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TAXONOMY OF THE KATYDIDS (ORTHOPTERA: TETTIGONIIDAE) FROM EAST ASIA AND ADJACENT ISLANDS. COMMUNICATION 8

A. V. Gorochov

*Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1,
St. Petersburg 199034, Russia. E-mail: orthopt@zin.ru*

Two new species and two new subspecies of the genus *Trachyzulpha* Dohrn, 1892 from the subfamily Phaneropterinae (*T. bhutanica* **sp. n.**, *T. siamica* **sp. n.**, *T. fruhstorferi borneo* **subsp. n.** and *T. fruhstorferi varia* **subsp. n.**) are described from Bhutan, Thailand, Malaysia, Vietnam and China. For this genus, tentatively included in the tribe Dysoniini, a new subtribe (*Trachyzulphina* **subtrib. n.**) is established.

KEY WORDS: Orthoptera, Tettigoniidae, Phaneropterinae, *Trachyzulpha*, new taxa, Bhutan, Thailand, Malaysia, Vietnam, China.

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Из Бутана, Таиланда, Малайзии, Вьетнама и Китая описаны два новых вида и два новых подвида рода *Trachyzulpha* Dohrn, 1892 из подсемейства Phaneropterinae (*T. bhutanica* **sp. n.**, *T. siamica* **sp. n.**, *T. fruhstorferi borneo* **subsp. n.** и *T. fruhstorferi varia* **subsp. n.**). Для этого рода, условно отнесенного к трибе Dysoniini, установлена новая потриба (*Trachyzulphina* **subtrib. n.**).

INTRODUCTION

This communication is a continuation of the series of papers by Gorochov (2011a, b, c, 2012a, b, 2013a, b) on taxonomy and faunistics of Indo-Malayan and Papuan Tettigoniidae. In the previous communications of this series, 48 new taxa from the subfamilies Phaneropterinae, Meconematinae and Conocephalinae were described. The present paper is based on material from collection of the Zoological Institute, Russian Academy of Sciences, St. Petersburg. All types of new species and subspecies are deposited at this institute.

DESCRIPTIONS OF NEW TAXA

Subfamily Phaneropterinae

Tribe Dysoniini Rehn, 1950

NOTES. This tribe contains several American genera living in tropical forests and usually imitating diverse tree mosses and lichens. Some of these genera (*Paraphidnia* Giglio-Tos, 1898, *Dysonia* White, 1862 and some others) are very similar in the general appearance and some other characters (body coloration greenish brown or mainly whitish; upper rostral tubercle of head spine-like; pronotum often with lateral spines; tegmina with very similar stridulatory apparatus in male and usually with widened apex; tympanal organs open; legs with similar armament; male genitalia completely membranous; ovipositor short, strongly curved and with additional denticles on lateral surfaces) to the genus *Trachyzulpha* Dohrn, 1892 distributed in tropical forests of the Indo-Malayan region (Fig. 1). Possibly, the latter genus is related to these American genera and belongs to the same tribe, or it has strong convergent similarity to them as a result of parallel adaptation to similar mode of life (with imitation of tree mosses and lichens). Possibly also, this genus is related to Dysoniini and has convergent similarity to this tribe at the same time. It is a reason that *Trachyzulpha*, not included in any tribe of Phaneropterinae up to now (Eades *et al.*, 2014), is tentatively included in Dysoniini here. However, this genus has some distinct differences from the other genera of Dysoniini and must be put in a separate subtribe.

Subtribe *Trachyzulphina* Gorochov, subtrib. n.

Type genus: *Trachyzulpha* Dohrn, 1892 (gender feminine).

DIAGNOSIS. Head with spine-like upper rostral tubercle distinctly projected forwards (Figs 2–19). Pronotal disc with spines, spine-like lobes or tubercles situated on lateral edges of prozona and on lateral keels of metazona, and with short narrowed

part between prozona and metazona lacking spines and tubercles (Figs 8–19). Male cerci rather simple in shape, with only apical hook and without additional processes, lobes or hooks; male genital plate with narrow posterior part having small or very small posteromedian notch (Figs 37–39); ovipositor very short, but not reduced (Figs 40, 42).

COMPOSITION. Type genus only.

COMPARISON. The new subtribe is distinguished from the other representatives of Dysoniini by the combination of characters listed above (especially by a laterally spinose pronotal disc and simple structure of the male cerci).

