

Linzer biol. Beitr.	47/2	1179-1190	30.12.2015
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## **A revision of *Trisunius* V. Three new species and additional records, including the first records of the genus from Vietnam (Coleoptera: Staphylinidae: Paederinae)**

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**A b s t r a c t :** Three species of the medonine genus *Trisunius* ASSING, 2011 from North Thailand are described and illustrated: *Trisunius scaphiformis* nov.sp. (Doi Inthanon), *T. conlectus* nov.sp. (Doi Inthanon), and *T. penicillatus* nov.sp. (Doi Pha Hom). Additional records of four species are reported from East Yunnan, Thailand, and Vietnam. The discovery of two species in Vietnam represents the first record of the *Trisunius* from this country. The distribution of the genus as a whole and the individual distributions of three widespread species are mapped. *Trisunius* now includes 22 species.

**K e y w o r d s :** Coleoptera, Staphylinidae, Paederinae, *Trisunius*, Palaearctic region, China, Thailand, Vietnam, taxonomy, new species, new records, distribution maps.

### **Introduction**

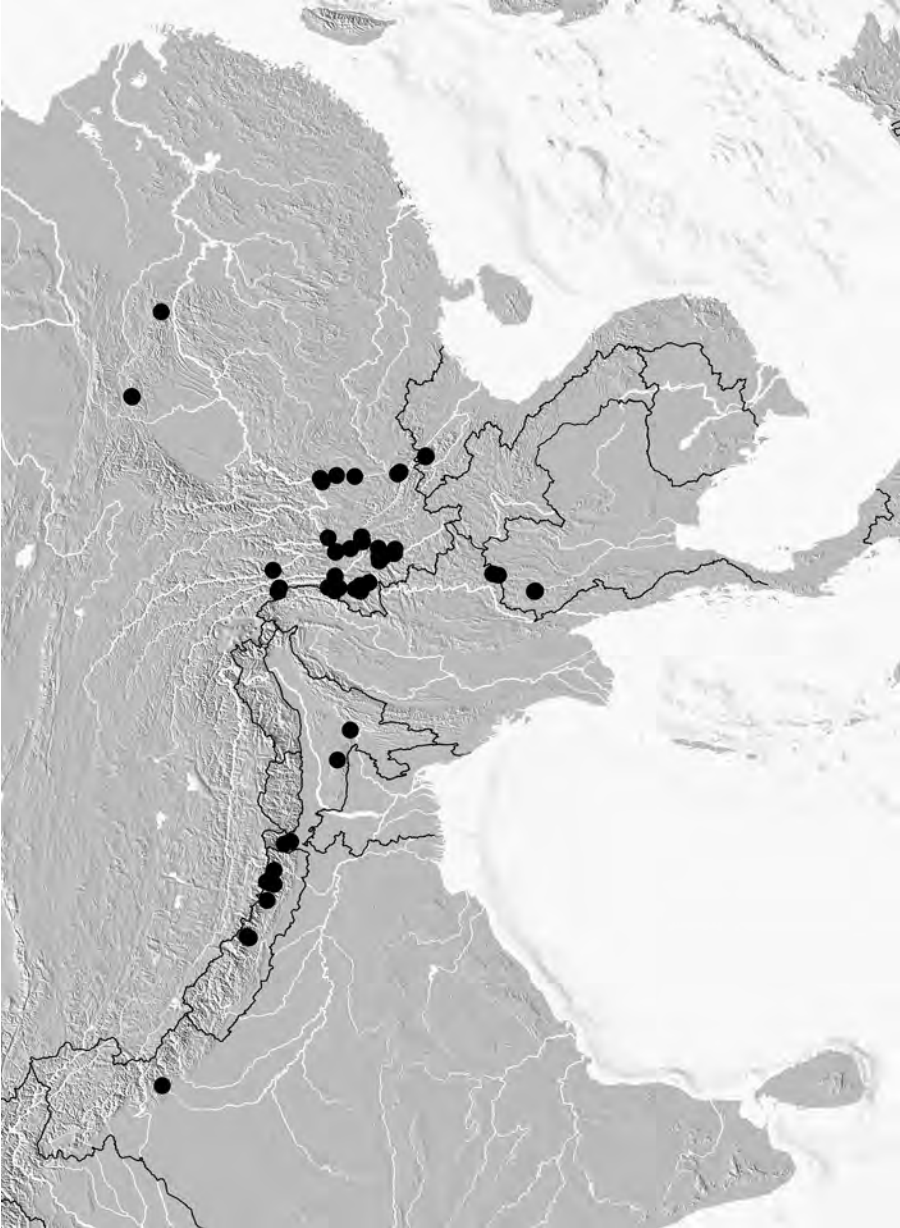
The medonine genus *Trisunius* ASSING, 2011 previously included 19 species distributed in the southern East Palaearctic region sensu SMETANA (2004) from the Himalaya across northeast India to China, with one species also recorded from northern Thailand (ASSING 2011, 2012, 2013, 2014). An updated catalogue was provided by ASSING (2013). Ten species had been recorded from China. Except for two species, their known distributions were confined to Yunnan.

