct from grayish brown areas between these spots.

Female. General appearance as in male, but face of epicranium with 7–9 weakly distinct light brown spots, and other characters practically indistinguishable from those of female of *T. michaili* excepting presence of only 9–10 longitudinal veins in dorsal tegminal field.

Length (mm). Body: male 15–18, female 15–16.5; body with wings: male 27–29, female 27–28; pronotum: male 3.2–3.5, female 3.2–3.4; tegmina: male 18.5–20, female 18–19; hind femora: male 14.5–15.5, female 13.5–14; inner subapical spine of hind tibiae: male 3.3–3.5, female 3.4–3.5; ovipositor 5.

Comparison. The new subspecies differs from nominotypical one described from “Kuala Lumpur” (Heller 1985) in small distinctions in male genitalia: narrower proximal part of median epiphallic sclerite, longer medial lobes of proximal part of epiphallus, denticulate vertical keel on basal part of hind lateral epiphallic processes, and wider area between this keel and inner spinules near it.

***Trellius (Protrellius) elenae* sp. nov.**
(Figs 3, 18–20, 52–54)

Etymology. The name is given in honor of entomologist Elena Tkatsheva, Moscow Zoo.

Type material. Holotype – male, MALAYSIA: Pahang State, Fraser’s Hill near border with Selangor State, 17–18 km SW of Raub Town, 1000–1300 m, near brook in primary forest, 15–23 April 2010, A. Gorochov, M. Berezin, E. Tkatsheva.

Description. *Male.* Coloration and external structure of body similar to those of *T. michaili*, but clypeus and face of epicranium under rostrum almost uniformly grayish, lateral tegminal field with light brown membranes of R–M area, cerci and abdominal sternites grayish, and tegminal dorsal field somewhat smaller and with clearly shorter apical area (Fig. 3). Genitalia (Figs 18–20, 52–54) similar to those of *T. siveci* and *T. suspectus* in having of moderately short

ectoparameres and very long and denticulate hind lateral processes (*p*) of epiphallus (these processes 2–3 times as long as ectoparameres); however they characterized by anterior part of median epiphallic sclerite (*m*) rather wide (Fig. 52), inner basal lobules (*in*) of hind lateral epiphallic processes as in Fig. 53, more distal part of these processes lacking any distinct ventral (ventromedial) lobules, ectoparameres somewhat shorter, sclerite of guiding rod (*g*) with angular hind notch and acute posterolateral corners (Fig. 54), and absence of any spine-like processes exposed behind this rod.

Female unknown.

Length (mm). Body 14.5; body with wings 20; pronotum 3.1; tegmina 15; hind femora 13.3; inner subapical spine of hind tibiae 3.4.

Comparison. The new species is most similar to *T. siveci* and *T. suspectus* in the structure of male genitalia; however *T. elenae* sp. nov. differs from *T. siveci* in the hind lateral processes of epiphallus with the inner basal lobules (*in*) different in shape and with the more distal part lacking any distinct lobules on ventral or ventromedial edges (for comparison see Figs 53 and 57: *lo*), slightly shorter ectoparameres, angular hind notch of guiding rod sclerite, acute posterolateral corners of this sclerite, and absence of any spine-like processes exposed behind guiding rod, and from *T. suspectus*, in the same characters and wider anterior part of median epiphallic sclerite (for comparison see Figs 52, 53 and 55, 56). From *T. helverseni*, *T. electus* and *T. michaili*, the new species is distinguished by the distinctly shorter ectoparameres, and from all the other congeners, by the same characters as *T. michaili* (see above).