Genus *Trachyzulpha* Dohrn, 1892

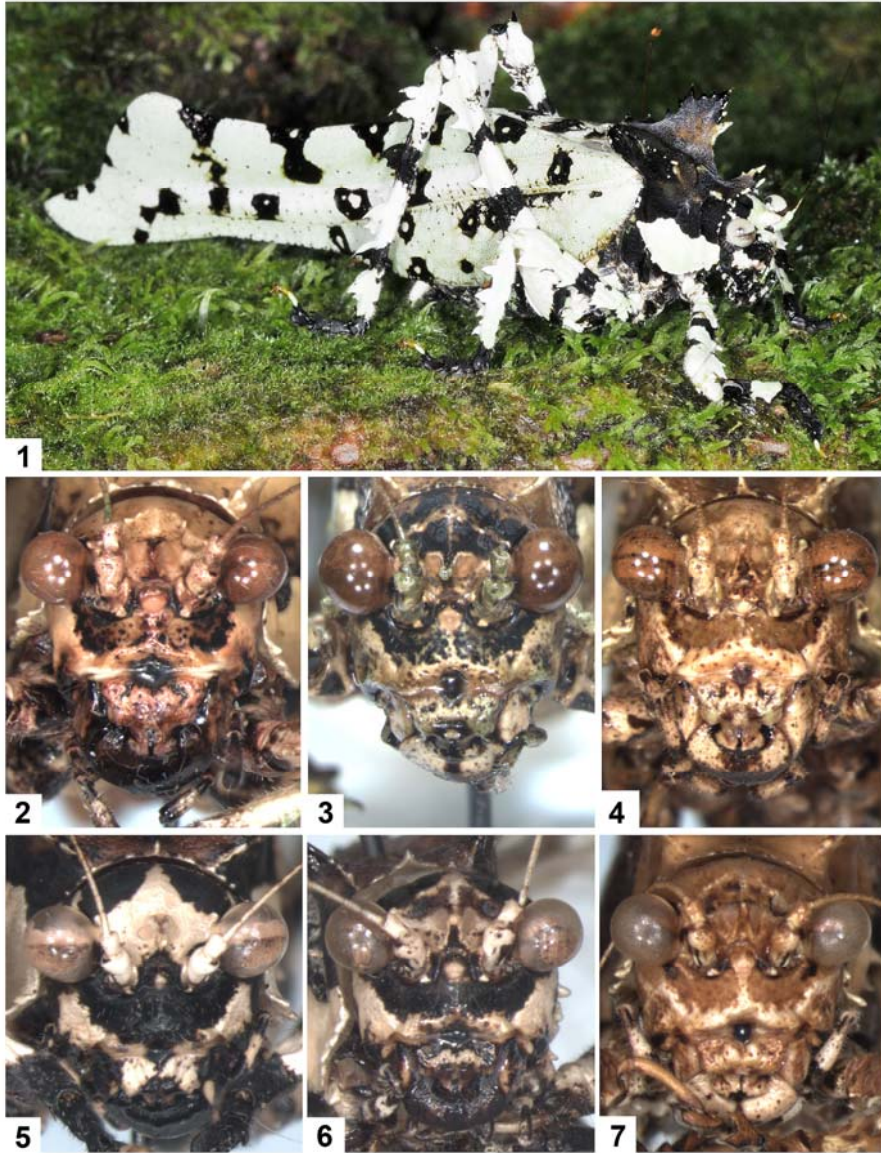
NOTES. This genus was originally established for a single species, *T. fruhstorferi* Dohrn, 1892 from Java (Dohrn, 1892). Later, the second species *T. annulifera* Carl, 1914 was described from “Tonkin” (Carl, 1914), and *T. fruhstorferi* was recorded from some other regions of South-East Asia (list of references see in Eades *et al.*, 2014). But in reality, this genus includes more than two species, and some records for the latter species are in need of examination.

***Trachyzulpha bhutanica* Gorochoff, sp. n.**

Figs 2, 8, 14, 20, 26, 31, 37.

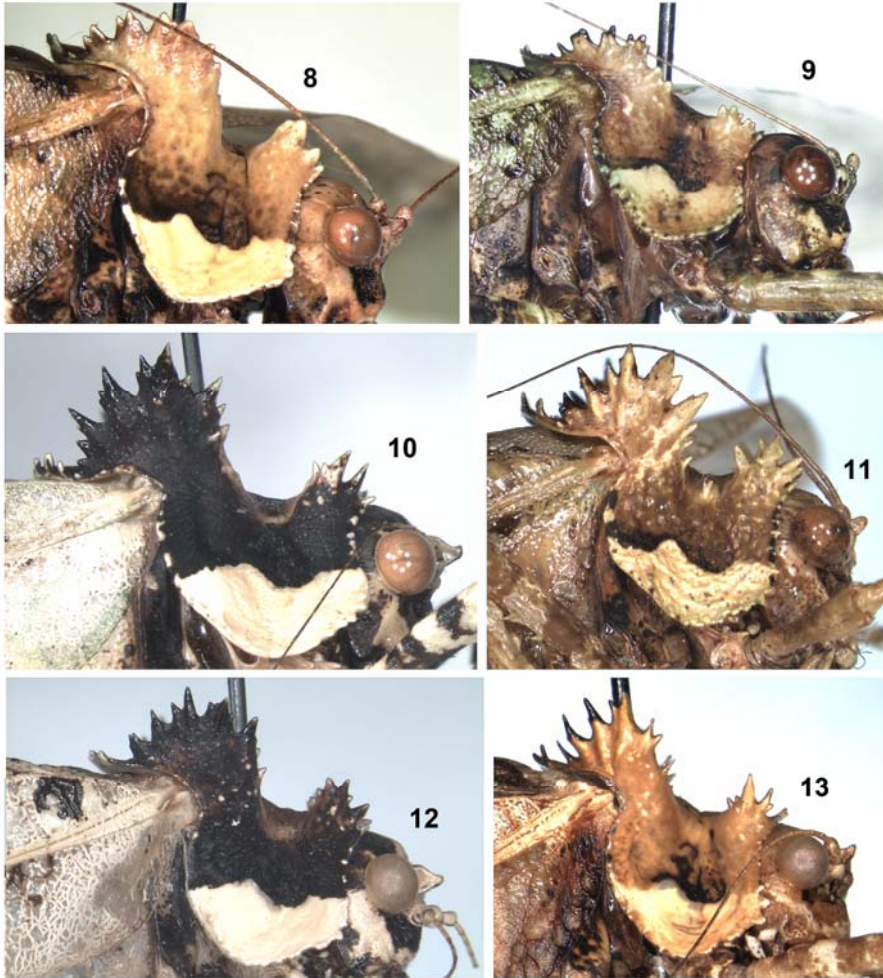
MATERIAL. Holotype – male, **Bhutan**: “Punakha, Mo Chu River”, 27°43'N, 89°45'E, 1500 m, 28–29.VI 2009, V. Sinyaev.