Additional material from eastern Yunnan, Thailand, and Vietnam examined since the previous contribution included three new species from North Thailand and the first records of the genus from Vietnam and East Yunnan.

### **Material and methods**

The material treated in this study is deposited in the following collections:

MNHUB..... Museum für Naturkunde der Humboldt-Universität Berlin (J. Frisch)  
cAss..... author's private collection  
cSch..... private collection Michael Schülke, Berlin  
cWun..... private collection Paul Wunderle, Mönchengladbach



**Map 1:** Distribution of *Trisunius* (all records pooled).

The morphological studies were conducted using a Stem i SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). A digital camera (Nikon Coolpix 995) was used for the photographs. The maps were created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the mandibles (in resting position) to the abdominal apex, the length of the forebody from the anterior margin of the mandibles to the posterior margin of the elytra, head length from the anterior margin of the frons to the posterior margin of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, and the length of the aedeagus from the apex of the ventral process to the base of the aedeagal capsule. The "parameral" side (i.e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect.

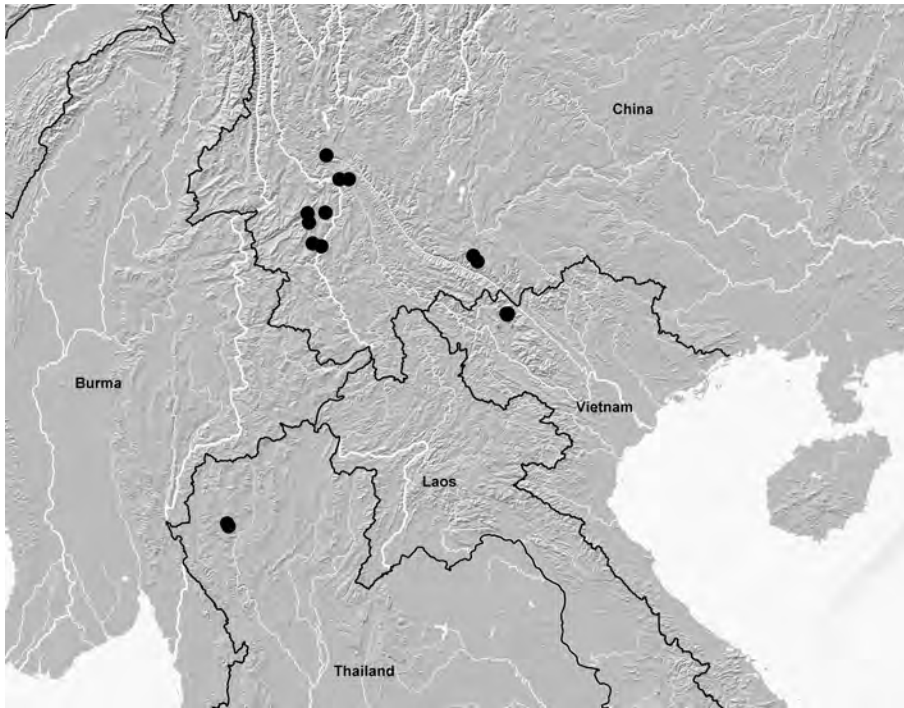
## Results

Including the new species, *Trisunius* now includes 22 species, its distribution ranging from the West Himalaya to North Thailand and North Vietnam (Map 1), from where the genus is recorded for the first time.

