

RESEARCH PAPER

Two new species of the beaded lacewing genus *Asadeteva* (Neuroptera: Berothidae) from Thailand

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Abstract. *Asadeteva* U. Aspöck & H. Aspöck, 1981 (Neuroptera, Berothidae), has been traditionally considered a Palearctic faunal element. *Asadeteva* was originally described from Afghanistan and Pakistan, while recent report has extended its known range into the Oriental Region. Herein, we report two new species of *Asadeteva* from Thailand, namely *Asadeteva christophi* U. Aspöck & H. Aspöck sp. nov. and *Asadeteva thailandica* sp. nov. This discovery highlights the presence and diversity of this genus in the Oriental Region. A distribution map and a revised key to the species of *Asadeteva* are also provided.

Key words. Neuroptera, Berothidae, Berothinae, new species, taxonomy, Thailand, Oriental Region

Zoobank: <http://zoobank.org/urn:lsid:zoobank.org:pub:F4DF70E4-FA5F-43A7-9C44-B74E70730342>

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Introduction

The family Berothidae (beaded lacewings) is a moderately diverse group of Neuroptera, characterized by distinctive features such as hairy tubercles on the head, hairy wings with scales on certain parts of the veins, and the presence of a long CuA vein that runs parallel to the posterior margin of the hindwing. Currently, the family comprises seven subfamilies, 26 genera, and 117 species recorded worldwide, with the major diversity of species found in tropical and subtropical regions (U. ASPÖCK & RANDOLF 2014, OSWALD 2024).

Asadeteva U. Aspöck & H. Aspöck, 1981 is a small genus of the subfamily Berothinae, with only three described species so far (OSWALD 2024). The genus was originally described by U. ASPÖCK & H. ASPÖCK (1981), based on two species: *Asadeteva afghana* U. Aspöck & H. Aspöck, 1981 and *Asadeteva vartianorum* U. Aspöck & H. Aspöck, 1981, from Afghanistan and Pakistan, respectively. Subsequent records of undetermined species from northern Pakistan and northwestern India were noted (U. ASPÖCK & RANDOLF 2014). These early records led to the understanding that *Asadeteva* may be a Palearctic genus, typically found at high altitudes (1400–1800 m)

(U. ASPÖCK & RANDOLF 2014). However, the report of *Asadeteva acutata* Li, H. Aspöck, U. Aspöck & Liu, 2020 in Thailand and Laos, marked the first record of *Asadeteva* in the Oriental Region (LI et al. 2020). This significant finding expanded the geographical distribution of the genus beyond the Palearctic Region.

In Thailand, there have been two genera and three species of Berothinae recorded so far: *Berotha insolita* Walker, 1860, *Berotha piepersii* van der Weele, 1904, and *Asadeteva acutata*. In this paper, we report two new species of *Asadeteva* from Thailand, namely *Asadeteva christophi* U. Aspöck & H. Aspöck sp. nov. and *Asadeteva thailandica* Li, U. Aspöck, H. Aspöck & Liu sp. nov. The discovery of the new species significantly highlights the presence of this genus in the Oriental Region, contributing to its known diversity beyond the Palearctic Region. A distribution map and a revised key to the species of *Asadeteva* are also provided.

Material and methods

The specimens examined in the present study are deposited in the Natural History Museum Vienna, Vienna, Austria (NHMW). Preparations of the genitalia were made



Taxonomy

***Asadeteva* U. Aspöck & H. Aspöck, 1981**

Asadeteva U. Aspöck & H. Aspöck, 1981: 8. Type species: *Asadeteva vartianorum* U. Aspöck & H. Aspöck, 1981: 9 (original designation).

Generic diagnosis. See LI et al. (2020).

Distribution. Afghanistan, India, Laos, Pakistan, Thailand (U. ASPÖCK & H. ASPÖCK 1981, LI et al. 2020).

Revised key to males of the species of *Asadeteva*

- 1 Male gonocoxites 9 in lateral view with distinctly hook-like apex curved dorsolaterally (LI et al. 2020: fig. 7: gx9); male fused gonocoxites 11 bifurcated at base (LI et al. 2020: fig. 7: gx11).....
 *A. acutata* Li, H. Aspöck, U. Aspöck & Liu, 2020

by clearing the apex of the abdomen with KOH for about 10–12 hours. After rinsing the KOH with distilled water, the apex of the abdomen was transferred to glycerin for further examination. Habitus photos were taken by a Canon EOS 500D camera with a Canon EF-S 60mm f/2.8 CANON MACRO LENS and a LEICA DFC 490 microscope (NHMW). The photos of genitalia were taken using a LEICA DFC 490 microscope (NHMW). All the photos, line drawings, as well as the distribution map were processed and arranged with Adobe Photoshop 2021. The terminology of the genitalia generally follows U. ASPÖCK & H. ASPÖCK (2008).