DESCRIPTION. Male. Body large. Coloration moderately spotted: head light brown with a few brown dots on dorsum, brown narrow stripe on dorsal surface of upper rostral tubercle, several dark brown spots and dots on anterior part of epicranium and on genae (Fig. 2), small blackish marks on palpi, dark brown areas on rest of mouthparts, and greyish brown middle part of antennal flagellum (its distal part missing); pronotum yellowish with light brown upper part of lateral lobes, dark brown middle part of these lobes (this part with strongly sinuate ventral edge and indistinct border with upper part; Fig. 8), brow area on posterior part of disc, and small darkish marks on middle part of disc (Fig. 14); tegmina yellowish green with not numerous greyish brown spots mainly in median part and almost transparent membranes of stridulatory apparatus (Figs 20, 26); hind wings transparent with yellowish venation, yellowish green small apical area, and two very small brownish spots on this area; legs yellowish with blackish marks on proximal parts and brown and light brown spots on other parts (but hind tibiae with some spots almost dark brown; Fig. 31); rest of body light brown with dark brown areas on thorax, yellowish areas on hind parts of pterothorax (including hind half of metasternum), and brown pleural membranes of abdomen as well as distal parts of cerci (Fig. 37). Structure of body typical of this genus but with following characteristic features: upper tubercle of head rostrum rather long and almost acute at apex, with slightly sinuate dorsal edge in profile, and with dorsomedian groove dividing dorsal part of this tubercle

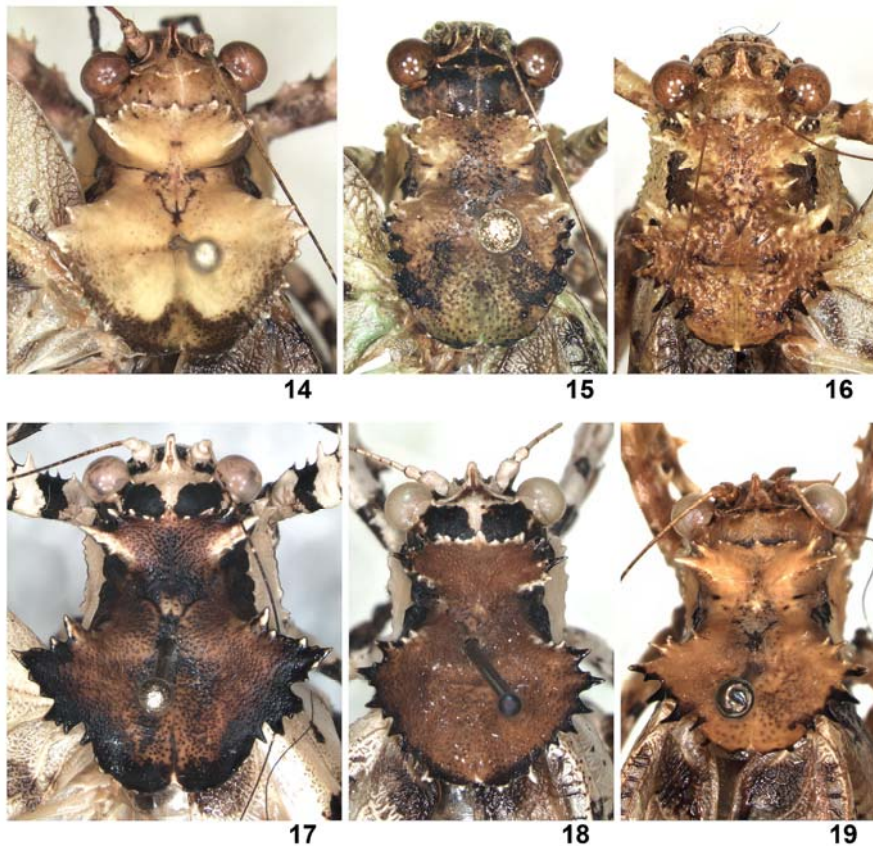


Figs 1–7. *Trachyzulpha*: 1 – *T. fruhstorferi borneo* subsp. n.; 2 – *T. bhutanica* sp. n.; 3 – *T. siamica* sp. n.; 4 – *T. f. fruhstorferi* Dohrn; 5 – *T. f. borneo*; 6, 7 – *T. f. varia* subsp. n. Holotype in living condition (1); head in front (2–7).

into a pair of lateral keels; tubercles near dorsal edge of median ocellus very small and weakly distinct; pronotum with posteroventral edges of lateral lobes not concave, with a pair of rather large and angular posterolateral lobes (spines) in prozona, with 1–2 distinctly smaller angular lobules (spines) before these lobes, with 7–8 similar lobes and lobules situated on rather large lateral keels of metazona, with small tubercles along all pronotal edges (excepting region of humeral notches), and with more or less smooth most part of disc (Figs 8, 14); tegmina long, with costal edge distinctly S-shaped, with almost not widened distal part having rather long apical (angularly narrowing) part, with two long and almost straight branches of *RS* (third,



Figs 8–13. *Trachyzulpha*, head and pronotum from side: 8 – *T. bhutanica* sp. n.; 9 – *T. siamica* sp. n.; 10 – *T. fruhstorferi borneo* subsp. n.; 11 – *T. f. fruhstorferi* Dohrn; 12, 13 – *T. f. varia* subsp. n.