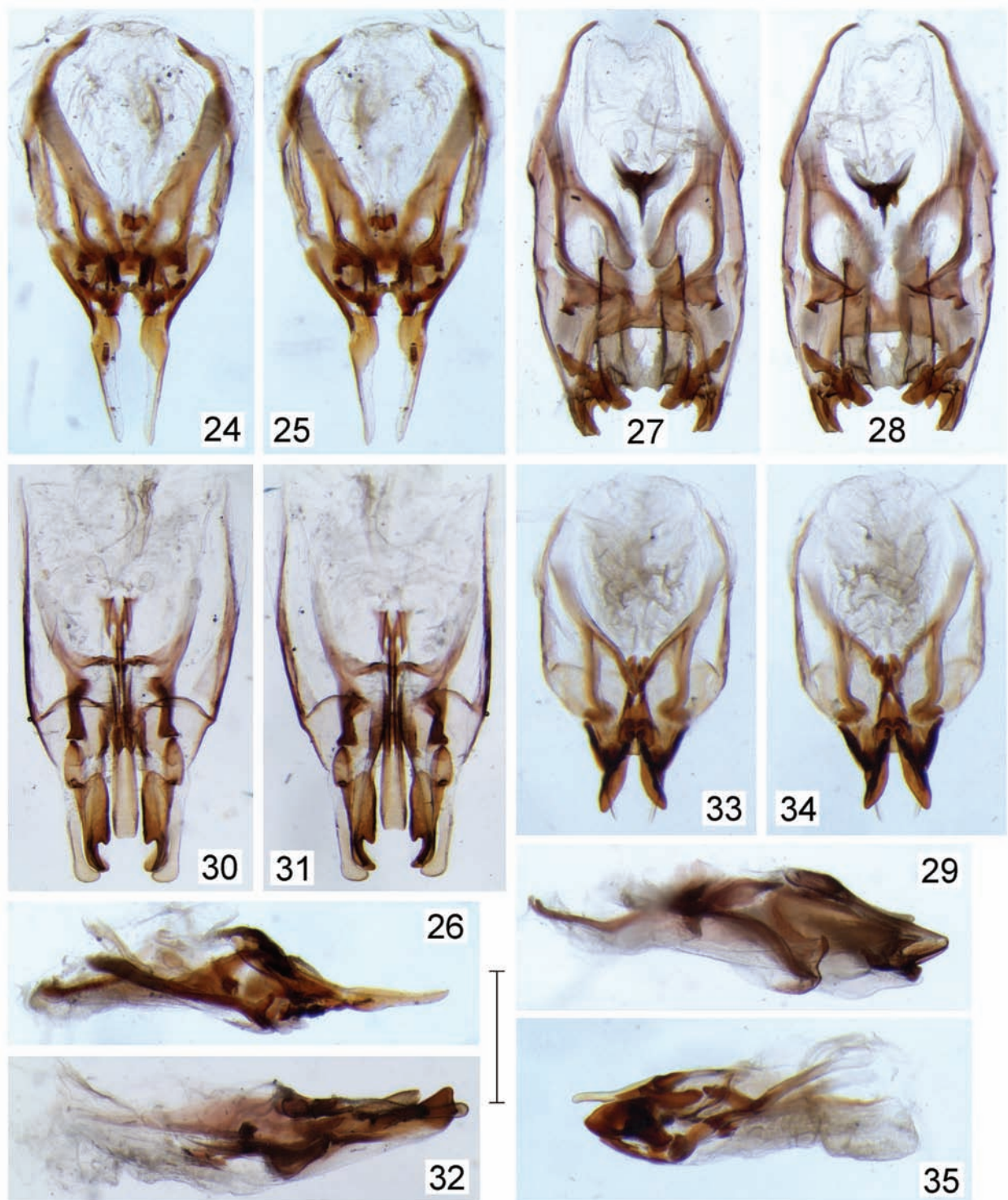
Genus *Phaloria* Stål, 1877

Subgenus *Sulaweloria* subgen. nov.

Etymology. The name originates from Sulawesi and the genus *Phaloria*.

Type species. *Phaloria (Sulaweloria) doloduo* sp. nov.

Diagnosis. General appearance typical of the genera *Trellius*, *Phaloria*, *Tremellia*, *Vescelia* Stål, 1877, *Strophiola* Uvarov, 1940 and *Ceyloria* Gorochov, 1996. Outer tympanum rather small, almost round, opened; inner tympanum clearly larger, elongate (oval), immersed, but also opened. Male genitalia (Figs 21–23, 58, 59) with median part of epiphal-



Figs 24–35. *Phaloria* Stål, *Tremellia* Stål and *Strophiola* Uv.; male: 24–26 – *Ph. lindu* sp. nov.; 27–29 – *Ph. halmahera* sp. nov.; 30–32 – *T. minahassa* sp. nov.; 33–35 – *S. tangkoko* sp. nov. Genitalia from above (24, 27, 30, 33), from below (25, 28, 31, 34), and from side (26, 29, 32, 35). Scale bar 1 mm.

lus (*ep*) in shape of transverse ribbon; hind edge of epiphallus in region of distal median notch without any distinct membranous lobes; guiding rod (*g*) small and membranous, with only a pair of thin sclerites along lateral edges; these sclerites fused with medial endoparameral arms (*a*).

Included species. Type species only.

Comparison. The new subgenus clearly differs from all the other subgenera of the genus *Phaloria* in the inner tympanum distinctly immersed and guiding rod significantly reduced. Additionally the new subgenus is distinguished from *Phaloria* s. str. by the ribbon-like median part of epiphallus, and from *Papuloria* and *Trelloria* by the absence of characteristic hind membranous lobe (or a pair of lobes) on the epiphallic edge between hind epiphallic lateral processes.

***Phaloria (Sulaweloria) doloduo* sp. nov.**
(Figs 4, 21–23, 46, 58, 59)

Etymology. The name originates from Doloduo Town.

Type material. Holotype – male, INDONESIA: Northern Sulawesi (Minahassa Peninsula), Sulawesi Utara Prov., National park Bogani Nani Wartabone near Toraut Vill. (not far from Doloduo Town), environs of Wallace Base Camp, ~500 m, near brook in primary forest, 17–25 January 2011, A. Gorochov. Paratypes: 2 males, 2 females, same data.

Description. *Male* (holotype). Coloration and external structure of body more or less similar to those of *T. michaili*, but distinguished by following characters: epicranium and pronotum dark brown with numerous rather small light brown spots and stripes on different parts of epicranium; scapes and mouthparts yellowish with dark and darkish spots on ventral half of scapes as well as on clypeus, mandibles and maxillary palpi; antennal flagellum brown with light brown proximal part; tegminal dorsal field brown with light brown spots at base of basal area, near proximal part of diagonal vein and between longitudinal veins of apical area; tegminal lateral field with dark brown Sc and areas between Sc and M, light brown R and M (but their distal parts brown), and semitransparent (slightly grayish) membranes between Sc branches; genital plate completely grayish brown; tympana characteristic of *Sulaweloria* (see diagnosis of this subgenus); venation of dorsal tegminal field as in Fig. 4; genital plate with distal part

rounded and having distinct median notch. Genitalia as in Figs 21–23, 58, 59.

Variation. One paratype with almost uniformly grayish brown face of epicranium and light brown proximal half of genital plate.

Female. General appearance (including structure of tympana) as in male, but pronotal lobes with two small lightish spots, dorsal tegminal field grayish brown with slightly darker spots along medial and lateral edges, lateral tegminal field with all veins dark and dark spots along crossveins in Sc–R area as well as with grayish (semitransparent) membranes, and structure of other body parts very similar to that of female of *T. michaili* excepting ovipositor which distinctly longer and with distal part as in Fig. 46.