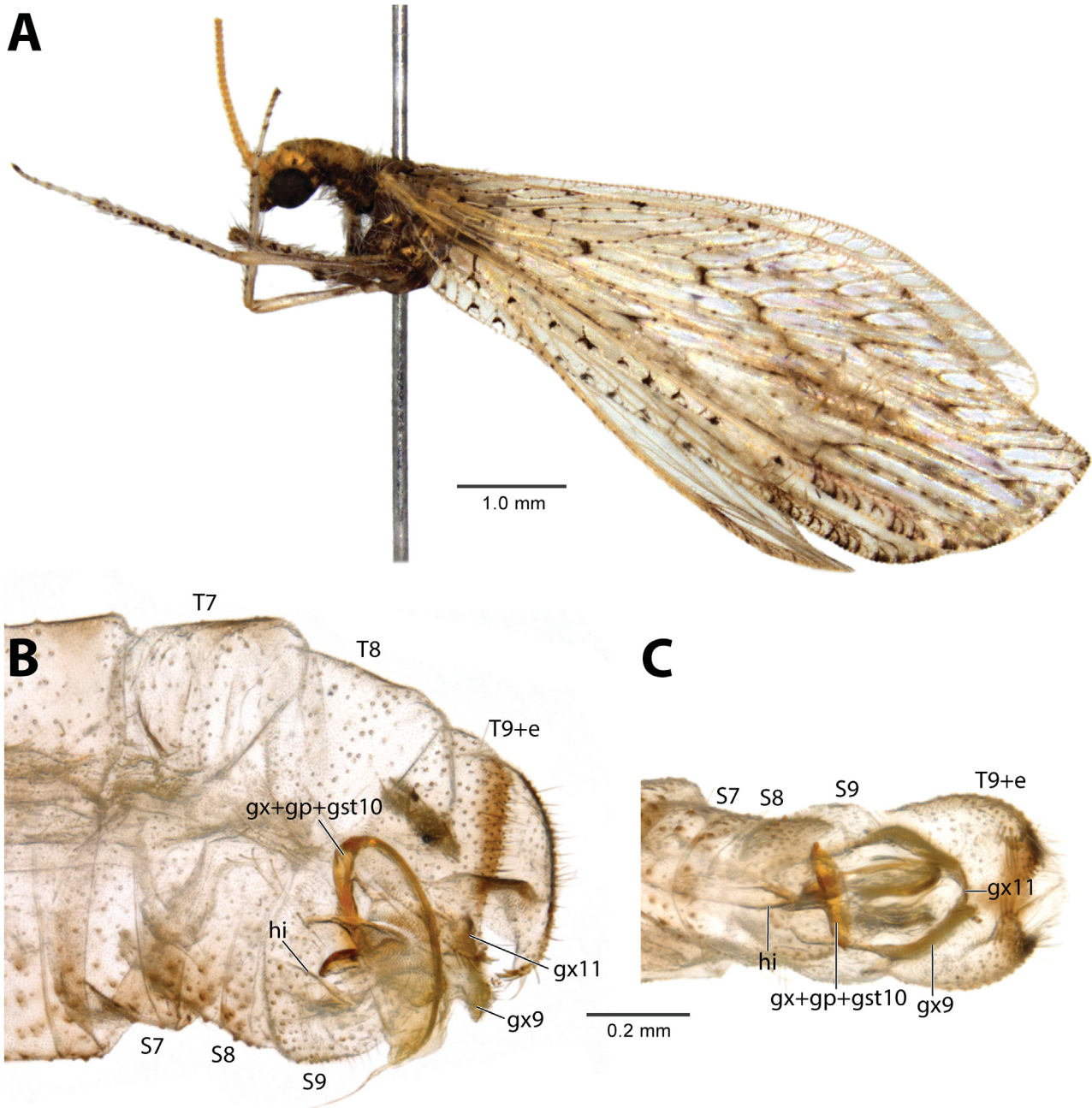


Fig. 1. Holotype of *Asadeteva christophi* U. Aspöck & H. Aspöck, sp. nov., male. A – habitus, lateral view; B – genitalia, lateral view; C – genitalia, ventral view. Abbreviations: e – ectoproct; gx9 – gonocoxites 9; gx+gp+gst10 – complex of fused gonocoxites, gonapophyses and gonostyli 10; gx11 – fused gonocoxites 11 (= gonarcus); hi – hypandrium internum; S7–9 – sternum 7–9; T7–9 – tergum 7–9.