### *Trisunius spathulatus* ASSING, 2011 (Map 2)

**Material examined:** China: Yunnan: 8♂♂, 10♀♀, 18 exs [partly teneral], mountain W Gejiu, 23°24'N, 103°07'E, 1990 m, mixed forest, litter and various debris sifted, 23.VIII.2014, leg. Assing & Schülke (cAss, cSch, MNHUB); 2♂♂, 1♀, 1 ex., same data, but 24.VII.2014 (cAss, cSch); 4♂♂, 4♀♀, 3 exs., same data, but 25.VII.2014 (cAss, cSch); 1♂, 3 exs. [partly teneral], mountain SE Gejiu, 23°18'N, 103°12'E, 2400 m, graveyard with pine, pine litter and herb roots sifted, 20.VIII.2014, leg. Schülke (cSch, cAss). Thailand: 4♂♂, 2♀♀, Doi Inthanon, Maeaum, 18°32'N, 98°31'E, 1560 m, along little river in dense vegetation, river bank, litter and debris sifted, 18.XII.2013, leg. Ob (cAss); 1♀, Doi Inthanon, summit, 18°35'N, 98°29'E, 2530 m, leaf litter sifted, 11.XII.2013, leg. Ob (cAss). Vietnam: 8♂♂, 9♀♀, 7 km NW Sa Pa, 22°22'N, 103°47'E, 1840 m, steep moist stream valley with bushes and trees, litter and roots of herbs sifted, 30.VII.2013, leg. Assing & Wunderle (cAss, cWun, MNHUB); 16♂♂, 17♀♀, same data, but 1.VIII.2013, leg. Assing (cAss, MNHUB); 1♂, pass 8 km WNW Sa Pa, 22°21'N, 103°46'E, 2010 m, secondary deciduous forest with bamboo, forest margin with bushes, litter, moss, and roots sifted, 5.VIII.2013, leg. Assing (cAss); 1♂, 1♀, same data, but 6.VIII.2013, leg. Wunderle (cWun); 1♂, 2♀♀, same data, but 12.VIII.2013, leg. Assing (cAss, MNHUB); 1♀, same data, but 14.VIII.2013 (MNHUB); 31♂♂, 25♀♀, 6 km NW Sa Pa, 22°22'N, 103°47'E, 1810 m, margin of pasture with bushes and small trees, litter and roots sifted, 7.VIII.2013, leg. Assing & Wunderle (cAss, cWun, MNHUB); 14♂♂, 11♀♀, 10 km NW Sa Pa, 22°22'N, 103°45'E, 1850 m, moist stream valley with deciduous trees, litter and roots between rocks sifted, 8.VIII.2013, leg. Assing & Wunderle (cAss, cWun, MNHUB); 42♂♂, 31♀♀, pass 8 km NW Sa Pa, 22°21'N, 103°46'E, 2030 m, margin of secondary deciduous forest with bushes, bamboo, and herbs, litter, roots, and moss sifted, 9.VIII.2013, leg. Assing & Wunderle (cAss, cWun, MNHUB); 12♂♂, 12♀♀, same data, but 10.VIII.2013 (cAss, cWun, MNHUB).