Length (mm). Body: male 17–18.5, female 14.5–16; body with wings: male 27–29, female 28–29; pronotum: male 2.9–3.2, female 3–3.2; tegmina: male 18–19.5, female 19–20; hind femora: male 13.5–15, female 15–16; inner subapical spine of hind tibiae: male 2.7–2.9, female 2.8–2.9; ovipositor 7.5–7.8.

***Phaloria (Papuloria) lindu* sp. nov.**
(Figs 5, 24–26, 60–63)

Etymology. The name originates from Lindu Lake.

Type material. Holotype – male, INDONESIA: Central Sulawesi, Sulawesi Tengah Prov., National park Lore Lindu, environs of Tomado Vill. on Lindu Lake (~45 km SSE of Palu City), ~1000 m, near small river in disturbed primary forest, 13–17 February 2011, A. Gorochov.

Description. *Male*. Coloration and external structure of body more or less similar to those of *T. michaili*, but distinguished by following features: epicranium and pronotum dark brown with a few grayish brown spots on vertex and lateral pronotal lobes, several light brown spots on face and genae, and short longitudinal lightish band behind each eye; scapes and mouthparts yellowish grey with darkish spots on scapes and dark marks on upper part of clypeus, on mandibles, and on maxillary palpi; antennal flagellum grayish brown with slightly lighter proximal part; tegmina grayish brown (rather dark) with numerous weakly distinct lightish spots on dorsal field and semitransparent (grayish) membranes between Sc branches; abdomen more or less uniformly grayish; spines (but not spurs) of hind tibiae somewhat shorter; venation of dorsal tegminal field

as in Fig. 5; tegminal Sc with 27–28 branches; hind wings slightly exposed behind tegmina; genital plate almost truncate (with short and widely rounded hind median notch). Genitalia (Figs 24–26, 60–63) with very long and thin (spine-like) hind lateral processes of epiphallus, a pair of rather small hind membranous lobes on epiphallic edge between these processes (Fig. 60), short (transverse) ectoparameres (Fig. 63), not very large guiding rod having rather long and very thin (spine-like) hind lateral projections (Fig. 62), narrowly rounded notch between them, and rather small (short) mold of spermatophore attachment plate (Fig. 61).

Female unknown.

Length (mm). Body 15.5; body with wings 23; pronotum 3; tegmina 17.8; hind femora 15; inner subapical spine of hind tibiae 2.2.

Comparison. The new species is similar to a species group of *Papuloria* with the short (transverse) ectoparameres in male genitalia (*Ph. vulgata* Gorochoch, 1996, *Ph. aspersa* Gorochoch, 1996, *Ph. solita* Gorochoch, 1996, *Ph. pulchra* Gorochoch, 1996, *Ph. rava* Gorochoch, 1996, *Ph. curta* Gorochoch, 1996, *Ph. gilva* Gorochoch, 1996, *Ph. pararava* Gorochoch, 1999 and *Ph. verecunda* Gorochoch, 2005, but clearly differs from them in the much longer hind lateral processes of epiphallus.

***Phaloria (Papuloria) halmahera* sp. nov.**
(Figs 6, 27–29, 47, 64–66)

Etymology. The name originates from Halmahera I.

Type material. Holotype – male, INDONESIA: Molucca Islands, Maluku Utara Prov., Halmahera I., environs of Subaim Vill. not far to S from Lolobata Vill. (coast of Wasile Bay), near small river in disturbed primary forest on hills, 27 January – 1 February 2011, A. Gorochoch. Paratype – female, same data.

Description. *Male.* Coloration and external structure of body more or less similar to those of *T. michaili*, but distinguished by following characters: head yellowish with grayish brown dorsum, narrow vertical stripes from eyes to lateral clypeal corners, rather large spots on genae and between eyes, a few small spots on rest of face and on scapes, and light brown antennal flagellum; pronotum also grayish brown, but slightly darker and with longitudinal yellowish stripe on each lateral lobe not far from its ventral edge; tegmina yellowish with dark (almost

grayish brown) all veins and rather numerous large spots on dorsal field (Fig. 6) as well as with semi-transparent membranes of lateral field; other parts of body yellowish with diverse distinct brown spots on legs; structure of tegminal dorsal field as in Fig. 6; tegminal Sc with 25–26 branches; genital plate similar to that of *Ph. doloduo*. Genitalia (Figs 27–29, 64–66) with short and not very thin hind lateral processes (*p*) of epiphallus, hind membranous lobes (*h*) on epiphallic edge between these processes widely separated from each other (Fig. 64), not transverse ectoparameres having characteristic strong postero-lateral hook (Fig. 66), rather large (wide) guiding rod having four short apical projections (Fig. 64), and small mold of spermatophore attachment plate having three elongate apodemes (Fig. 65).

Female. General appearance as in male, but dorsum of head with small sparse lightish stripes, dorsal tegminal field slightly darker (yellowish grey) and with smaller and more numerous grayish brown spots, structure of body parts similar to that of female of *T. michaili* excepting distal part of ovipositor which as in Fig. 47.

Length (mm). Body: male 13.5, female 12.5; body with wings: male 24, female 25; pronotum: male 2.7, female 2.6; tegmina: male 16.5, female 16; hind femora: male 12.7, female 13; inner subapical spine of hind tibiae: male 2.7, female 2.7; ovipositor 4.7.