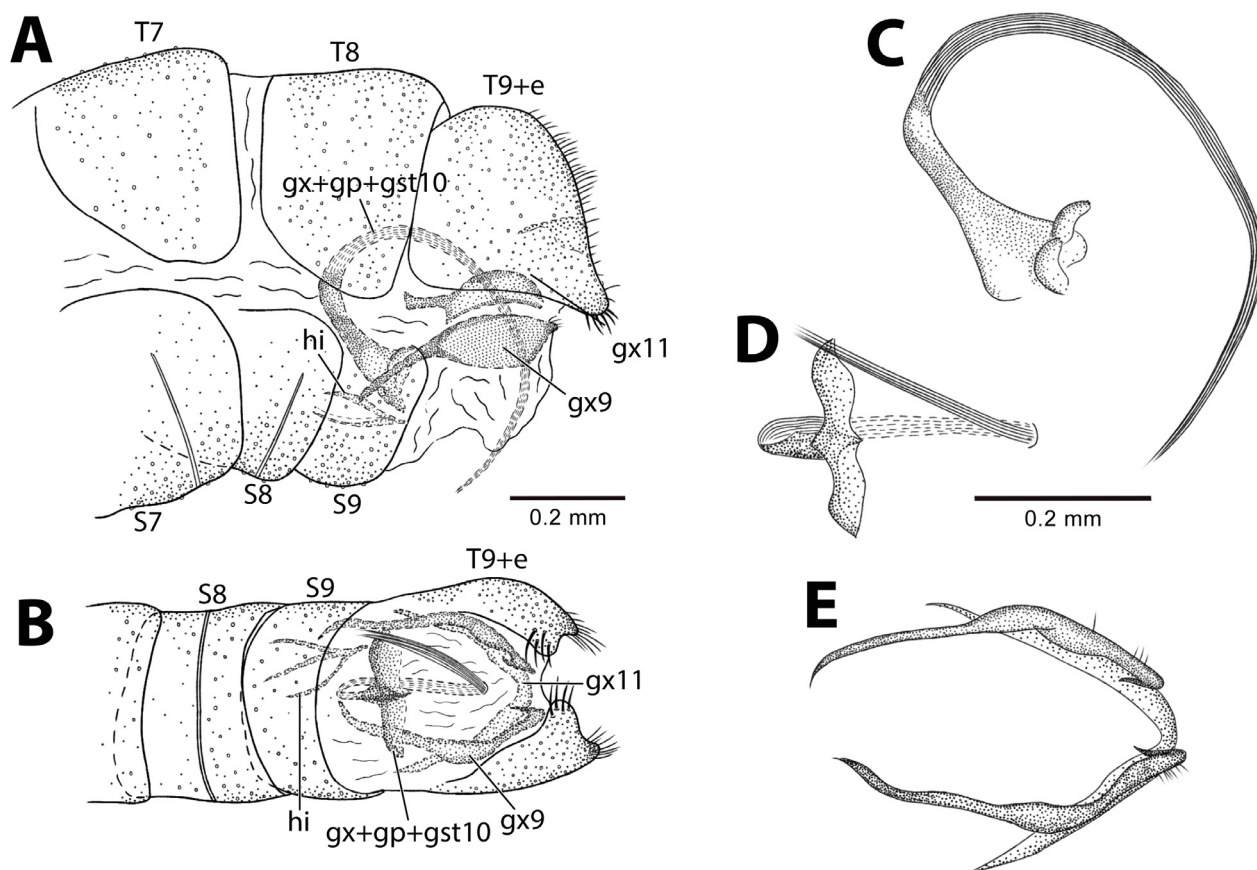


Fig. 2. Representation of male terminalia and genitalia of *Asadeteva christophi* U. Aspöck & H. Aspöck, sp. nov. holotype. A – genitalia, lateral view; B – genitalia, ventral view; C – complex of fused gonocoxites, gonapophyses and gonostyli 10, lateral view; D – complex of fused gonocoxites, gonapophyses and gonostyli 10, ventral view; E – gonocoxites 9 and fused gonocoxites 11, ventral view. Abbreviations: e – ectoproct; gx9 – gonocoxites 9; gx+gp+gst10 – complex of fused gonocoxites, gonapophyses and gonostyli 10; gx11 – fused gonocoxites 11 (= gonarcus); hi – hypandrium internum; S7–9 – sternum 7–9; T7–9 – tergum 7–9.

