



A new genus of grasshoppers (Orthoptera: Acrididae: Spathosterninae) from Thailand

PATTARAWICH DAWWRUENG^{1,3}, SERGEY YU. STOROZHENKO² & AKEKAWAT VITHEEPRAKIT^{3,4,*}

¹Rabbit in the Moon Foundation, 399, Village No.3, Suan Phueng, Ratchaburi, 70180, Thailand

✉ mapormail@gmail.com; <https://orcid.org/0000-0002-3336-7007>

²Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far Eastern Branch of the Russian Academy of Sciences, Vladivostok, 690022, Russia

✉ storozhenko@biosoil.ru; <https://orcid.org/0000-0001-9269-4043>

³Department of Entomology, Faculty of Agriculture, Kasetsart University, Bangkok, Thailand

⁴Research and Lifelong Learning Center for Urban and Environmental Entomology, Kasetsart University, Institute for Advanced Studies, Kasetsart University, Bangkok, 10900, Thailand

*Corresponding author: ✉ agraww@ku.ac.th; <https://orcid.org/0000-0003-4777-8330>

Abstract

A new genus of Spathosterninae, *Tenasserimacris* **gen. nov.** (type species: *T. punctata* **sp. nov.**), was discovered and described from a lower montane forest in Tenasserim Mountain Range of western Thailand, Khao Krajom in Ratchaburi Province. Clearly, this genus is similar to *Beybienkoacris* Storozhenko in the presence of parallel veinlets on the radial area of tegmina. However, this new genus differs from the latter in the temporal foveolae in both sexes, shape of ventral genicular lobe of hind femur in female, shape of furculae on 10th abdominal tergite in male, shape of valves of cingulum and apical valves of penis, shape of epiphallus, and shape of female subgenital plate. Additionally, tribe Tristrini is transferred from subfamily Tropicopolinae to Spathosterninae. Lastly, the composition and distribution of subfamily Spathosterninae are briefly discussed.

Key words: grasshoppers, Spathosterninae, Spathosternini, Tristrini, new taxa, Southeast Asia

Introduction

Numerous endemic genera and species of grasshoppers from Thailand have been described (Willemse, 1957; Ingrisch, 1989; Storozhenko, 2005; Tan *et al.*, 2017; etc.), nevertheless until now the taxonomic knowledge of family Acrididae of this country is inadequate. Undoubtedly, new taxa may be found in this country or adjacent areas since the fauna is in one of the world's biodiversity hotspots. An expedition was conducted at Khao Krajom, part of Suan Phueng Nature Education Park initiated by Her Royal Highness Princess Maha Chakri Sirindhorn yielding specimens of an unidentified acridid. Khao Krajom is in the northern section of the Tenasserim Mountain Range in western Thailand. The objective of this work is to describe a new genus from Thailand and to clarify its position in the modern system of the family Acrididae.

Material and methods

The present work is based on specimens collected by the first author in 2021 from western Thailand (Ratchaburi Province) and deposited in the Entomology Museum, Department of Entomology, Kasetsart University, Bangkok, Thailand (EMKU) and Rabbit in the Moon Foundation Museum Collection (RIM). The specimens were dried and pinned. The male genitalia were pulled and cleaned by using KOH 10% solution and subsequently preserved in glycerin. Photographs of general habitus and some external morphology were made using a Canon EOS 400D with Canon Macro lens EF 100mm and speedlite 270EX II flash unit. Photographs of some external morphology and

male genitalia were made using Olympus SZX10 microscope attached with Wireless Digital Imaging Olympus EP50 and Olympus LG-LSLED light source. The final illustrations were post-processed for contrast and brightness using Adobe Photoshop 2020 software.

Nomenclature is given according to rules of the International Code of the Zoological Nomenclature (ICZN, 1999). The morphological terminology and terminology of male genitalia follows those of Uvarov (1966) and Dirsh (1956), respectively. The images of the type specimens of some species are available in the Orthoptera Species File database (Cigliano *et al.*, 2024). Measurements are given in mm.

Descriptions of new taxa

Family Acrididae MacLeay, 1821

Subfamily Spathosterninae Tinkham, 1940

Tribe Tristrini Mistshenko, 1945

Genus *Tenasserimacris* Dawwrueng, Storozhenko et Vitheepradit, gen. nov.

Type species: *Tenasserimacris punctata* sp. nov., here designated.