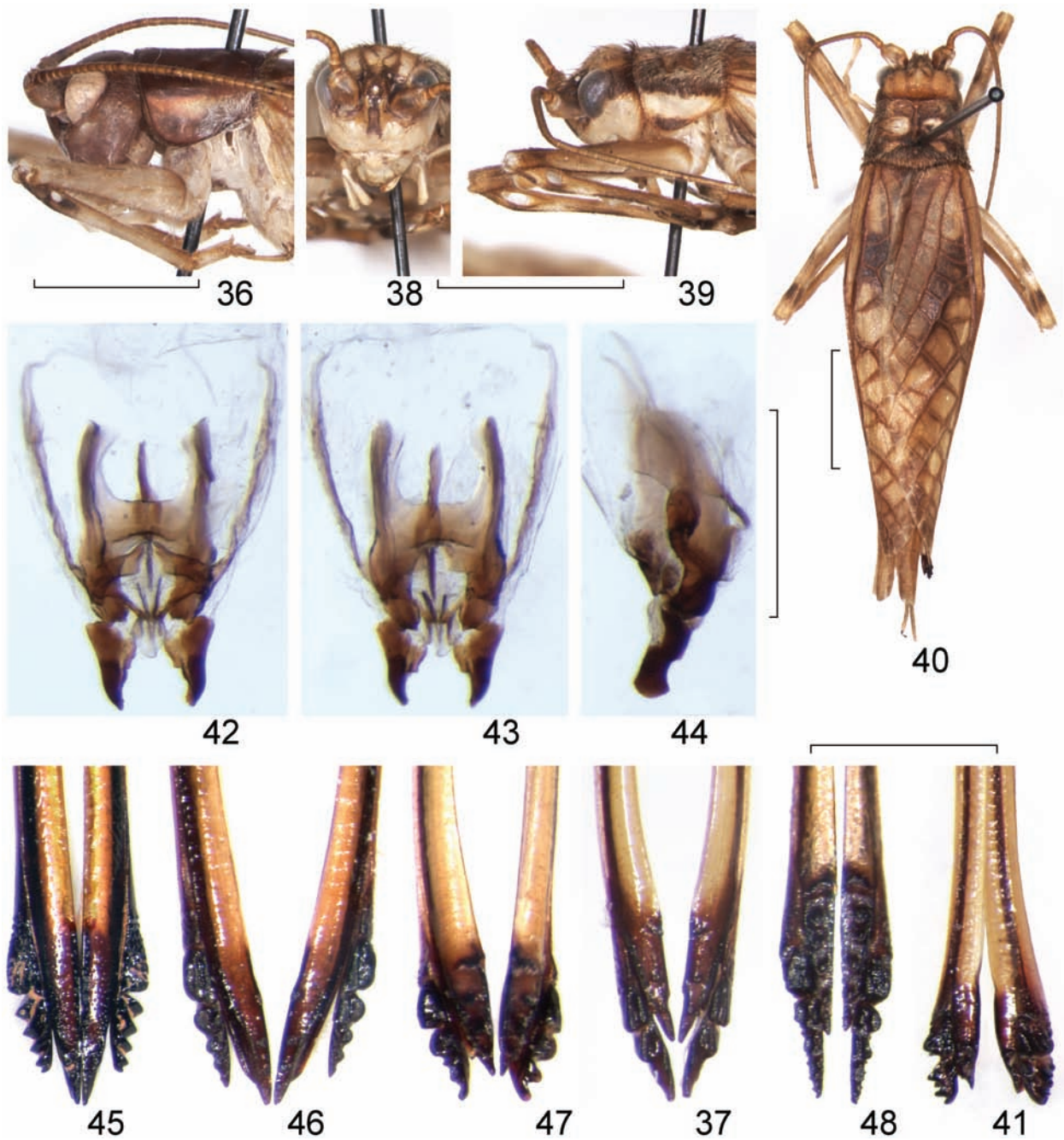
Comparison. The new species is somewhat similar to *Ph. aperta* Gorochoch, 1999 and *Ph. beybienkoi* Gorochoch, 2005 in the presence of a rather large posterolateral hook on each ectoparamere, but it clearly differs from them by the distinctly longer and narrower proximal part of ectoparameres as well as very different shape of mold of spermatophore attachment plate.

***Phaloria (Papuloria) ternate* sp. nov.**
(Figs 36, 37)

Etymology. The name originates from Ternate I.

Type material. Holotype – female, INDONESIA: Molucca Islands, Maluku Utara Prov., Ternate I. near Halmahera I., environs of Ternate City, remnants of secondary forest along brook in garden on high hill, 2 February 2011, A. Gorochoch.

Description. *Female.* Coloration yellowish with following darker parts: head and pronotum (Fig. 36) brown with light brown genae, lateral parts of



Figs 36–48. Different body parts: 36, 37 – *Phaloria temate* sp. nov.; 38–41 – *Sumatloria juara* sp. nov.; 42–44 – *Pseudotrigonidium grigoriji* sp. nov.; 45 – *Trellius michaili* sp. nov.; 46 – *Ph. doloduo* sp. nov.; 47 – *Ph. halmahera* sp. nov.; 48 – *Strophiola tangkoko* sp. nov. Head with pronotum from side (36, 39); head in front (38); female body without hind legs from above (40); male genitalia from above (42), from below (43) and from side (44); distal part of ovipositor from below (37, 41, 45–48). Scale bars: 4 mm for Figs 36, 38–40; 1 mm for Figs 37, 41–48.