Figs 14–19. *Trachyzulpha*, head and pronotum from above: 14 – *T. bhutanica* sp. n.; 15 – *T. siamica* sp. n.; 16 – *T. fruhstorferi fruhstorferi* Dohrn; 17 – *T. f. borneo* subsp. n.; 18, 19 – *T. f. varia* subsp. n.

distal branch of this vein very short and almost indistinct), with rather wide mirror, and with almost not thickened both stridulatory vein of left tegmen and nearest vein forming proximal edge of mirror (Figs 20, 26); hind femora with outer apical spine (spur) very long, much longer than inner one; hind tibiae with moderately large lobe-like spines having additional lobules on some of them almost spine-like (Fig. 31); abdomen with very small median tubercles on some tergites, simple last tergite, rounded epiproct, cylindrical proximal half of cerci, slightly curved and thinner distal cercal half (somewhat hooked at apex), distal (narrow) part of genital plate having four very small apical lobules (Figs 37), and completely membranous genitalia.

Female unknown.

Length (in mm). Body 26; body with wings 59; pronotum (median length) 8.8; tegmina 47; hind femora 20.

COMPARISON. The new species is similar to *T. fruhstorferi*, but it is distinguished from the latter species by shorter pronotal spines, a more smooth most part of the pronotal disc, almost not widened distal tegminal halves having longer apical (angularly narrowing) parts, almost straight longest branches of *RS*, and almost spine-like additional lobules of the hind tibia spines. From *T. annulifera*, the new species differs in a larger head upper rostral tubercle, more numerous spines (angular lobes and lobules) on the pronotal prozona, distinctly longer wings, a transparent most part of the hind wings, and a clearly longer outer apical spine of the hind femora.

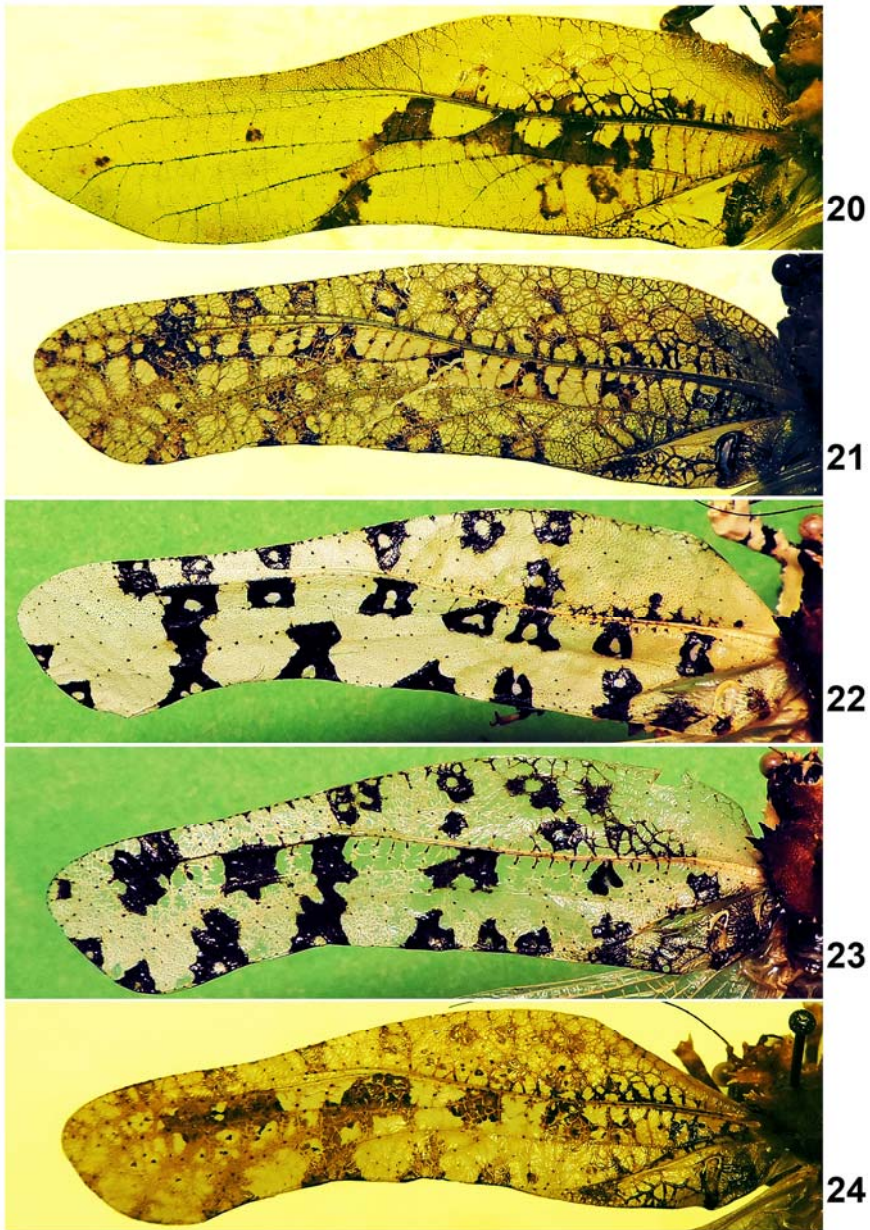
ETYMOLOGY. The species is named after Bhutan.