Description. Male. Body elongated. Head slightly shorter than the pronotum (Figs. 1A–D). Frons and genae coarsely punctured (Figs. 1C, E). Face in profile reclinate (Figs. 1A, C). Frontal ridge distinct to nearby the edge of clypeus, deeply sulcate between the antennae, slightly narrowed near median ocellus (Fig. 1E). Vertex between eyes distinctly broader than maximal width of frontal ridge. Fastigium of vertex punctured, slightly broader than long, apex rounded in dorsal view; foveolae absent (Figs. 1C–D). Eyes large, almost oval. Antennae 22-segmented, slightly surpassing the posterior margin of pronotum. Pronotum punctured, crossed by three transverse furrows, almost cylindrical in dorsal view (Fig. 1D); median carina present, but low in profile; lateral carinae of pronotum low (Figs. 1C, D); prozona 2.0 times as long as metazona; anterior margin of pronotum broadly rounded with shallow excision medially; posterior margin of pronotum rounded, slightly projecting medially (Fig. 1D). Prosternal spine small, narrow conical with acute apex (Fig. 1F). Mesosternal lobes with internal margin almost straight, mesosternal interspace distinctly narrower than mesosternal lobe (Fig. 1F); metasternal lobes fused (Fig. 1G). Tegmina developed, touching each other in dorsal view, slightly surpassing 10th abdominal tergite, with small basal dilatation at anterior margin, posterior margin almost straight, narrowing apically, apex rounded, radial area with straight, parallel cross-veins; (Figs. 1A–B, H). Hind wings slightly shorter than tegmina (Fig. 1H). Hind femora rather slender, 4.2 times as long as their maximal width; dorsal margin coarsely serrate, ventral margin smooth; ventral genicular lobes without spine (Fig. 1I). Hind tibiae with 8–9 outer and 10 inner dorsal spines; outer apical dorsal spine present but small (Figs. 1J–K). Hind tarsi long, almost reach the half of hind tibiae; third segment without claws slightly longer than basitarsus; arolium large, surpassing apex of claws. Tympanum rather large, oval, covered by tegmina. 7th and 8th abdominal sternites with two subparallel rows of hairs; 10th abdominal tergite with small rounded or indistinct furculae on posterior margin, not raised upward or backward in lateral view (Figs. 2A–B); supra-anal plate triangular with shallow median groove, lateral margin with shallow excision near the half of the plate, longer than its width near base, with obtuse rounded apex (Fig. 2A). Paraprocts simple. Cerci reaching beyond the supra-anal plate, conical, with obtuse pointed apex, 3.4 times as long as their width near base (Fig. 2B). Subgenital plate long, conical in both lateral and dorsal views (Figs. 2A–B).

Epiphallus bridge-shaped; bridge narrow, curved anteriorly and not divided (Fig. 2F); ancorae large, obtuse triangular; anterior projections obtuse rounded (Fig. 2F); posterior projections absent (Fig. 2F); lophi of epiphallus large, broadly rounded (Figs. 2F–G); oval sclerites small. Cingulum sclerotized, consisting of nearly straight apodemes, its apex slightly bent outward (Figs. 2C–D); rami slightly broadened (Fig. 2D); zygoma straight, covering the arch of cingulum (Fig. 2D). Valves of cingulum long and narrow, apical part divided in two flattened, rounded lobes (Figs. 2C–D). Apical valves of penis divided, widened in median part, narrowed apically, distinctly shorter than valves of cingulum (Figs. 2C, E); basal and apical penis valves connected by thin flexure.