clypeus, most part of mandibles, labrum, antennae (however scapes with a few brown spots) and lower half of pronotal lobes, yellowish rest of mouthparts and longitudinal stripe along upper edge of lower half of pronotal lobes, and slight whitish pubescence; tegmina light brown with brown veins on dorsal field and semitransparent (yellowish) membranes on lateral field; other parts of body with grayish brown apical part of hind femora and proximal part of all tibiae, light brown spots and numerous oblique lines on middle 2/4 of hind femora as well as small area at middle of each tarsus, and grayish spot not far from apex of middle tibiae and several spots on rest of hind tibiae. Median ocellus round, rather small, but distinct; lateral ocelli indistinct; rostrum slightly narrower than scape. Pronotum slightly transverse and hardly narrowing to head. Inner tympanum rather large, oval (opened), practically not immersed; outer one similar, but almost twice smaller; spines of hind tibiae comparatively short, distinctly shorter than their longest (dorsomedial) spur. Dorsal tegminal field with 14 oblique longitudinal veins and rather regular crossveins; cells between these veins almost quadrate; lateral tegminal field similar to that of female of *T. michaili*, but somewhat shorter and with only 18 branches of Sc; distal part of hind wings weakly exposed behind tegmina. Anal and genital plates also similar to those of female of *T. michaili*, however genital plate with slightly more angular apical notch; ovipositor moderately long, with distal part as in Fig. 37.

Male unknown.

Length (mm). Body 14; body with wings 20; pronotum 3.3; tegmina 15.5; hind femora 13.6; inner subapical spine of hind tibiae 1.5; ovipositor 9.

Comparison. The new species is most similar to *Ph. rava* Gorochov, 1996 and *Ph. pulchra* Gorochov, 1996 in general appearance [including striped lateral lobes of pronotum, more or less similar structure of ocelli (in *Rh. rava*, lateral ocelli are indistinct, but in *Rh. pulchra*, they are weakly distinct), and comparatively small size of hind tibial spines], however it differs from them in the uniformly brown face of epicranium and darker pronotal disc. *Ph. pararava* Gorochov, 1999 is also close related to these species, as it is characterized by the external body structure and male genitalia similar to those of *Ph. rava*; the new species differs from the latter species in the striped (not uniform) coloration of pronotum.

Tremellia Stål, 1877

Tremellia minahassa sp. nov.

(Figs 7, 30–32, 67)

Etymology. The name originates from Minahassa Peninsula.

Type material. Holotype – male, INDONESIA: Northern Sulawesi (Minahassa Peninsula), Sulawesi Utara Prov., National park Bogani Nani Wartabone near Toraut Vill. (not far from Doloduo Town), environs of Wallace Base Camp, ~500 m, near brook in primary forest, 17–25 January 2011, A. Gorochov. Specimen collected as nymph of middle age; imago in May 2011.

Description. *Male.* Coloration yellowish with following marks: epicranium with brown stripes on dorsum (six longitudinal stripes; two medial of them having small yellowish oval spot on each one between eyes) and on face (six vertical stripes: two under rostral apex, two under eyes, and two on genae); middle and distal parts of antennal flagellum from grayish to grayish brown; pronotum grayish brown with hardly lighter spots on disc and two large yellowish spots situated along median line of each lateral lobe; dorsal tegminal field light brown with slightly darker spot near plectrum and stripes along anterolateral and hind edges of mirror (Fig. 7); lateral tegminal field with semitransparent (yellowish) membranes and light brown R and M; legs with slight light brown sparse spots on fore and middle legs and on hind femora behind their middle part, grayish numerous oblique lines on proximal and middle parts of these femora, and darker (grayish brown) apical part and subapical ring of these femora, elongate spots on dorsal half of hind tibiae, and area at middle part of hind tarsi; abdomen yellowish grey with slightly lighter genital plate and cerci. Median ocellus approximately as in *Ph. ternate*, but lateral ocelli distinct, round and almost equal to median one in size; rostrum almost as wide as scape. Pronotum moderately transverse, strongly narrowing to head. Tympana and hind tibiae similar to those of *Ph. ternate*. Dorsal tegminal field as in Fig. 7; lateral tegminal field similar to that of *Trellius michaili*, however with sparse crossveins in R–M area; hind wings not exposed behind tegmina, but reaching their apex. Anal and genital plate more or less similar to those of *T. michaili*, but genital plate somewhat shorter and with roundly truncate apex. Genitalia very similar to those of *Tremellia fratercula*

(Chopard, 1937), however distinguished by deeper notch in basal part of ectoparameres, presence of distinct angular medial projection in subapical part of ectoparameres, and absence of any distinct notches at apex of ectoparameres in profile (Figs 30–32, 67).

Female unknown.

Length (mm). Body 16; body with wings 21; pronotum 3.2; tegmina 15.5; hind femora 14; inner subapical spine of hind tibiae 1.3–1.4.

Comparison. The new species is most similar to *T. fratercula* in the structure of male genitalia, but distinguished by the deeper notch in the basal part of ectoparameres, presence of angular medial projection in the subapical part of ectoparameres, and absence of any distinct notches at the ectoparameral apex. From *T. mindoro* Gorochov, 2004, the new species differs in the distinctly shorter ectoparameres with the angular medial subapical projection, and from *T. spurca* Stål, 1877, in the much larger light areas on the face of head and on the pronotal lobes.

***Strophiola* Uvarov, 1940**

***Strophiola tangkoko* sp. nov.**

(Figs 8, 33–35, 48, 68–70)

Etymology. The name originates from National park Tangkoko.