**Comment:** The previously known distribution of *T. spathulatus* was confined to southwestern Yunnan (ASSING 2013). The above material represents the first records from southeastern Yunnan, Thailand, and Vietnam (Map 2). The males from Thailand and Vietnam differ from the type material in that the apex of the ventral process of the aedeagus is only weakly dilated. However, since the aedeagal, the males secondary sexual, and the external characters are otherwise identical and since the males from East Yunnan are somewhat intermediate in this respect, the observed differences are attributed to clinal variation. The species is wing-dimorphic, the macropterous morph having fully developed hind wings and the brachypterous morph having wings of reduced length (approximately twice as long as the elytra). The presence of a macropterous morph explains the rather extensive distribution of *T. spathulatus*. Some of the specimens from Vietnam are teneral.

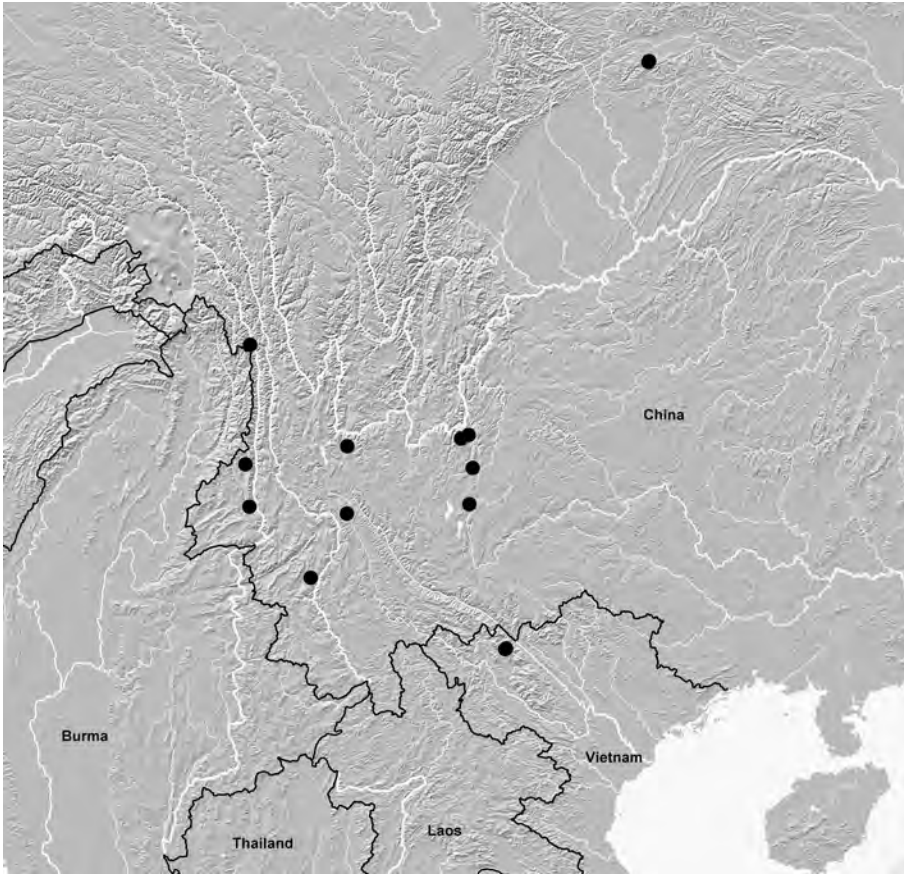


**Map 2:** Distribution of *Trisunius spathulatus*.

***Trisunius cultellatus* ASSING, 2011 (Map 3)**

**Material examined:** China: Yunnan: 1♂, 1♀, mountains NW Dongchuan, 26°10'N, 103°04'E, 2350 m, trail margin, litter and soil between herbs sifted, 8.VIII.2014, leg. Assing (cAss); 2♂♂, 2♀♀, 3 exs., E Kunming, Xiaobailong Forest Park, 24°56'N, 103°05'E, 2110 m, secondary pine forest, pine litter and litter at trail margin sifted, 10.VIII.2014, leg. Assing & Schülke (cAss, cSch); 1♂, mountains W Dongchuan, Sedan Snow Mountain Scenic Resort, 26°06'N, 102°55'E, 2620 m, secondary pine forest, litter, moss, and roots of herbs sifted, 14.VIII.2014, leg. Assing (cAss); 1♀, mountain W Xundian, 25°35' N, 103°09'E, 2200 m, mixed forest with alder and pine, bark of rotting pine trunk with termites sifted, 15.VIII.2014, leg. Assing (cAss). Vietnam: 1♂, 7 km NW Sa Pa, 22°22'N, 103°47'E, 1840 m, steep moist stream valley with bushes and trees, litter and roots of herbs sifted, 30.VII.2013, leg. Wunderle (cAss); 1♂, pass 8 km WNW Sa Pa, 22°21'N, 103°46'E, 2010 m, secondary deciduous forest with bamboo, forest margin with bushes, litter, moss, and roots sifted, 5.VIII.2013, leg. Assing (cAss); 1♀, same data, but 6.VIII.2013 (cWun); 3♂♂, 5♀♀, pass 8 km NW Sa Pa, 22°21'N, 103°46'E, 2030 m, margin of secondary deciduous forest with bushes, bamboo, and herbs, litter, roots, and moss sifted, 9.VIII.2013, leg. Assing & Wunderle (cAss, cWun); 1♀, same data, but 10.VIII.2013, leg. Assing (cAss).

**Comment:** This wing-dimorphic species is the most widespread representative of the genus in China, where it has been recorded from numerous localities in Yunnan and Shaanxi (ASSING 2011, 2013, 2014). The above material represents the first records from eastern Yunnan and Vietnam (Map 3). All the examined specimens from Vietnam are micropterous.