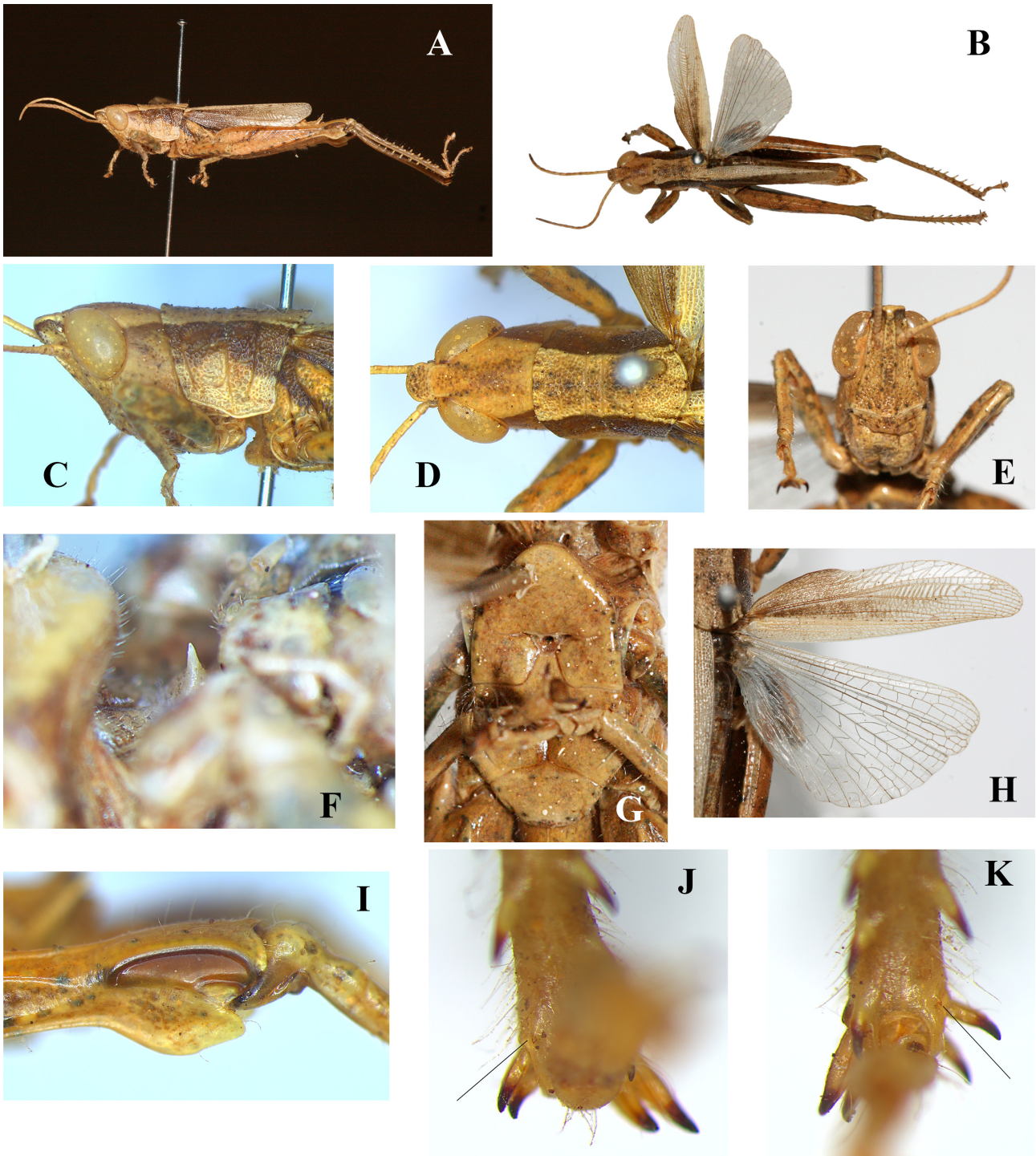


FIGURE 1. *Tenasserimacris punctata* **gen. et sp. nov.**, male (holotype): A. General habitus, lateral view; B. Same, dorsal view; C. Head and pronotum, lateral view; D. Same, dorsal view; E. Head, frontal view; F. Prosternal process in slightly oblique lateral view; G. Sternal plate, ventral view; H. Right tegmen and hind wing, dorsal view; I. Hind knee, lateral view; J. Apex of left hind tibia, the line indicated the small outer apical spine; K. Same, right hind tibia.

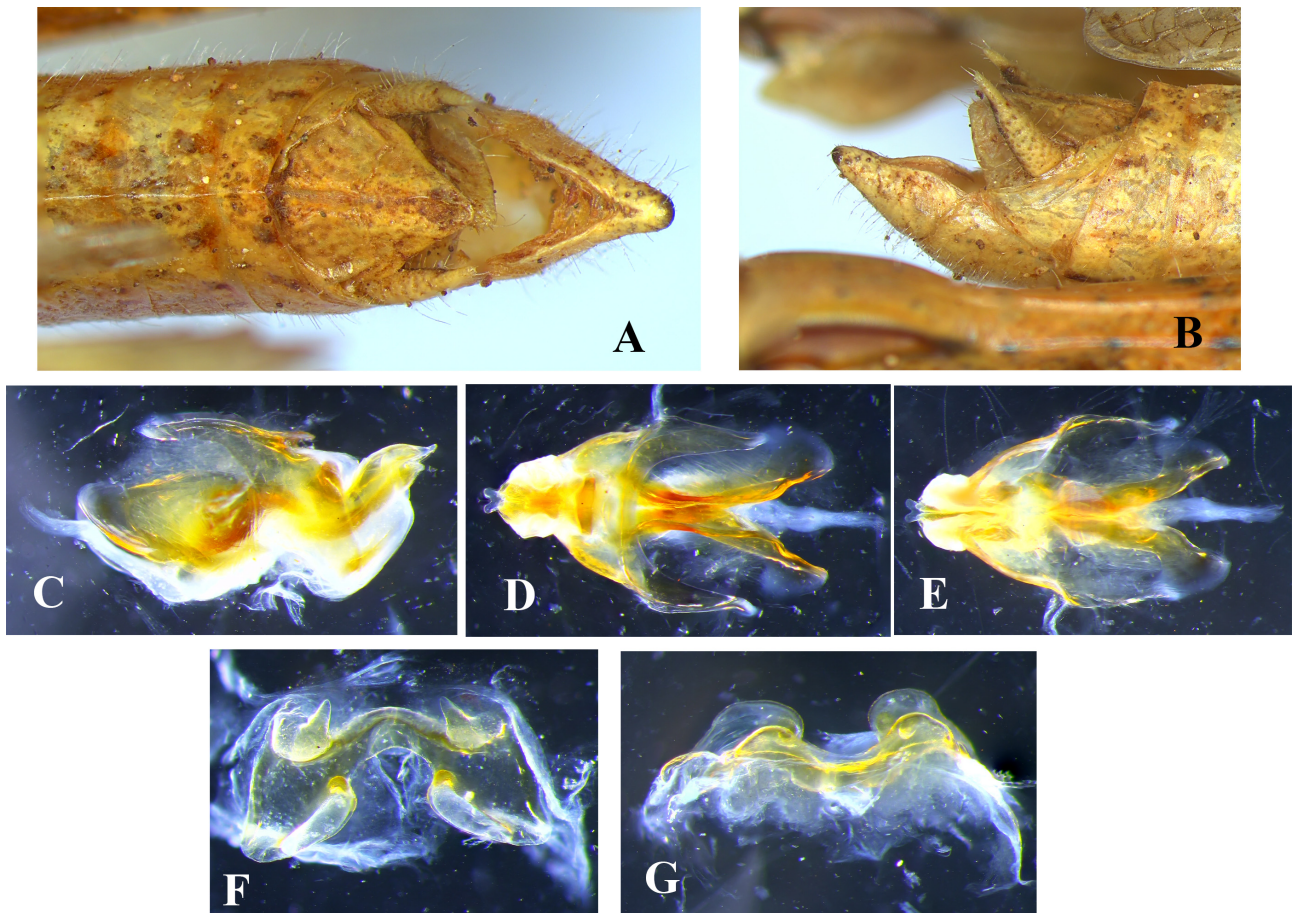


FIGURE 2. *Tenasserimacris punctata* gen. et sp. nov., male (holotype). A. Apex of abdomen in dorsal view; B. Same, lateral view; C. Genital complex, lateral view; D. Same, dorsal view; E. Same, ventral view; F. Epiphallus, dorsal view; G. Same, anterior view.