Type material. Holotype – male, INDONESIA: Northern Sulawesi (Minahassa Peninsula), Sulawesi Utara Prov., ~40 km NE of Manado City, National park Tangkoko, environs of Tangkoko Lodge (eastern coast), near brook in disturbed primary forest, 3–6 February 2011, A. Gorochov. Paratype – female, same data.

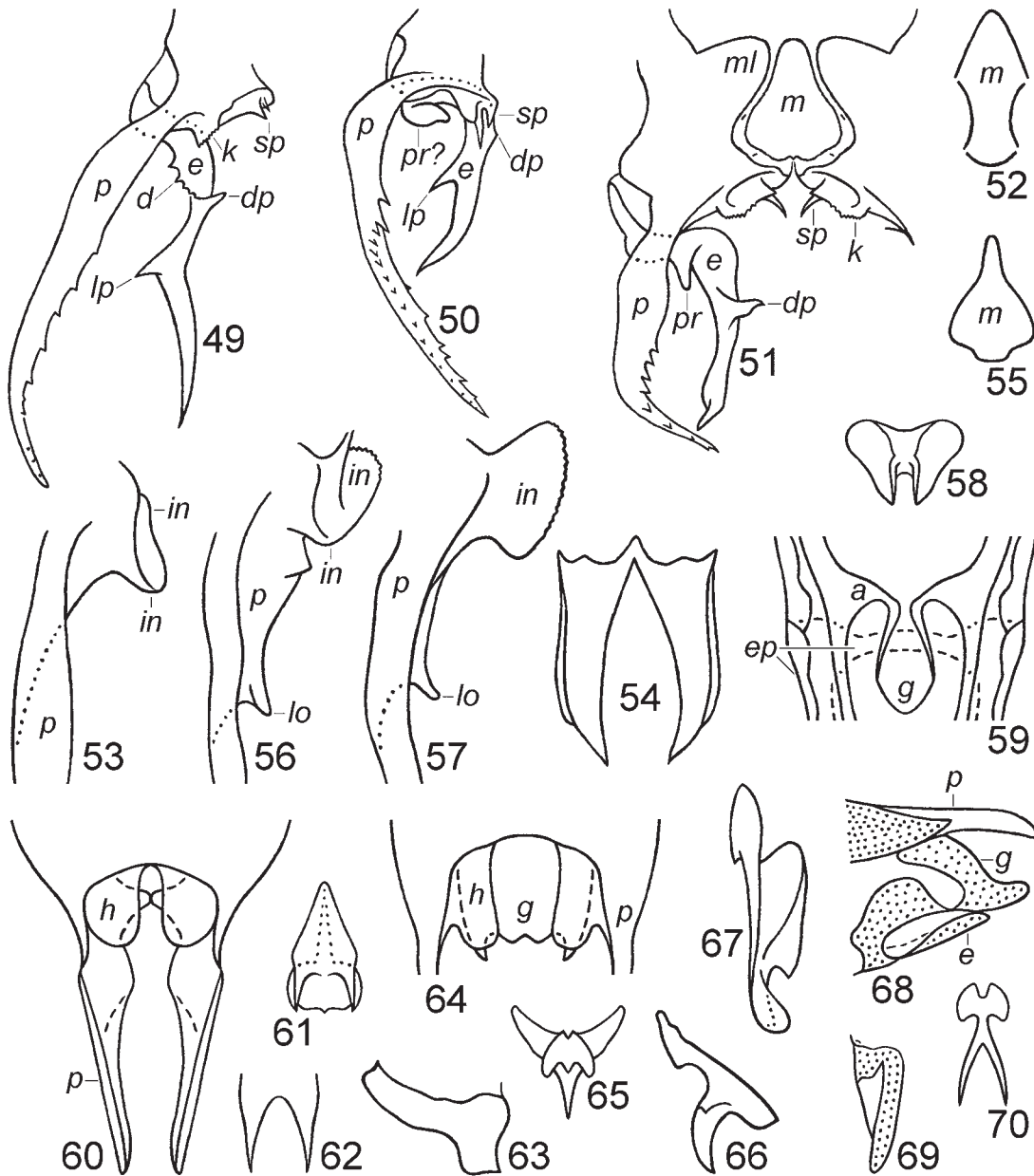
Description. *Male.* Coloration and external structure of body more or less similar to those of *Trellius michaili*, but with following differences: head yellowish with grayish brown dorsum, antennal flagellum (excepting slightly more light proximal part), and spots under antennal cavities, between them, behind eyes, and on genae and scapus; pronotum also grayish brown, however its upper half rather dark (darker than head dorsum) and lateral lobes with sinuate yellowish longitudinal stripe along their median line; dorsal tegminal field grey with rather small and weakly distinct lightish spots on membranes between chords, on apical area, and on area between chords and medial part of apical area (Fig. 8); lateral tegminal field transparent with brown veins; hind

wings with grey distal part; other part of body yellowish with grayish brown abdominal tergites and spots on legs as well as light brown cerci (excepting yellowish base); ocelli small (somewhat smaller than in *T. michaili*); scape approximately 1.5 times as wide as rostrum; inner tympanum rather large, slit-like; outer tympanum almost twice smaller than inner one, oval (opened); structure of dorsal tegminal field as in Fig. 8; lateral tegminal field with rather sparse crossveins in R–M area and 31–32 branches of Sc; hind wings with very long distal part exposed behind tegmina; genital plate with rounded apex having small (but distinct) median notch. Genitalia (Figs 33–35) similar to those of *S. renschi* Gorochov, 1996 and *S. xanthella* Gorochov, 1996, but they differ from genitalia of *S. renschi* in distinctly shorter ectoparameres connected (or almost connected) with guiding rod by much larger plate-like sclerite as well as in clearly longer guiding rod having less distinct notch near apex of its left lobe (its right lobe without any hind notch; see Figs 35 and 68), and from genitalia of *S. xanthella* in presence of four sclerotized projections of mold of spermatophore attachment plate (two short and wide proximal ones, and two longer and narrower distal ones; Fig. 70) and narrower subproximal part of ectoparameres (see Fig. 69).