- Male gonocoxites 9 in lateral view distally arcuate or slightly protruding; male fused gonocoxites 11 with rod-shaped base, not bifurcated. 2
- 2 Male gonocoxites 9 with broad distal plate, the maximum length of which is approximately equal to its maximum width in lateral view. 3
- Male gonocoxites 9 with relatively narrow distal plate, the maximum length of which is approximately twice its maximum width in lateral view. 4
- 3 Forewing broad; hindwing without pigmentation along longitudinal veins (U. ASPÖCK & H. ASPÖCK 1981: fig. 31). *A. afghana* U. Aspöck & H. Aspöck, 1981
- Forewing narrow; hindwing with pigmentation around longitudinal veins (U. ASPÖCK & H. ASPÖCK 1981: fig. 30). *A. vartianorum* U. Aspöck & H. Aspöck, 1981
- 4 Forewing with indistinct pterostigma (Fig. 1A); male gonocoxites 9 with strongly recurved, narrowly hook-like apex in ventral view (Figs 2B, 2E).
..... *A. christophi* U. Aspöck & H. Aspöck, **sp. nov.**
- Forewing with distinct pterostigma, reddish brown in middle (Fig. 3A); male gonocoxites 9 feebly protruding distally in ventral view (Figs 4B, 4D).
..... *A. thailandica* Li, U. Aspöck, H. Aspöck & Liu, **sp. nov.**

Asadeteva christophi U. Aspöck & H. Aspöck, sp. nov.
(Figs 1–2)

Material examined. HOLOTYPE: ♂, T00/18A, Thailand, Province of Mae Hong Son, mountains SE Pai, valley of the Huai Mae Ya, road to Ban Wat Chan, 19°15'31" N / 98°29'01" E, 700 m, 20.IV.2000, H. & U. Aspöck leg. (NHMW).

Diagnosis. The new species is characterized by slightly falcate forewing with indistinct pterostigma, broad shell-shaped male tergum 9 + ectoprocts, male gonocoxites 9 with strongly recurved, narrowly hook-like apex, and male fused gonocoxites 11 (= gonarcus) rod-shaped at base.

Description. Male. Forewing length 7.15 mm, hindwing length 6.46 mm.

Head yellow. Compound eyes blackish brown. Antennae yellow with yellowish setae; scape long and thick, as long as proximal four flagellomeres.

Thorax yellowish brown; pronotum pale brown, with blackish brown spots laterally. Legs yellow, tibiae with dark brown spots ventrally, each tarsomere dark on tip. Forewing with slightly falcate apex, slightly smoky brown, with dark brown markings on branching points of most longitudinal veins; pterostigma not distinct. Longitudinal veins pale yellow, interrupted by many brownish spots; crossveins brown. Hindwing much paler than forewing,