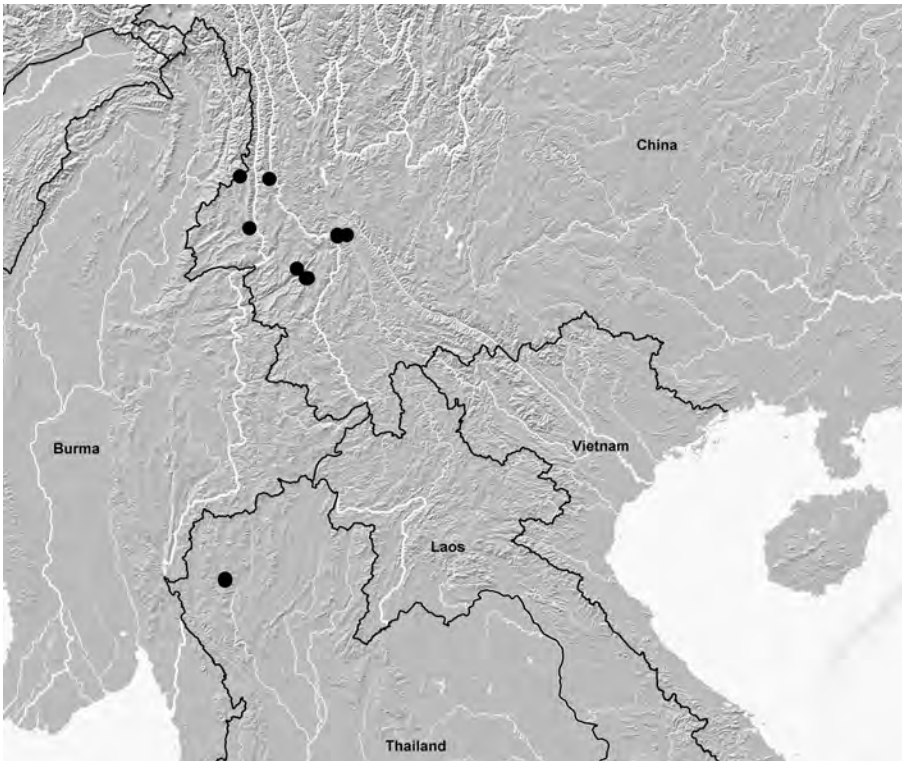


**Map 3:** Distribution of *Trisunius cultellatus*.

***Trisunius iaculatus* ASSING, 2011 (Map 4)**

**Material examined:** Thailand: 2♂♂, Doi Inthanon, Kew Mae Pan, 18°33'N, 98°29'E, 2100 m, along stream, leaf litter sifted, 19.XII.2013, leg. Ob (cAss); 1♀, Doi Inthanon, summit (Ang Ka), 18°35'N, 98°29'E, 2555 m, peat bog, in reeds, 10. XII.2013, leg. Ob (cAss); 1♂, Doi Inthanon, summit, 18°35'N, 98°29'E, 2530 m, along stream bank, 11.XII.2013, leg. Ob (cAss); 2♂♂, 2♀♀, Doi Inthanon, summit, 18°35'N, 98°29'E, 2530 m, leaf litter sifted, 11.XII.2013, leg. Ob (cAss); 1♀, Doi Inthanon, 18°35'N, 98°29'E, 2440 m, peat bog, litter in swampy area, 14.I.2014, leg. Ob (cAss); 1♀, Doi Inthanon, Kew Mae Pan Waterfall, 18°33'N, 98°29'E, 2190 m, litter sifted, 15.I.2014, leg. Ob (cAss).

**Comment:** The previously known distribution of *T. iaculatus* was confined to West Yunnan (ASSING 2013). The above specimens represent the first records from Thailand (Map 4).