***Trachyzulpha siamica* Gorochov, sp. n.**

Figs 3, 9, 15, 21, 27, 32, 38.

MATERIAL. Holotype – male, **Thailand**: Lampang Prov., “Buon Pa Mieng”, forest, at light, 11.VIII 2011, A. Pushenkov.

DESCRIPTION. Male. Body medium-sized. Coloration moderately spotted: head yellowish with large blackish areas on epicranium, dark spots and dots on mouthparts (Figs 3, 9, 15), greenish scape and pedicel, and greyish brown middle and distal parts of antennal flagellum; coloration of pronotum as in *T. bhutanica*, but its disc slightly darker (brownish grey) and with greenish tinge in posterior part, and spines of metazona partly dark brown; tegmina yellowish green with almost transparent median part of lateral field and membranes of stridulatory apparatus, and with numerous rather small brown and dark brown marks (including almost blackish both stridulatory vein of left tegmen and nearest vein forming proximal edge of mirror; Figs 21, 27); other parts of body similar to those of *T. bhutanica* in coloration, but hind wings with greenish venation and more distinct dark marks in apical part, legs with larger and darker (dark brown) areas on hind femora as well as with darkish dots on light parts of dorsal surface of hind tibiae (Fig. 32), and cerci and distal part of genital plate somewhat darker (from greyish brown to dark brown; Fig. 38). Structure of body similar to that of *T. bhutanica* but with following characters: tubercles near dorsal edge of median ocellus more distinct, looking as a pair of short finger-like spinules; pronotum with slightly concave posteroventral edges of lateral lobes, with somewhat more numerous (5–6) and partly tubercle-like lateral spines of prozona, with smaller (lower and narrower) lateral keels of metazona, and with strongly punctate disc (Figs 9, 15); tegmina with costal edge less S-shaped, with apical (angularly narrowing) part distinctly shorter, with two proximal branches of *RS* less long and more curved, with distal branch of this vein transferred to *RA*, with stridulatory vein of left tegmen and nearest (parallel) vein clearly thickened, and with distinctly narrower mirror (Figs 21, 27); hind femora with outer apical spine (spur) rather short, almost equal to inner one in length; hind tibiae with somewhat wider and more or less rounded additional lobules on some of large lobe-like spines (Fig. 32); abdominal tergites without distinct median lobules or tubercles; genital plate with only a pair of apical lobules and somewhat deeper notch between them (Fig. 38).

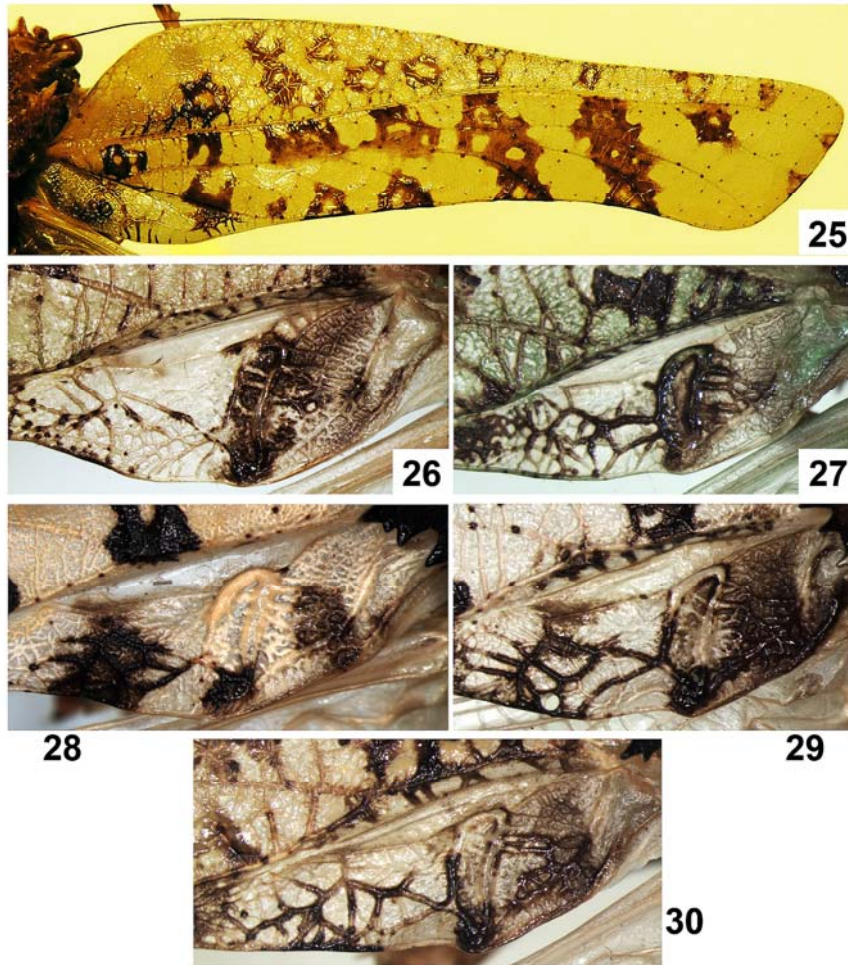


Figs 20–24. *Trachyzulpha*, left tegmen of male: 20 – *T. bhutanica* sp. n.; 21 – *T. siamica* sp. n.; 22 – *T. fruhstorferi borneo* subsp. n.; 23, 24 – *T. f. varia* subsp. n.