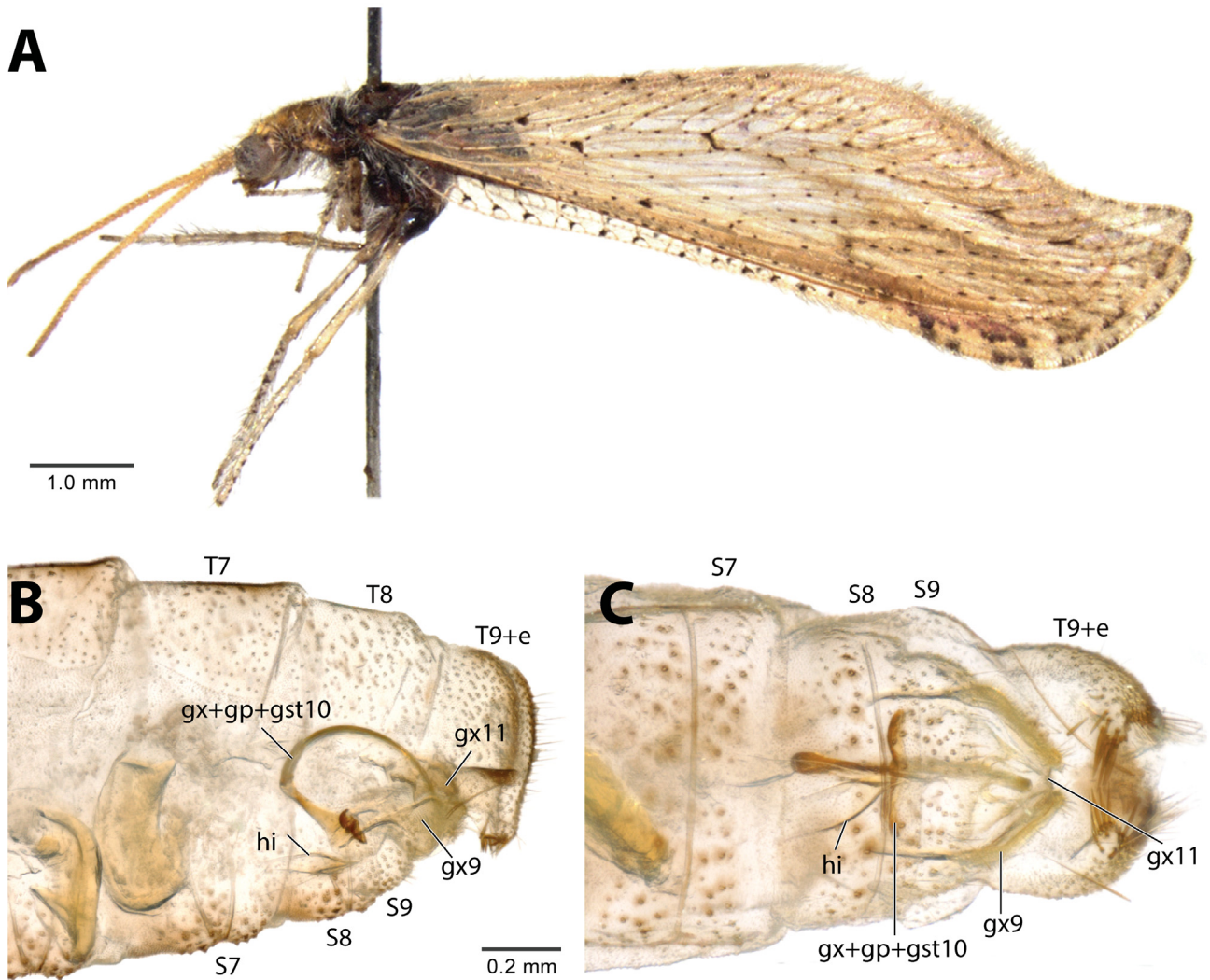


Fig. 3. Holotype of *Asadeteva thailandica* sp. nov., male. A – habitus, lateral view; B – genitalia, lateral view; C – genitalia, ventral view. Abbreviations: e – ectoproct; gx9 – gonocoxites 9; gx+gp+gst10 – complex of fused gonocoxites, gonapophyses and gonostyli 10; gx11 – fused gonocoxites 11 (= gonarcus); hi – hypandrium internum; S7–9 – sternum 7–9; T7–9 – tergum 7–9.

with brown markings on branching points of some longitudinal veins.

Longitudinal veins pale yellow, crossveins brown.

Abdomen brown.

Tergum 9 + ectoprocts in lateral view nearly shell-shaped but tapering posteroventrally into digitiform process, which bears tuft of spinous setae (Figs 1B, 2A). Trichobothria reduced. Sternum 9 shorter than sternum 8 (Figs 1B, 2A). Gonocoxites 9 in lateral view rod-shaped in basal half and expanded as subtriangular plate in distal half, covered densely with short setae, posteriorly slightly protruding (Fig. 2A); in ventral view distal plate slenderly narrowed, distally with strongly recurved, narrowly hook-like apex, which is not visible in lateral view (Figs 1, 2). Complex of fused gonocoxites, gonapophyses and gonostyli 10 with basal sclerite, which extends laterally and posteriorly in middle in ventral view, has pair of broad leaf-like lobes laterally, and short bow formed by bundled bristles that extends anteriorly to segment 8 (Figs 1, 2). Fused gonocoxites 11 (= gonarcus) arched, rod-like at base,

in lateral view posteriorly slightly expanded as slenderly semilunar plate (Figs 1, 2). Hypandrium internum subtriangular (Figs 1, 2).

Differential diagnosis. Among all known species of *Asadeteva*, *A. christophi* sp. nov. can be distinguished from *A. thailandica* sp. nov. by slightly falcate forewing with indistinct pterostigma (Fig. 1A), broad shell-shaped male tergum 9 + ectoprocts, male gonocoxites 9 with strongly recurved, narrowly hook-like apex in ventral view (Figs 2B, 2E). In contrast, in *A. thailandica* sp. nov., the forewing is narrowly falcate with distinctly reddish-brown pterostigma (Fig. 3A), and the male genitalia are characterized by narrowly subquadrate male tergum 9 + ectoprocts and gonocoxites 9 feebly protruding distally (Figs 4A, 4B).

Etymology. The species is cordially and sadly dedicated to our son, Christoph Aspöck (6 March 1965–25 February 2022). He has accompanied us on many expeditions and field trips and has significantly contributed to the success.