**Map 4:** Distribution of *Trisunius iaculatus*.

***Trisunius thaicus* ASSING, 2011**

**Material examined:** Thailand: 1♂, Doi Pha Hom Pok, Tad Luang waterfall, 19°52'N, 99°07'E, 1100 m, on rocks in stream, 27.I.2014, leg. Ob (cAss).

**Comment:** The above male represents the first record of this species since the original description (ASSING 2011). The previously known distribution was confined to Doi Inthanon.

***Trisunius scaphiformis* nov.sp.** (Figs 1-6)

**Type material:** Holotype ♂: "THAILAND [1] - Doi Inthanon, Maeaum, 18°32' N, 98°31'E, 1560 m, sifted near stream, 18.XII.2013, leg. Ob / Holotypus ♂ *Trisunius scaphiformis* sp.n. det. V. Assing 2015" (cAss).

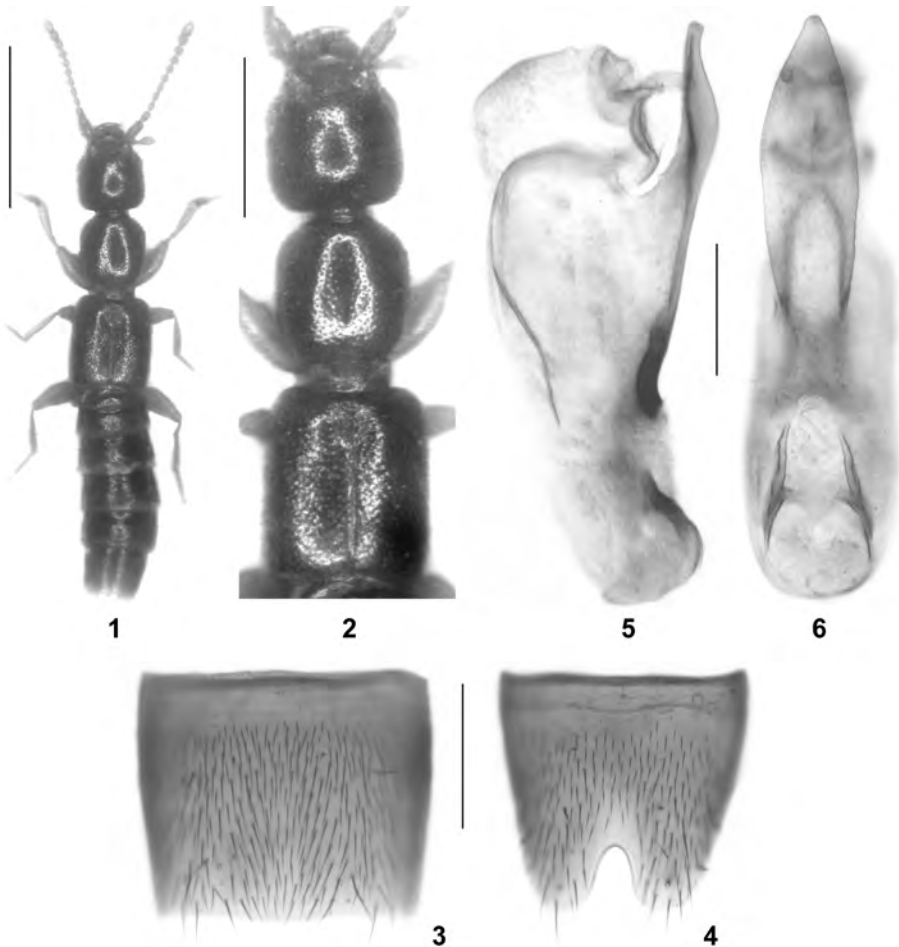
**Etymology:** The specific epithet (Latin, adjective, from scapha = boat) alludes to the shape of the ventral process of the aedeagus in ventral view, which somewhat resembles the outline of a boat.