Female unknown.

Length (in mm). Body 25; body with wings 47; pronotum (median length) 6.9; tegmina 35; hind femora 14.5.

COMPARISON. The new species differs from *T. fruhstorferi* in shorter pronotal spines, smaller lateral keels of the pronotal metazona, shorter (not spine-like and not lobe-like) tubercles on ventral and posterior edges of pronotum, the distal tegminal part not widened, tegminal mirror (especially in the left tegmen) narrower, and outer apical spine of the hind femora much shorter (almost equal to inner one). From *T. bhutanica*, the new species is distinguished by the characters listed in the



Figs 25–30. *Trachyzulpha*: 25 – *T. fruhstorferi fruhstorferi* Dohrn; 26 – *T. bhutanica* sp. n.; 27 – *T. siamica* sp. n.; 28 – *T. f. borneo* subsp. n.; 29, 30 – *T. f. varia* subsp. n. Right tegmen of female (25); stridulatory apparatus of left tegmen of male (26–30).

description (mainly by the shape of the tegminal apical part, structure of the male stridulatory apparatus, and length of the outer apical spine in the hind femora); and from *T. annulifera*, by the same characters as *T. bhutanica* (excepting the latter spine length).

ETYMOLOGY. The species is named after Siam (old name of Thailand).

***Trachyzulpha fruhstorferi borneo* Gorochoch, subsp. n.**

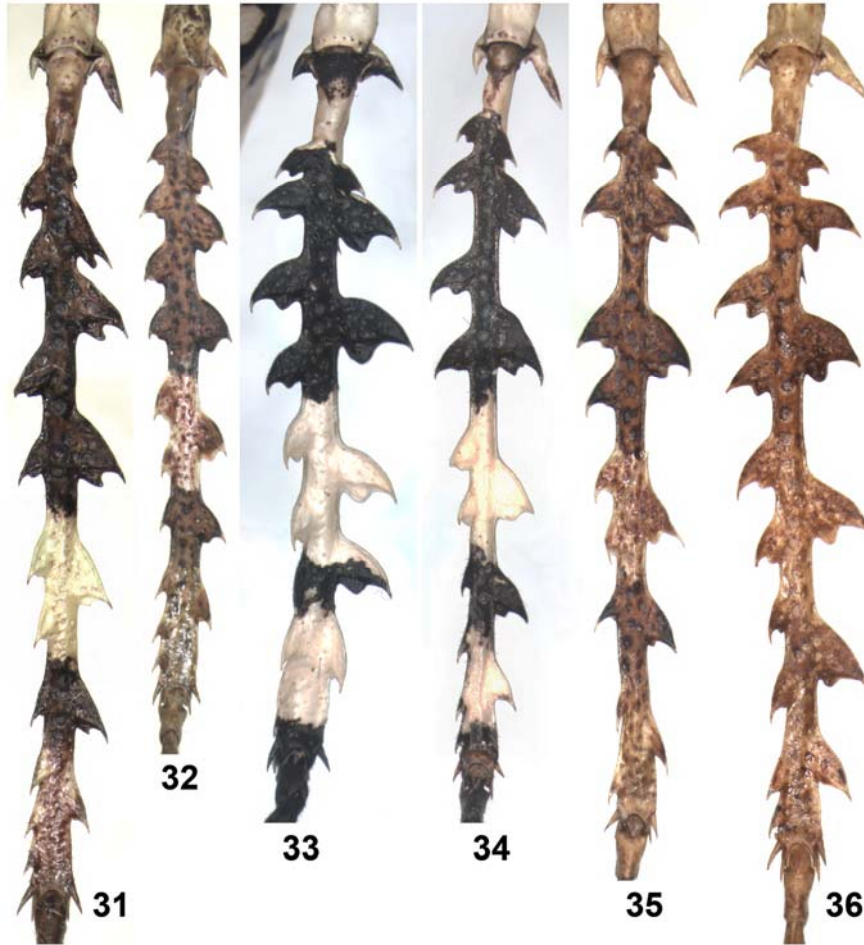
Figs 1, 5, 10, 17, 22, 28, 33, 39–41.

MATERIAL. Holotype – male, **Malaysia**: Sabah State (Borneo), Kinabalu Mount near southern part of Kinabalu National Park, 1500–2000 m, primary forest, at light, 26.IV–1.V 2013, A. Gorochoch, M. Berezin, V. Gorochova, E. Tkatsheva. Paratypes: male and female, same state, Trus Madi Mount, about 1000 m, partly primary / partly secondary forest, at light, 13–25.V 2007, A. Gorochoch.