Distribution. Thailand (Mae Hong Son).

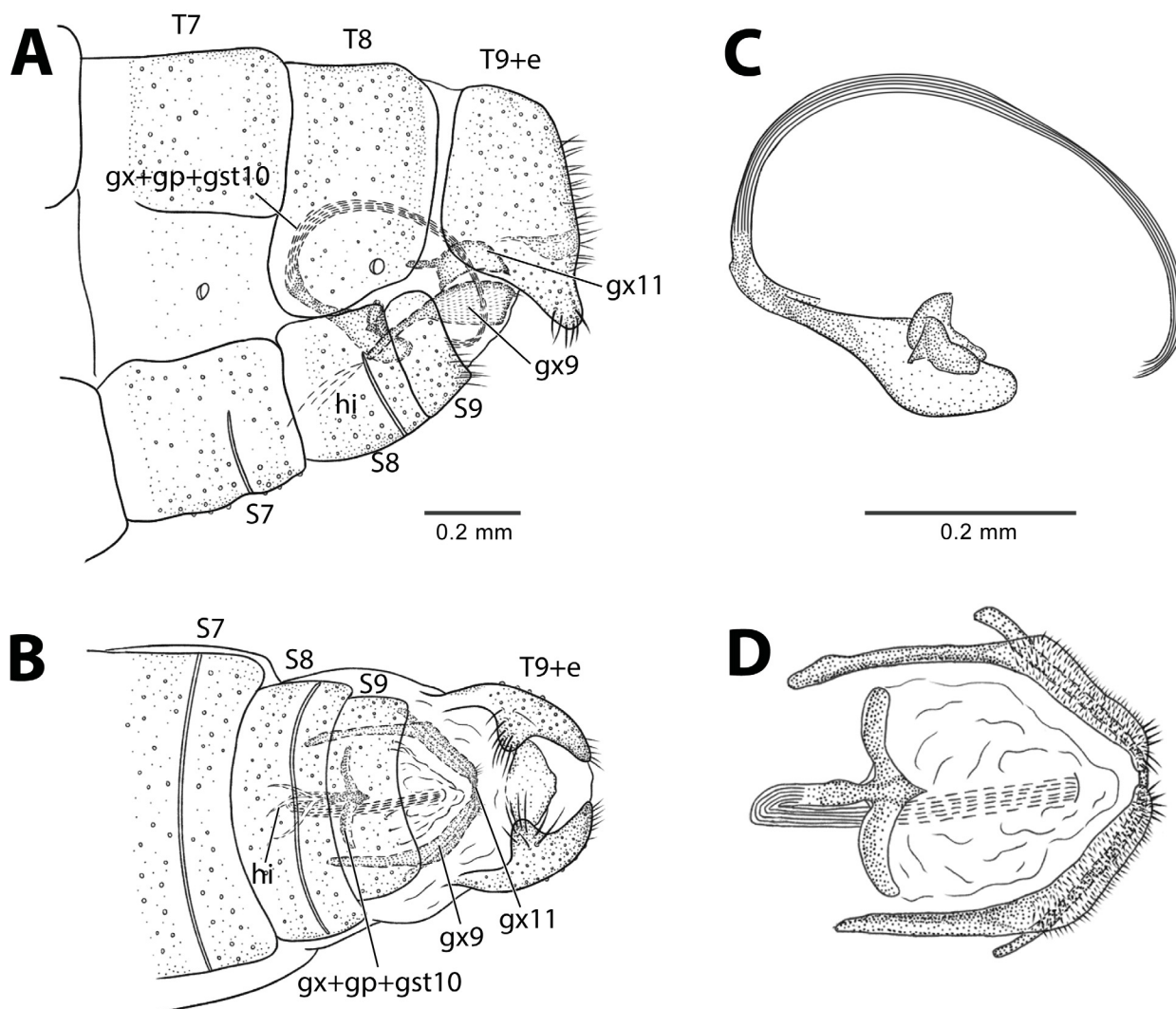


Fig. 4. Representation of male terminalia and genitalia of *Asadeteva thailandica* sp. nov. holotype. A – genitalia, lateral view; B – genitalia, ventral view; C – complex of fused gonocoxites, gonapophyses and gonostyli 10, lateral view; D – gonocoxites 9, complex of fused gonocoxites, gonapophyses and gonostyli 10, and fused gonocoxites 11, ventral view. Abbreviations: e – ectoproct; gx9 – gonocoxites 9; gx+gp+gst10 – complex of fused gonocoxites, gonapophyses and gonostyli 10; gx11 – fused gonocoxites 11 (= gonarcus); hi – hypandrium internum; S7–9 – sternum 7–9; T7–9 – tergum 7–9.