Female. Similar to male but larger. Head shorter than the pronotum (Figs. 3A–D). Head and frons coarsely punctured, shape of frontal ridge as in male. Vertex between eyes distinctly broader than maximal width of frontal ridge. Fastigium of vertex broad; foveolae absent (Fig. 3D). Eyes large, almost oval. Antennae 22-segmented, not reaching the posterior margin of pronotum. Pronotum as in male; prozona 2.5–2.6 times as long as metazona; anterior margin of pronotum subtruncate; posterior margin of pronotum nearly truncate with shallow excision on the middle (Fig. 3D). Prosternal spine widened from basal part to the median part and narrowing into a short conical and acute apex (Fig. 3G). Mesosternal lobes with internal margin convex; mesosternal interspace distinctly narrower than mesosternal lobe; metasternal lobes fused (Fig. 3F). Tegmina similar as in male, but broader and shorter than, reached 7th abdominal tergite (Figs. 3A, H). Hind femora as in male; ventral genicular lobe without spine (Fig. 3I). Hind tibiae with 7 or 8 outer and 10 inner dorsal spines; outer apical dorsal spine present, larger than male (Figs. 3J–K). 6th and 7th abdominal sternites with two subparallel rows of short hairs. Supra-anal plate triangular with shallow median groove, the middle part with transverse groove, longer than width near base. Cerci short, not reaching the supra-anal plate, conical, with obtuse rounded apex, 2.3–2.5 times as long as their width near base (Fig. 4A). Subgenital plate 1.6–1.7 times longer than wide, apical part slightly concave with broadly triangular median process (Fig. 4B). Ovipositor short, dorsal valves thicker and longer than ventral valves, dorsal valves with weak serration margin, lower valves with smooth margin, both valves slightly curved upward and downward (Fig. 4A).