**Description:** Body length 3.1 mm; length of forebody 1.7 mm. Habitus as in Fig. 1. Coloration: head and pronotum brown; elytra dark-brown with the humeral and posterior portion diffusely paler; abdomen dark-brown; legs pale yellowish-brown; antennae reddish.

Head (Fig. 2) 1.05 times as long as broad; lateral margins behind eyes subparallel in dorsal view; punctuation fine and dense; interstices with distinct microreticulation. Eyes weakly protruding from lateral contours of head approximately 0.7 times as long as postocular region in dorsal view. Antenna 0.9 mm long.

Pronotum (Fig. 2) 1.07 times as long as broad and approximately as broad as head; lateral margins weakly converging posteriorly in dorsal view; punctuation fine and dense, somewhat more distinct than that of head; midline very narrowly impunctate; interstices with shallow microsculpture.

Elytra (Fig. 2) long, 1.07 times as long as pronotum; punctuation fine and dense; interstices without microsculpture. Metatarsomere I approximately as long as II.



**Figs 1-6:** *Trisunius scaphiformis* nov.sp.: (1) habitus; (2) forebody; (3) male sternite VII; (4) male sternite VIII; (5-6) aedeagus in lateral and in ventral view. Scale bars: 1: 1.0 mm; 2: 0.5 mm; 3-4: 0.2 mm; 5-6: 0.1 mm.

Abdomen slightly narrower than elytra; punctation very fine and very dense; interstices with distinct microreticulation; posterior margin of tergite VII with palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 3) moderately transverse, pubescence not distinctly modified, posterior margin weakly convex in the middle; sternite VIII (Fig. 4) weakly transverse, posterior excision nearly 0.3 times as deep as length of sternite; aedeagus (Figs 5-6) 0.45 mm long; ventral process slender, lateral margins somewhat folded ventrad subapically.

**Comparative notes:** This species is characterized particularly by the distinctive shape of the ventral process of the aedeagus. It is additionally separated from the syntopic *T. spathulatus* by the longer and weakly bicoloured elytra, by the unmodified pubescence of the male sternite VII, and by the less deep and differently shaped posterior excision of the male sternite VIII. For illustrations of *T. spathulatus* and other *Trisunius* species see ASSING (2011, 2012, 2013, 2014).

**Distribution and natural history:** The type locality is situated in Doi Inthanon, North Thailand. The holotype was sifted from leaf litter and debris near a stream at an altitude of 1560 m, together with *T. spathulatus* and *T. conlectus* (see the following section).

***Trisunius conlectus* nov.sp. (Figs 7-12)**

**Type material:** Holotype ♂: "THAILAND [1] - Doi Inthanon, Maeaum, 18°32' N, 98°31'E, 1560 m, sifted near stream, 18.XII.2013, leg. Ob / Holotypus ♂ *Trisunius conlectus* sp. n. det. V. Assing 2015" (cAss).