Female. General appearance as in male, but face of head with small darkish spots under rostrum (lower than antennal cavities) and on clypeus, light stripe on each lateral pronotal lobe interrupted near middle, dorsal tegminal field slightly darker and almost without spots (excepting two elongate light semitransparent cells along proximal part of lateral edge of this field), and structure of tegmina and abdomen similar to that of female of *T. michaili*, however crossveins of tegminal dorsal part dense, Sc with 18–19 branches, and ovipositor much longer and with distal part as in Fig. 48.

Length (mm). Body: male 17.5, female 15.5; body with wings: male 31, female 32; pronotum: male 2.8; female 2.9; tegmina: male 19.5, female 19.5; hind femora: male 16, female 15.5; inner subapical spine of hind tibiae: male 3.1, female 3.2; ovipositor 15.3.

Comparison. The new species differs from *S. lugubrina* (Stål, 1877) in the distinctly larger light marks of pronotum as well as clearly darker dorsal field of tegmina. From *S. renschi*, it is distinguished by the narrower rostrum of head, from *S. xanthella*, by the darker coloration, and from both these species, by the above-listed (in the description) characters of male genitalia.



Figs 49–70. Different genital structures (schematic); male: 49 – *Trellius michaili* sp. nov.; 50 – *T. electus* Gor.; 51 – *T. helverseni tioman* subsp. nov.; 52–54 – *T. elenae* sp. nov.; 55, 56 – *T. suspectus* Gor.; 57 – *T. siveci* Gor.; 58, 59 – *Phaloria doloduo* sp. nov.; 60–63 – *Ph. lindu* sp. nov.; 64–66 – *Ph. halmahera* sp. nov.; 67 – *Tremellia minahassa* sp. nov.; 68–70 – *Strophiola tangkoko* sp. nov. (68, 69 – sclerotized parts dotted). Left hind lateral epiphallus process with left ectoparamere (49, 50) and this process with left ectoparamere and median part of epiphallus (51) from above; median epiphallus sclerite from above (52, 55); proximal half of left hind lateral epiphallus sclerite from above and slightly from inner side (53, 56, 57); sclerite of guiding rod from below (54); mold of spermatophore attachment plate from below (58, 61, 65, 70); middle part of genitalia from below (59); distal half of epiphallus (60) and same without epiphallus apices and with distal half of guiding rod (64) from above; distal part of guiding rod from below (62); ectoparamere from below (63, 66, 67, 69); distal part of genitalia from side (68). Abbreviations: *a* – medial endoparamere arm; *d* – dorsolateral ectoparamere denticles; *dp* – dorsal (or medial) ectoparamere projection; *e* – ectoparamere; *ep* – epiphallus; *g* – guiding rod; *h* – hind membranous epiphallus lobes; *in* – inner epiphallus lobule, *k* – vertical epiphallus keel; *lo* – ventral epiphallus lobule; *lp* – lateral ectoparamere projection; *m* – median epiphallus sclerite; *ml* – medial epiphallus lobe; *p* – hind lateral epiphallus process; *pr* – dorsolateral ectoparamere projection; *sp* – two or three inner epiphallus spinules (or tubercles).

Genus *Sumatloria* Gorochov, 2003

Sumatloria juara sp. nov.

(Figs 38–41)

Etymology. The name originates from Juara Vill.

Type material. Holotype – female, MALAYSIA: Pahang State, Tioman I. not far from Mersing City in Johor State, environs of Juara Vill. (eastern coast), near brook in primary forest, 6–14 April 2010, A. Gorochov, M. Berezin, E. Tkatsheva.

Description. *Male* (holotype). Coloration more or less similar to that of *Ph.? hobbyi* (Chop.) (Gorochov 1999: Figs 159, 160): head yellowish with light brown dorsum of epicranium, dorsal and medial parts of scape, antennal flagellum (middle and distal part of this flagellum missing), and four dots on clypeus, as well as brown marks on dorsum, behind eyes and on upper 2/3 of median part of face (Figs 38–40); pronotum brown with a pair of rather large yellowish spots on disc, wide yellowish longitudinal band on lateral lobes, and smaller and less distinct lightish spots on rest of disc (Figs 39, 40); legs yellowish with a few brown spots in distal half of fore and middle femora, in proximal and distal halves of hind femora, and on dorsal surface of fore and middle tibiae, as well as with more numerous brown spots on dorsal surface of hind tibiae, brown both middle part of fore and middle tarsi and spot on distal part of dorsal surface of hind basitarsus, and light brown areas around above-listed brown marks, ventral surface of hind tibiae, and ventromedial part of hind coxae; tegmina yellowish with a few longitudinal brown veins along tegminal bend and rather large brown spot on dorsal field, light brown all other veins and stripes along them in dorsal field (Fig. 40), and transparent membranes of lateral field; distal part of hind wings light; ventral surface of thorax and abdomen yellowish with grayish hind thoracic sternite as well as transverse stripes on abdominal tergites and wide median part of abdominal sternites. Head rostrum clearly angular (with rounded apex) in profile, slightly narrower than scape; ocelli well developed, round, rather small, approximately equal to each other in size, situated in corners of triangle. Pronotum distinctly transverse, moderately narrowing to head. Both tympana oval (opened), but inner tympanum slightly larger than outer one and hardly immersed; spines of hind tibiae rather short, distinctly shorter than longest (dorsomedial) spur of these tibiae reaching base of second segment of hind tarsi. Venation of dorsal tegminal field as in Fig. 40;

lateral tegminal field more or less similar to that of *T. michaili*, however with only 12–13 branches of Sc; hind wings weakly (but distinctly) exposed behind tegmina. Genital plate approximately as wide as long, slightly narrowing to apex and with weakly sinuate hind edge (almost roundly truncate and with weak rounded median notch); ovipositor rather short, with distal part as in Fig. 41.