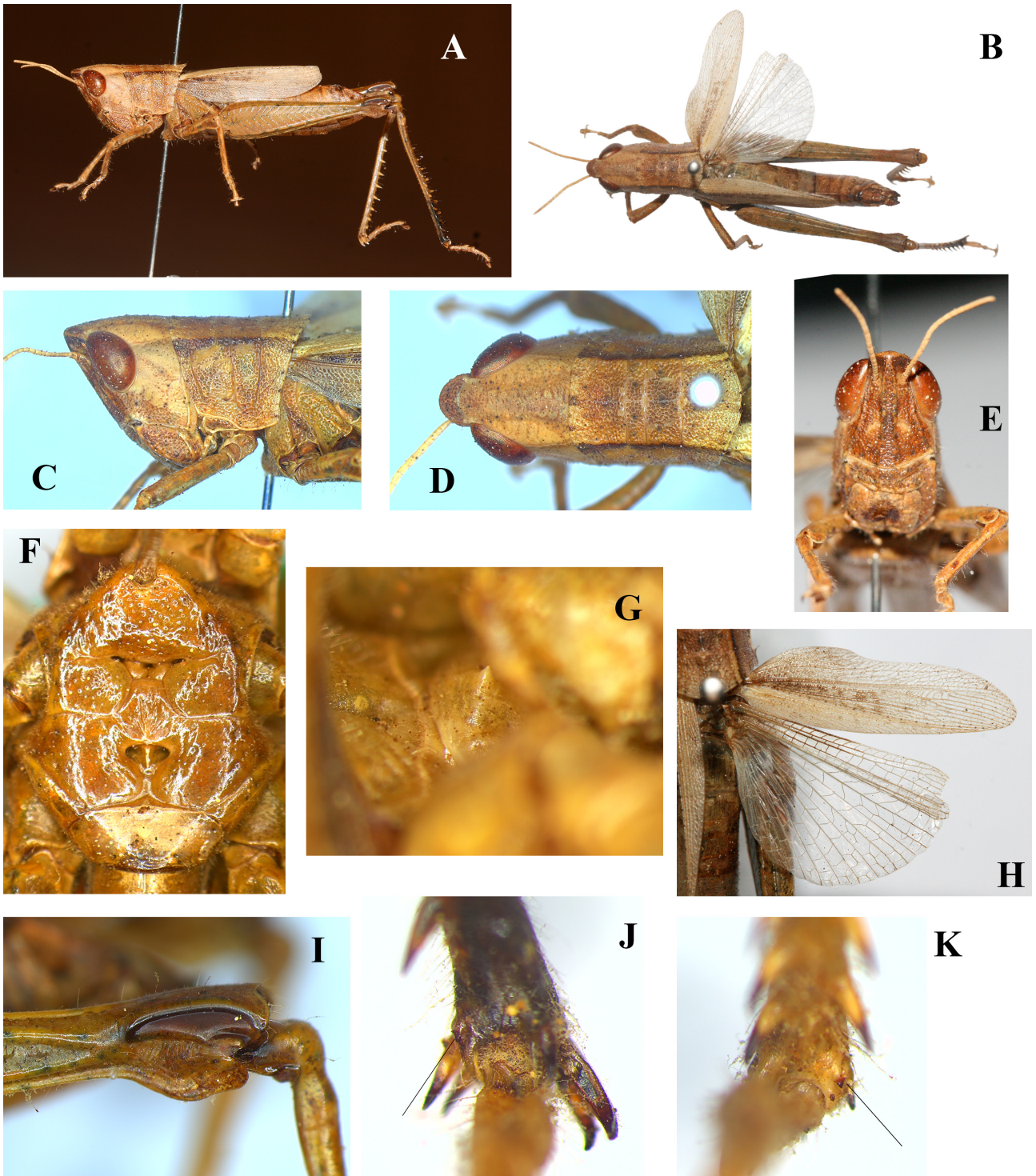


FIGURE 3. *Tenasserimacris punctata* gen. et sp. nov., female. A. General habitus, lateral view; B. Same, dorsal view; C. Head and pronotum, lateral view; D. Same, dorsal view; E. Head, frontal view; F. Sternal plate, ventral view; G. Prosternal process in slightly oblique lateral view; H. Right tegmen and hind wing, dorsal view; I. Hind knee, lateral view; J. Apex of left hind tibia, the line indicated the small outer apical spine; K. Same, left hind tibia.

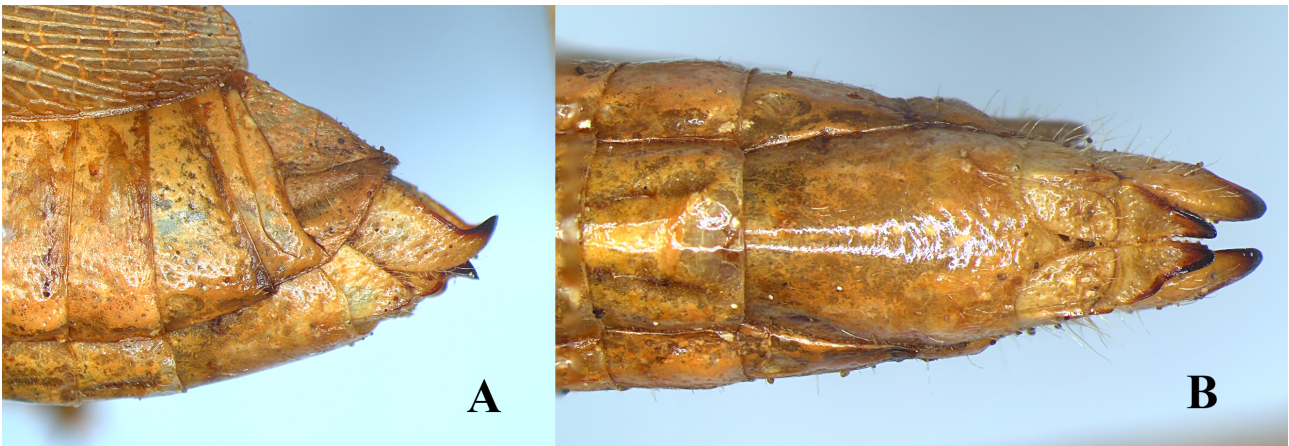


FIGURE 4. *Tenasserimacris punctata* gen. et sp. nov., female. A. Apex of abdomen, lateral view; B. Same, ventral view.