Asadeteva thailandica Li, U. Aspöck, H. Aspöck & Liu, sp. nov.

(Figs 3–4)

Material examined. HOLOTYPE: ♂, T00/18B, Thailand, Province of Mae Hong Son, mountains SE Pai, valley of the Huai Mae Ya, road to Ban Wat Chan, 19°15'31" N / 98°29'01" E, 700 m, 20.IV.2000, H. & U. Aspöck leg. (NHMW).

Diagnosis. The new species is characterized by narrowly falcate forewing with distinct pterostigma which is reddish-brown in middle, narrowly subquadrate male tergum 9 + ectoprocts, male gonocoxites 9 feebly protruding distally, and male fused gonocoxites 11 (= gonarcus) rod-shaped at base.

Description. Male. Forewing length 8.01 mm, hindwing length 7.30 mm.

Head yellow. Compound eyes blackish brown. Antennae yellow with yellowish setae, the distal quarter of the antennal flagellomeres gradually darkened; scape long and thick, as long as proximal four flagellomeres.

Thorax yellow; pronotum pale brown, with blackish brown spots laterally; meso- and metanotum brown. Legs yellow, tibiae with dark brown spots ventrally. Forewing with narrowly falcate apex, slightly pale brown, with dark brown markings on branching points of most longitudinal veins; pterostigma distinct, reddish-brown in middle. Longitudinal veins pale yellow, interrupted by many brownish spots; crossveins brown. Hindwing much paler than forewing, with brown markings on branching points of some longitudinal veins. Longitudinal veins pale yellow, crossveins brown.

Abdomen brown.

Tergum 9 + ectoprocts in lateral view narrowly subquadrate, strongly tapering posteroventrally into digitiform process, which bears tuft of spinous setae (Figs 3B, 4A). Trichobothria reduced. Sternum 9 shorter than sternum 8, slightly concaved posteriad in ventral view (Figs 3C, 4B). Gonocoxites 9 in lateral view rod-shaped in basal half and expanded as subtriangular plate in distal