Male unknown.

Length (in mm). Body 10; body with wings 18; pronotum 2.3; tegmina 12.5; hind femora 12.3; inner subapical spine of hind tibiae 1.6; ovipositor 6.8.

Comparison. The new species is similar to *S. minima* Gorochov, 2003 (type species of the genus) in the short drilling part of ovipositor provided with the rather acute teeth which are more or less distinctly divided into proximal and distal teeth by their different heights or a rather large interspace (Fig. 41). It differs from the latter species in the clearly larger size, much longer wings, less spotted lower half of head, and distinctly wider light longitudinal band on the pronotal lateral lobes. From *S.? testaceus* (Chopard, 1925) and *Ph.? hobbyi* which may belong to *Sumatloria* [reasons of their problematic generic position are discussed by Gorochov (1999, 2003)], the new species differs in the well developed darkish ornament on head and pronotum (from the first species) or distinctly shorter ovipositor (from *Ph.? hobbyi* which has the hind femur 1.4 times as long as ovipositor; in the new species, this ratio is almost 1.9).

Genus *Pseudotrigonidium* Chopard, 1915

Pseudotrigonidium (Pseudotrigonidium) grigoriji sp. nov.

(Figs 9–11, 42–44)

Etymology. The name is given in honor of Grigorij Irisov, a big lover of nature and my companion on trip to Sulawesi and Moluccas.

Type material. Holotype – male, INDONESIA: Molucca Islands, Maluku Utara Prov., Halmahera I., environs of Subaim Vill. not far to S from Lolobata Vill. (coast of Wasile Bay), near small river in disturbed primary forest on hills, 27 January – 1 February 2011, A. Gorochov.

Description. *Male*. Coloration variegated: head with dark brown (almost black) face of epicranium, grayish brown dorsum (having weakly distinct lightish lines and dots) and upper part of eyes, yellowish

genae, transverse stripe on apical part of rostrum, rest of eyes, most part of visible surface of mouthparts and narrow spot along hind edge of eyes, light brown antennae (but scape with a few darker areas, and flagellum with numerous weakly distinct darkish and lightish spots), visible part of mandibles and marks on maxillary palpi, and brown (almost dark brown) clypeus and labrum (however clypeus with light stripe along clypeal suture); pronotum with light brown (almost grayish brown) lateral lobes, brown disc, and yellowish longitudinal band between disc and each lateral lobe as well as a few smaller spots on disc; legs yellowish with rather numerous grayish, light brown and brown spots and stripes; tegmina yellowish grey, but with almost transparent membranes having slightly darker (brownish) areas on some membranes of dorsal field, dark brown most part of veins (excepting distal halves of oblique and diagonal veins, lateral chord and all veins of mirror) and spots near plectrum, along medial chord and on subbasal and subapical parts of upper half of lateral field, as well as yellowish membranes near plectrum and at base of lateral field (Figs 9–11); ventral surface of body light grayish brown (including genital plate); rest of abdomen yellowish with grayish distal half of cerci. Head rostrum angular in profile, hardly wider than scape, and with concave dorsal surface; median ocellus extremely small, lateral ocelli indistinct. Pronotum transverse and distinctly narrowing to head. Inner tympanum medium-sized, oval (opened), not immersed; outer tympanum absent; hind tibiae with short spines and spurs (longest spur reaching only middle part of hind basitarsus). Dorsal tegminal field as in Fig. 11; lateral tegminal field with rather narrow costal area (it almost not wider than maximal width of R–M area) and 16–17 branches of Sc (Fig. 10); hind wings not exposed behind tegmina. Anal plate rather simple and small; genital plate distinctly longer, moderately narrowing to apex, and with almost rounded hind part having a pair of small lobules directed to each other; genitalia with moderately narrow epiphallus, comparatively short and not denticulate hind lateral epiphallic lobes, rather small guiding rod lacking strong curvature upwards, and wide sclerite connecting medial arms of endoparameres with each other (Figs 42–44).

Female unknown.

Length (mm). Body 10; body with wings 12.3; pronotum 1.9; tegmina 10; hind femora 8.4; inner subapical spine of hind tibiae 0.6.

Comparison. The new species belongs to a group of *Pseudotrigonidium* s. str. with the small guiding rod lacking strong curvature upwards (*P. proximum* Gorochov, 1996; *P. probatum* Gorochov, 1999; *P. cheesmanae* Gorochov, 1999), but distinguished from them by the not denticulate hind lateral epiphallic lobes. From *P. australe* (Chopard, 1951), it differs in the distinctly shorter apical area of male tegmina, and from *P. lepidum* Gorochov, 1999, *P. significatum* Gorochov, 1999 and *P. greensladei* Gorochov, 1999 with unknown males, in the different coloration: clearly less light than in *P. lepidum*, with much darker face than in *P. significatum*, and with much lighter lateral parts of pronotum and distinctly lighter dorsum of head than in *P. greensladei*.

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