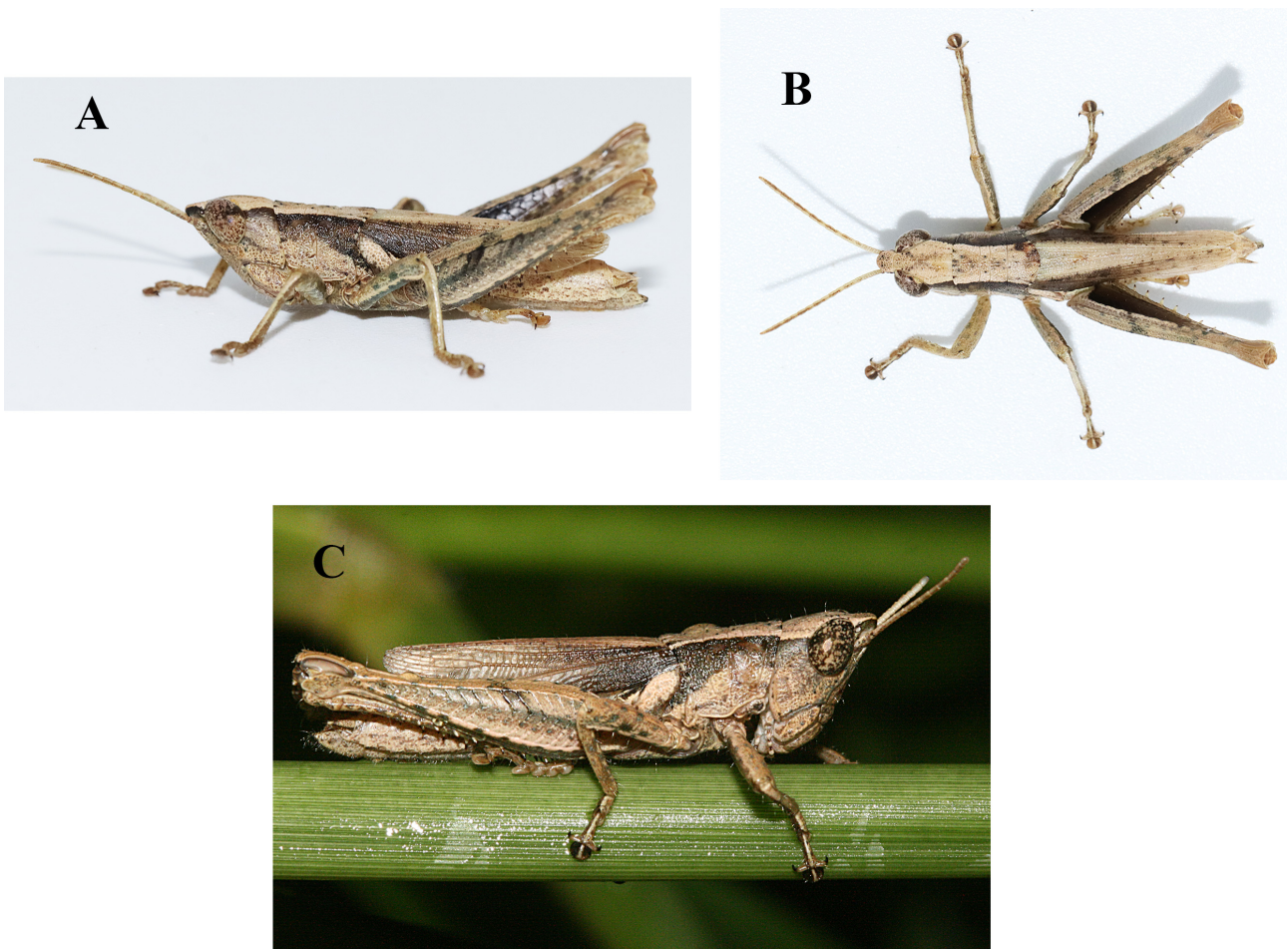


FIGURE 5. *Tenasserimacris punctata* gen. et sp. nov., male, ex-situ. A, C. Lateral view; B. Dorsal view.

Diagnosis. New genus is very similar to *Beybienkoacris* Storozhenko, 2005 from Thailand. The main morphological differences of both genera are provided in Table 1.

Species included. *Tenasserimacris punctata* sp. nov.

Etymology. The genus name is derived from the locality of type (the Tenasserim Mountain Range) and *-acris* a common generic name of grasshoppers. Gender feminine.

TABLE 1. Character comparisons between *Tenasserimacris* gen. nov. and *Beybienkoacris*.

| Characters | <i>Tenasserimacris</i> gen. nov. | <i>Beybienkoacris</i> |
|---|--|--|
| 1. Temporal foveolae | Absent | Present |
| 2. Ventral genicular lobe of female | Obtuse | Acute |
| 3. Furculae on 10th abdominal tergite of male | Small and low in profile | Distinct and bent upward |
| 4. Shape of valves of cingulum and apical valves of penis | Valves of cingulum longer than apical valves of penis | Valves of cingulum as long as apical valves of penis |
| 5. Epiphallus | Bridge curved anteriorly; ancorae thick; lophi more oblique in dorsal view | Bridge straight anteriorly; ancorae slim; lophi more transverse in dorsal view |
| 6. Female subgenital plate | Concave apically, broadly triangular median process | Broadly triangular apically, with small pointed median process |

***Tenasserimacris punctata* Dawwrueng, Storozhenko et Vitheepradit, sp. nov.**

Figs 1–5

Type material. Holotype—male, **Thailand:** Ratchaburi Province, Suan Phueng District, Khao Krajom, 2 XI 2021, coll. P. Dawwrueng (EMKU). Allotype—female, same locality and deposition as holotype. Paratypes—1 male, 1 female (RIM-I-2024-00085-0086), same locality data as holotype (RIM).

Description. Male. Head and pronotum light brown with dark marks; abdomen light brown with small, scattered spots on lateral side. Dorsal side of head with faintly dark brown bands near the middle; frons and genae light brown with small blackish spots; mandibles light brown. Antennae yellowish brown. Postocular dark brown band present. Disc of pronotum light brown with small black spots. Upper part of lateral lobe of pronotum with large dark brown stripe, lower part light brown. Mesopleuron light brown with narrowly oblique dark brown stripe, metapleuron light brown. Tegmina light brown with precostal and medial areas dark brown. Inner and outer sides of fore and mid legs light brown with dark green spots vary in size, outer and inner side on both legs dark brown, ventral area of mid femur dark green; arolium on both legs dark brown with narrow light brown stripe medially. Hind femur light brown with several dark green spots along the outer keel from basal to apical part, median part of external surface greyish brown with large longitudinal dark green stripe near the base, inner surface dark brown; dorsal and ventral genicular lobes light brown. Hind tibia light brown with dark brown spots; dorsal spines with black apex. Hind tarsi light brown. Supra-anal plate and paraprocts light brown; cerci light brown with numerous, small, dark brown spots; subgenital plate light brown with dark brown spots.

Female. The coloration is very similar to male, but frons much darker; postocular stripe, pronotal stripe, mesopleuron dark brown stripe and dark brown area on basal part of tegmina distinctly narrower; hind femur with less and smaller dark green spots. Apex of abdomen (supra-anal plate, cerci, paraprocts, subgenital plate) light brown; ovipositor yellowish brown with dark brown apices of both valves.