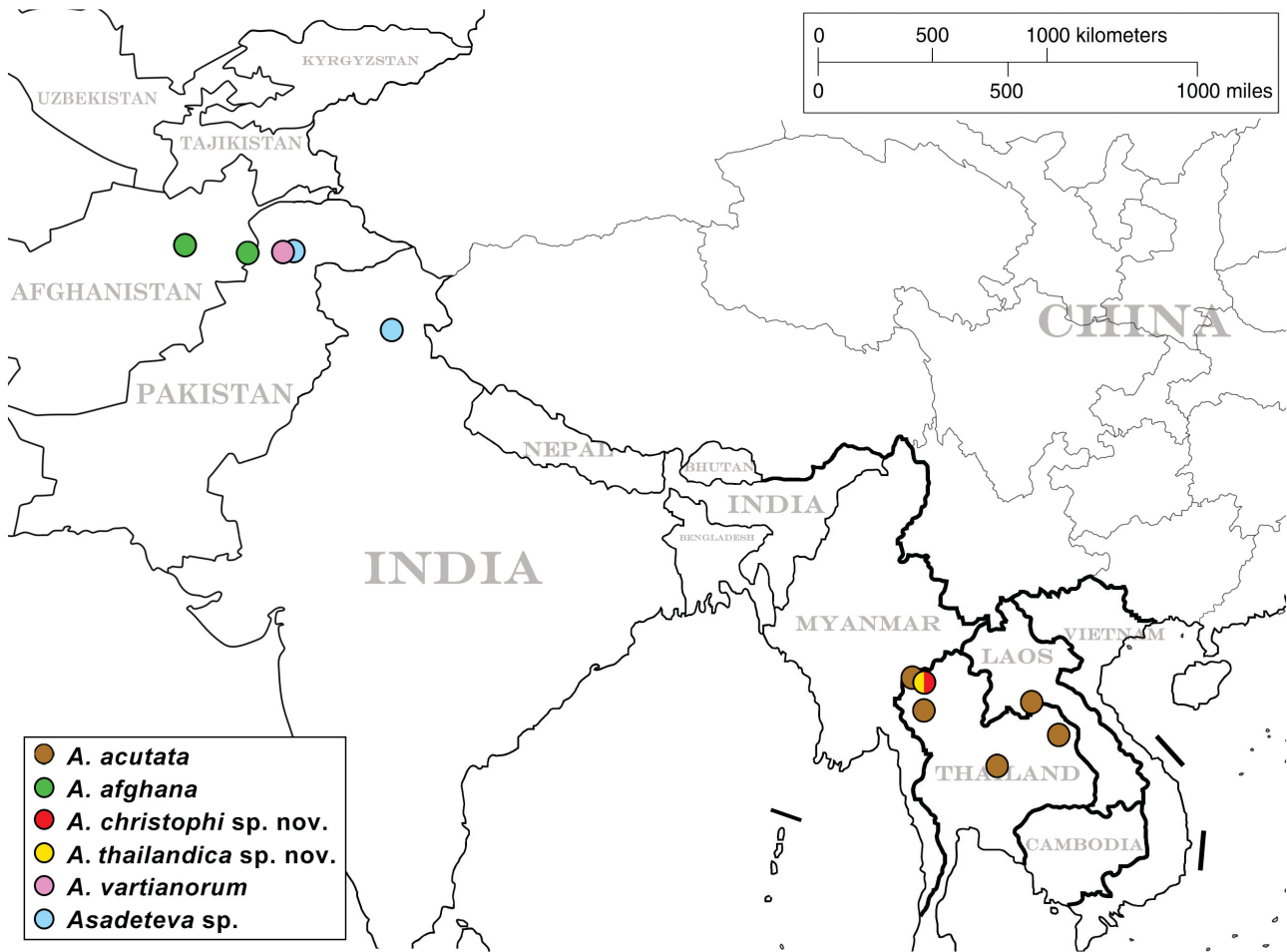


Fig. 5. Distribution map of the species of the genus *Asadeteva*. Distribution information of the undetermined species from northern Pakistan and northwestern India was taken from U. ASPÖCK & RANDOLF (2014).

half, covered densely with short setae, posteriorly slightly protruding; in ventral view distal plate slenderly narrowed, distally with tiny, pointed apex (Figs 3, 4). Complex of fused gonocoxites, gonapophyses and gonostyli 10 with basal sclerite, which extends laterally and posteriorly in middle in ventral view, has pair of broad ovoid lobes laterally, and short bow formed by bundled bristles that extends anteriorly to segment 8 (Figs 3, 4). Fused gonocoxites 11 (= gonarcus) arched, rod-like at base, in lateral view posteriorly slightly expanded as broad semilunar plate (Figs 3, 4). Hypandrium internum subtriangular (Figs 3, 4).

Differential diagnosis. See Differential diagnosis under *A. christophi* U. Aspöck & H. Aspöck, sp. nov.

Etymology. The name of the species, *thailandica*, is an adjective singular feminine and means 'from Thailand'.

Distribution. Thailand (Mae Hong Son).

Discussion

The present findings enrich our understanding of the genus *Asadeteva* in general, particularly in the Oriental Region. Currently, the distribution pattern of *Asadeteva* is disjunct, with one group of species restricted to Central Asia, representing a Palearctic faunal element, and the other group endemic to Indochina, representing an Oriental faunal element (Fig. 5). The occurrence of *Asadeteva*

species in both Palearctic and Oriental Regions suggests significant biogeographical and ecological diversification within the genus. Notably, the Oriental species share some features that can be distinguished from the Palearctic species, such as their smaller size (male forewing length 7.0–8.0 mm compared to more than 10 mm in the Palearctic species) and the shape of male tergum 9 + ectoprocts (strongly tapering posteroventrally into a process in the Oriental species, while slightly protruding in the Palearctic species). Nonetheless, among the five species of *Asadeteva* with described males, the two new species share more similar features with the Palearctic species *A. afghana* and *A. vartianorum*. These shared features include the presence of a longitudinal ridge on sternum 8 (absent in *A. acutata*), the paired gonocoxites 9 curved and converging towards the midline (distinctly curved laterad in *A. acutata*), and the fused gonocoxites 11 with a rod-like base and slightly expanded as a plate in the middle in lateral view (bifurcated at base and rod-like in the middle in *A. acutata*).

The geographic distribution of the Palearctic and Oriental species of *Asadeteva* is primarily separated by the region south of the Himalayas. Other berothid species in the subfamily Berothinae, i.e., *Berotha insolita* Walker, 1860 and *Lekrugeria nepalica* U. Aspöck & H. Aspöck, 1986, were recorded in northeastern India and Nepal, ranging

into the Oriental Region (U. ASPÖCK 1983; U. ASPÖCK & H. ASPÖCK 1986; U. ASPÖCK & RANDOLF 2014). Considering the current disjunct distribution of *Asadeteva*, it is likely that this genus also has a potential distribution in the region south of the Himalayas, which requires further exploration and verification in the future.

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