DESCRIPTION. Male (holotype). Body rather large for this genus. Coloration yellowish white with following marks: epicranium with a pair of large areas on posterior half of dorsum, large area under apex of upper rostral tubercle and under lower halves of eyes, genae and areas behind eyes black; most part of mouthparts also black (palpi with whitish and blackish spots); scape with small dark brown marks; antennal flagellum blackish with short proximal part whitish and a few small light spots in more distal part of flagellum (Figs 5, 17); lateral lobes of pronotum with very contrast coloration (Fig. 10); pronotal disc brown with posterior band and majority of spines in metazona black, with rest of spines partly whitish, with a few light and dark brown spots between prozona and metazona, and with dark marks in central part of metazona (Fig. 17); tegmina with rather numerous and comparatively large blackish spots (many of them more or less ring-shaped), light both stridulatory vein of left tegmen and nearest thickened vein, brownish proximal spot near these veins, and almost transparent membranes of stridulatory apparatus (Figs 22, 28); hind wings transparent with yellowish both venation and small apical area having a few small blackish spots; legs with very contrast (spotted) coloration (Figs 1, 33); venter of thorax from blackish to dark brown; its pleurites with blackish spots and areas; abdominal sternites and genital plate from brown to dark brown (but with small light marks on majority of sternites); small posteromedian area of last tergite, base of epiproct, and areas on paraprocts and on cerci blackish (Fig. 39). Structure of body distinguished from that of *T. bhutanica* and *T. siamica* by following characters: tubercles near dorsal edge of median ocellus similar to those of *T. siamica* but somewhat shorter (intermediate between those of *T. siamica* and *T. bhutanica*); pronotum similar to that of *T. bhutanica* but with slightly more numerous, longer and acute spines on prozona and metazona, with wider lateral keels of metazona, with rather large angular (lobe-like and almost spine-like) tubercles on anterior, posterior and ventral edges, and with distinctly punctate disc (Figs 10, 17); tegmina similar to those of *T. siamica* but with slightly more S-shaped costal edge, somewhat narrowed short part before distal area, and somewhat wider mirror (however, this mirror barely narrowing than in *T. bhutanica*; Figs 22, 28); legs with tibiae thicker

and with spines larger than in both previous species (spines of hind tibiae especially large, and some of them with additional lobules almost as in *T. siamensis* in shape), and with outer apical spine of hind femora slightly shorter than in *T. bhutanica* but distinctly longer than in *T. siamica* (this spine almost conical; in *T. bhutanica*, it more or less springle-shaped; Fig. 33); many of abdominal tergites with very small median lobules; genital plate with apex similar to that of *T. bhutanica* but having distinctly deeper posteromedian notch (Fig. 39).

Variations. Paratype with greenish tinge, slightly lighter prozona of pronotal disc, clearly darker (almost completely dark brown) metazona of this disc, and somewhat less numerous dark spots of tegmina.



Figs 31–36. *Trachyzulpha*, hind tibia and apical part of hind femur from above: 31 – *T. bhutanica* sp. n.; 32 – *T. siamica* sp. n.; 33 – *T. fruhstorferi borneo* subsp. n.; 34, 35 – *T. f. varia* subsp. n.; 36 – *T. f. fruhstorferi* Dohrn.

Female. General appearance similar to that of male, but with some differences: dorsal tegminal field completely whitish; upper half of pronotum and almost all spots on middle and hind tibiae light brown with apices of spines of pronotal metazona, stripe along posterior edge of disc, and longitudinal band in middle part of pronotal lateral lobes black. Genital plate and ovipositor as in Figs 40, 41.

Length (in mm). Body: male 25–29, female 24; body with wings: male 51–54, female 54; pronotum (median length): male 9–9.3, female 8.9; tegmina: male 39–42, female 42; hind femora: male 18–19, female 19; ovipositor 6.

COMPARISON. The new subspecies differs from *T. fruhstorferi fruhstorferi* stat. n. in a whitish (not yellowish green) general coloration, the presence of black and blackish areas and spots, wider keels on the pronotal metazona, a less shagreen pronotal disc, narrower short part before distal area of tegmina, shorter and almost conical (not more or less springle-shaped) outer apical spine of hind femora, thicker hind tibiae, and larger spines of these tibiae. These differences are very distinct, and this new subspecies may be a separate species. From all the other congeners, it differs in the same characters as *T. f. fruhstorferi* (see the comparisons given above).

ETYMOLOGY. The new subspecies is named after Borneo I.