Measurements (length in mm). Body: male 24.7–25.9, female 31.5–32.7; pronotum: male 5.0–5.3, female 6.9–7.0; tegmen: male 12.5–13.0, female 14.9–15.0; hind femur: male 14.1–14.7, female 19.9–20.0; hind tibia: male 12.0–12.7, female 17.2–18.3 ovipositor: 1.3–1.6.

Habitat. We found this species from Khao Krajom in Suan Phueng District, Ratchaburi Province. This area is an important non-protected area of the Tenasserim mountain range. Grasshoppers were found perched and fed on *Alpinia malaccensis* (Zingiberaceae) and some grass species in both understory and open area of lower montane forest in daytime.

Distribution. This species is known from type locality only.

Etymology. The specific epithet from the Latin word “punctatus (-a, -um)” which gave the meaning “punctuated” for the integument of both sexes distinctly punctuated.

Discussion

The name *Tristria* was erected by Tinkham (1940) in the subfamily Cyrtacanthacrinae of the family Acrididae for the genus *Tristria* [sic] Stål, 1873. Tinkham (1940) also proposed a new group: Spathosterni Tinkham, 1940 for the genera *Spathosternum* Krauss, 1877 and *Sinacris* Tinkham, 1940. Later Mistshenko (1945) proposed name Tristrini based on correct spelling of the genus *Tristria* Stål, 1873; according to Article 35.4.1 of the Code of Zoological Nomenclature (ICZN, 1999), namely Mistshenko must be considered as the author of this tribe. Later *Tristria* and *Spathosternum* were placed in a single tribe by Mistshenko (1952). Willemse (1955) described the monotypic genus *Siamacris* C. Willemse, 1955 from Thailand in the subfamily Catantopinae *sensu lato*. Dirsh (1961) transferred *Tristria* to the subfamily Tropicopolinae while this genus was characterized by a radial area of tegmen with a series of regular, parallel, so-called ‘stridulatory’ veinlets, which is a typical feature for Hemiacridinae, but not for Tropicopolinae.

More recently, Storozhenko (1991) included the genera *Tristria* and *Spathosternum* in Tristrini, and also placed this tribe in the subfamily Catantopinae *sensu lato*, and again considered Spathosternini and Tristrini as a single tribe as Tristrini, which was proposed by Mistshenko (1952). Otte (1995) considered that the tribe Tristrini consists of two genera (i.e., *Tristria* and *Tristriella* Descamps et Wintrebert, 1967) as a tribe of the family Tropicopolinae. The monotypic genus *Beybienkoacris* Storozhenko, 2005 was described from Thailand and compared with the genus *Toacris* without discussion on the tribal position of both genera (Storozhenko, 2005). Later the genus *Tristria* was placed in the subfamily Tristrinae of the family Catantopidae (Li & Xia, 2006). Finally, Spathosterninae was considered as subfamily distinctly differs from Hemiacridinae and Tropicopolinae and consists of the tribe Spathosternini only (Rowell & Hemp, 2017) but Tristrini is traditionally placed in Tropicopolinae (Cigliano *et al.*, 2024).

Here, we transferred the tribe Tristrini from subfamily Tropicopolinae to Spathosterninae mainly based on specific wing-venation and shape of male genitalia. As a result, the subfamily Spathosterninae is divided into two tribes. The first tribe is Spathosternini consists of three genera, which are *Spathosternum* [9 species from Africa, Madagascar, and Asia (China, India, Nepal, Pakistan, Thailand, and Vietnam)], *Paraspathosternum* Ramme, 1929 (two species from Africa and Madagascar), and monotypic *Laxabilla* Sjöstedt, 1934 from Australia (Cigliano *et al.*, 2024). The second tribe is Tristrini includes six genera, which are *Tristria* [10 species from Africa and Asia (China, India, Indonesia, Myanmar, Thailand, and Vietnam)], *Tristriella* (one species from Madagascar), and three monotypic genera *Siamacris*, *Beybienkoacris* and *Tenasserimacris* **gen. nov.** from Thailand (Descamps & Wintrebert, 1967; Hollis, 1970; 2005; Rowell & Hemp, 2017; Cigliano *et al.*, 2024). Spathosternini is easy recognizable from Tristrini by prosternal process compressed into a thin transverse plate, mesosternal interspace closed, hind tibia with large outer apical dorsal spine, and lateral carinae of pronotum distinct, thick (in Tristrini, the prosternal process conical with acute apex or strongly bent backwards with apex very broad, concave, trapezoidal, the mesosternal interspace open, the outer apical dorsal spine of hind tibia small, sometimes poorly visible, and lateral carinae of the pronotum low, sometimes almost completely reduced).

Acknowledgements

All fieldwork, including collecting insects in the field and specimen exportation, was authorized by the Institute of Animals for Scientific Purpose Development (IAD), Bangkok, Thailand (permit number U1-08285-2562, issued to Pattarawich Dawwrueng. The research of Storozhenko was conducted within the state assignment of Ministry of Science and Higher Education of the Russian Federation (theme No. 124012400285-7). A. Vitheepradit thanks the Kasetsart University Research and Development Institute, KURDI (Grant No. FF (KU) 51.68) for financial support. This research was approved by the Institutional Animal Care and Use Committee, Faculty of Agriculture, Kasetsart University, Thailand, under Project number ACKU67-AGR-040.

We thanks Charnchai Bindusen and Juthamas Wangaryattawanich from Rabbit in the Moon Foundation for their helpful support under the “Biodiversity Study of Khao Krajom, Suan Phueng, Ratchaburi Project”, and also Parinya Pawangkhanant, Akrachai Aksornneam, Kawin Jiaranaisakul, Mali Naiduangchan, Ani Boonthong, Pornthip Chaiwat and Wongdee family (Joe, Pree, Boontorn, Nudee and Krarok Wongdee), Tao family (Bangrau and Naka Tao), Suphap Sisuk, Cherd Manora [Rabbit in the Moon Foundation Team] and Suan Phueng Nature

Education Park initiated by Her Royal Highness Princess Maha Chakri Sirindhorn for their support and assistance in the fieldwork.

References

- Cigliano, M.M., Braun, H., Eades, D.C. & Otte, D. (2024) Orthoptera Species File Online. Version 5.0/5.0. Available from: <http://Orthoptera.SpeciesFile.org> (accessed 30 May 2024)
- Descamps, M. & Wintrebert, D. (1967) Diagnoses de quelques Acrididae nouveaux de Madagascar (Orth. Acridoidea). *Bulletin de la Société Entomologique de France*, 72, 89–104.
<https://doi.org/10.3406/bsef.1967.20930>
- Dirsh, V.M. (1956) The phallic complex in Acridoidea (Orthoptera) in relation to taxonomy. *The Transactions of the Royal Entomological Society of London*, 108, 223–356.
<https://doi.org/10.1111/j.1365-2311.1956.tb02270.x>
- Dirsh, V.M. (1961) A preliminary revision of the families and subfamilies of Acridoidea (Orthoptera, Insecta). *Bulletin of the British Museum (Natural History) Entomology*, 10 (9), 351–419.
- Hollis, D.A. (1970) A revision of the genus *Tristria* (Orthoptera: Acridoidea). *Journal of Natural History*, 4, 457–480.
<https://doi.org/10.1080/00222937000770441>
- Ingrisch, S. (1989) Records, descriptions, and revisionary studies of Acrididae from Thailand and adjacent regions (Orthoptera, Acridoidea). *Spixiana*, 11 (3), 205–242.
- International Commission on Zoological Nomenclature. (1999) *International code of zoological nomenclature, Fourth Edition*. International Trust for Zoological Nomenclature, London, 306 pp.
<https://doi.org/10.5962/bhl.title.50608>
- Li, H. & Xia, K. (2006) *Fauna Sinica. Insecta. Vol. 43. Orthoptera, Acridoidea, Catantopidae*. Science Press, Beijing, 721 pp.
- Mistshenko, L.L. (1945) Geographical distribution of the subfam. Catantopinae [Saltatoria (Orthoptera sens. str.) Acridoidea]. *Entomologicheskoe Obozrenie*, 28 (3–4), 101–105. [in Russian]
- Mistshenko, L.L. (1952) *Locust and grasshoppers, Catantopinae. Fauna of the USSR, Orthoptera 4(2)*. USSR Academy of Sciences Publ., Moscow & Leningrad, 610 pp. [in Russian]
- Otte, D. (1995) *Orthoptera Species File 4. Grasshoppers (Acridomorpha) C*. Orthopterists' Society & Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania, 518 pp.
- Rowell, C.H.F. & Hemp, C. (2017) *Jago's Grasshoppers of East and North East Africa. Vol. 2. Acrididae: Teratodinae, Hemicridinae, Spathosterninae, Tropidopolinae, Calliptaminae, Oxyinae, Coptacrinae, and Eyprepocnemidinae*. Blurb Publishers, San Francisco, 237 pp.
- Storozhenko, S.Yu. (1991) Grasshoppers (Orthoptera: Acrididae) collected in Vietnam by A.V. Gorochochov in 1988. *Proceedings of the Zoological Institute, USSR Academy of Sciences*, 240, 25–37. [in Russian]
- Storozhenko, S.Yu. (2005) New grasshoppers of the subfamily Catantopinae (Orthoptera, Acrididae) from Thailand. *Proceedings of the Russian Entomological Society*, 76, 79–91. [in Russian with English Summary]
- Tan, M.K., Dawwrueng, P. & Artchawakom, T. (2017) A new species of the genus *Striatosedulia* (Orthoptera: Acrididae, Catantopinae) from Thailand. *Far Eastern Entomologist*, 333, 1–9.
- Tinkham, E.R. (1940) Taxonomic and biological studies on the Cyrtacanthacrinae of South China. *Lingnan Science Journal*, 19 (3), 269–382.
- Uvarov, B.P. (1966) *Grasshoppers and locusts. A handbook of general acridology. Vol. 1. Anatomy, physiology, development, phase polymorphism, introduction to taxonomy*. University Press, Cambridge, 481 pp.
- Willemse, C. (1955) Synopsis of the Acridoidea of the Indo-Malayan and adjacent regions (Insecta, Orthoptera). Part II. Fam. Acrididae, subfam. Catantopinae. Part I. *Publicaties van het Natuurhistorisch Genootschap in Limburg*, 8, 3–225.