***Trachyzulpha fruhstorferi varia* Gorochov, subsp. n.**

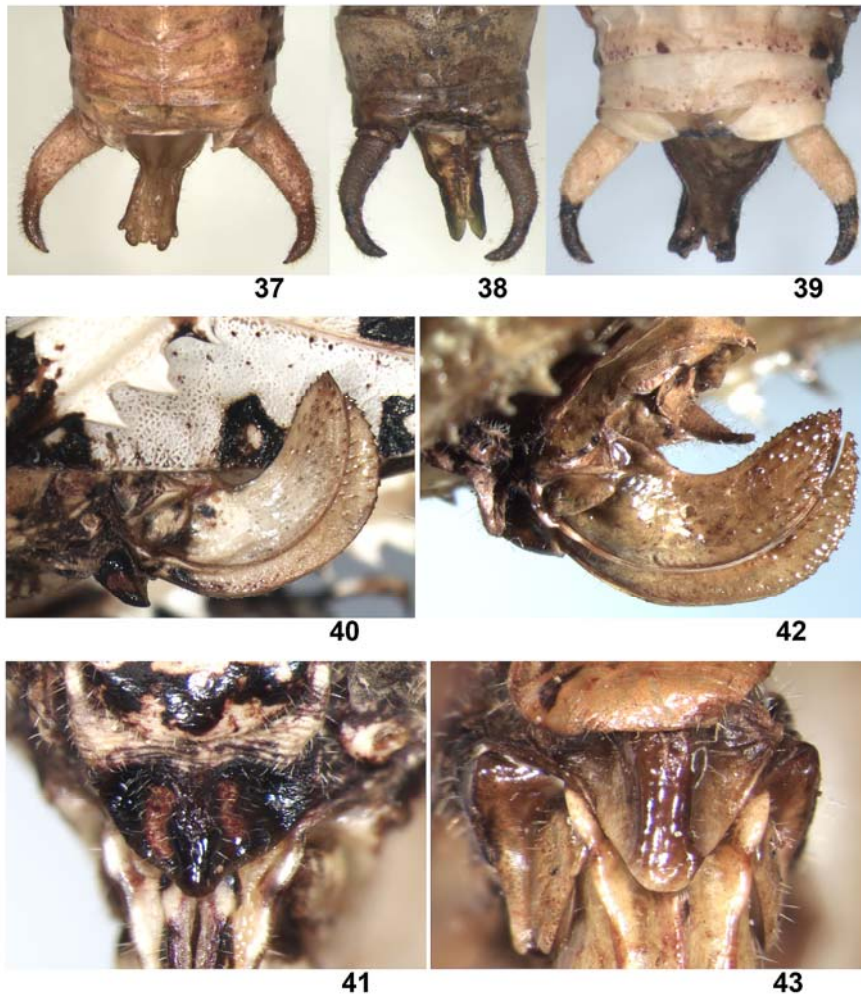
Figs 6, 7, 12, 13, 18, 19, 23, 24, 29, 30, 34, 35.

MATERIAL. Holotype – male, **Vietnam**: Kon Tum Prov., “Kon Plong, Mang Canh”, 1200 m, III – IV 2005, N. Orlov, S. Ryabov. Paratypes: 5 males, same data as for holotype; male, **China**, south-eastern part of Yunnan Prov., “Давейшань, окр. Бинбяня” (= “Daweishan, vicinity of Binbjan”), 2200 m, 25.VI 1956, D. Panfilov.

DESCRIPTION. Male (holotype). General appearance (including coloration) similar to that of *T. f. borneo* holotype, but with following differences: body slightly smaller (medium-sized for this genus); head with a pair of additional dark brown spots on dorsum between middle part of rostrum and black areas on posterior half of this dorsum (Fig. 6); pronotum with whitish marks along anterior and posterior edges of disc (including some spine-like tubercles; Figs 12, 18); tegminal dorsal field with larger brownish spot between base of dorsal field and stridulatory vein; genital plate with a pair of distinct yellowish spots at base; pronotal metazona with lateral keels clearly narrower and with tubercles along posteromedian edge spine-like (Figs 12, 18); tegmina with three branches of *RS* situated on same stock, and with stridulatory vein slightly thinner (Figs 23, 29); hind femora with outer apical spine longer (much longer than inner one) and almost springle-shaped (not approximately conical); hind tibiae clearly thinner and with smaller lobe-like spines (Fig. 34); abdominal tergites without distinct median lobules or tubercles; apical part of genital plate intermediate between those of *T. f. borneo* and *T. siamica*.

Variations. Paratypes from Vietnam with two types of coloration: two specimens almost identical to holotype, but one male practically without dark spots on anterior half of head dorsum and with somewhat lighter (brown to light brown) both most part of pronotal disc and upper half of lateral lobes; three other males (Figs 7, 13, 19,

24, 30, 35) yellowish with light brown spots and areas, with yellowish green tegmina having numerous light brown and brown marks, and with only a few marks darker (longitudinal stripe on middle part of pronotal lateral lobes, some spines of pronotal metazona, some marks on proximal third of tegmina, and a few spots on hind legs dark brown; abdomen completely light or with darkened distal part of genital plate). These variants of coloration probably adaptive: imitation of mosses on bark (greenish brown variant as in *T. siamica*) and imitation of tree lichens (whitish variant as in *T.*



Figs 37–43. *Trachyzulpha*: 37 – *T. bhutanica* sp. n.; 38 – *T. siamica* sp. n.; 39–41 – *T. fruhstorferi borneo* subsp. n.; 42, 43 – *T. f. fruhstorferi* Dohrn. Abdominal apex of male from above (37–39); ovipositor from side (40, 42); genital plate of female from below (41, 43).

f. borneo). Coloration of Chinese male similar to that of holotype but with slight greenish tinge, light head dorsum, and partly light genital plate.

Female unknown.

Length (in mm). Body 20–22; body with wings 50–52; pronotum (median length) 7.5–8.5; tegmina 37–40; hind femora 17–18.5.

COMPARISON. The new subspecies differs from *T. f. fruhstorferi* in the pronotal disc with finely punctate surface (but not with roughly shagreen one), tegmina with three branches of *RS* situated on the same stock and with very distinct crossveins (*vs.* one branch of tegminal *RS* transferred to *RA*, and tegminal crossveins less distinct, slightly obliterated), and without distinct median lobules on the abdominal tergites. It is useful to note that Javanese material on *T. f. fruhstorferi* studied by me (Figs 4, 11, 16, 25, 36, 42, 43) is similar to the greenish brown specimens of the new subspecies in coloration. Differences of the new subspecies from *T. f. borneo* are listed in the description.

ETYMOLOGY. The subspecies name is the Latin word “*varia*” (varied).

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