**Etymology:** The specific epithet (Latin, adjective: narrow) alludes to the conspicuously slender ventral process of the aedeagus, particularly in ventral view.

**Description:** Body length 3.1 mm; length of forebody 1.7 mm. External characters (Figs 7-8) as in *T. scaphiformis*, except as follows:

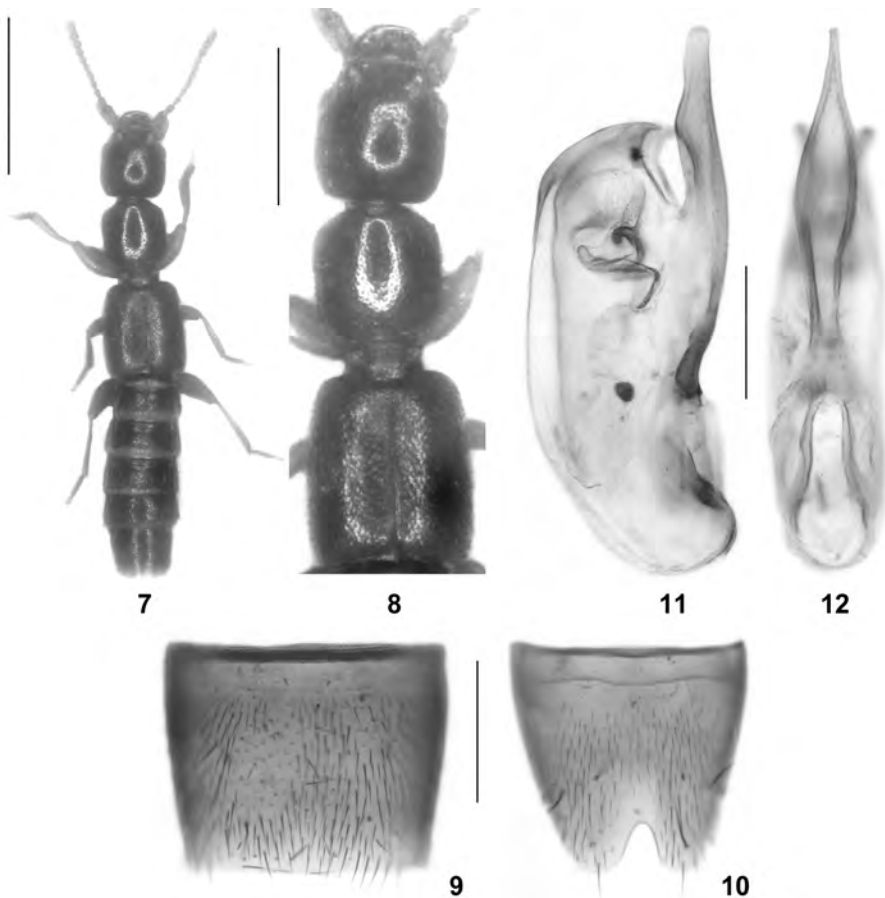
Head (Fig. 8) more oblong, approximately 1.1 times as long as broad. Pronotum with extremely shallow, nearly obsolete microreticulation visible only at high magnification (100x) and with fine median furrow posteriorly. Posterior margin of tergite VIII weakly convex.

♂: sternite VII (Fig. 9) moderately transverse, pubescence not distinctly modified, posterior margin truncate; sternite VIII (Fig. 10) weakly transverse, posterior excision only 0.22 times as deep as length of sternite; aedeagus (Figs 11-12) 0.42 mm long; ventral process very slender and apically acute, both in lateral and in ventral view.

**Comparative notes:** This species is characterized particularly by the distinctive shape of the ventral process of the aedeagus. It is additionally separated from the syntopic *T. scaphiformis* by the external characters indicated above, the shape of the male sternite VII, and the smaller posterior excision of the male sternite VIII. For illustrations of the male sexual characters of other *Trisunius* species see ASSING (2011, 2012, 2013, 2014).

**Distribution and natural history:** The type locality and the circumstances of collection are identical to those of *T. scaphiformis*.





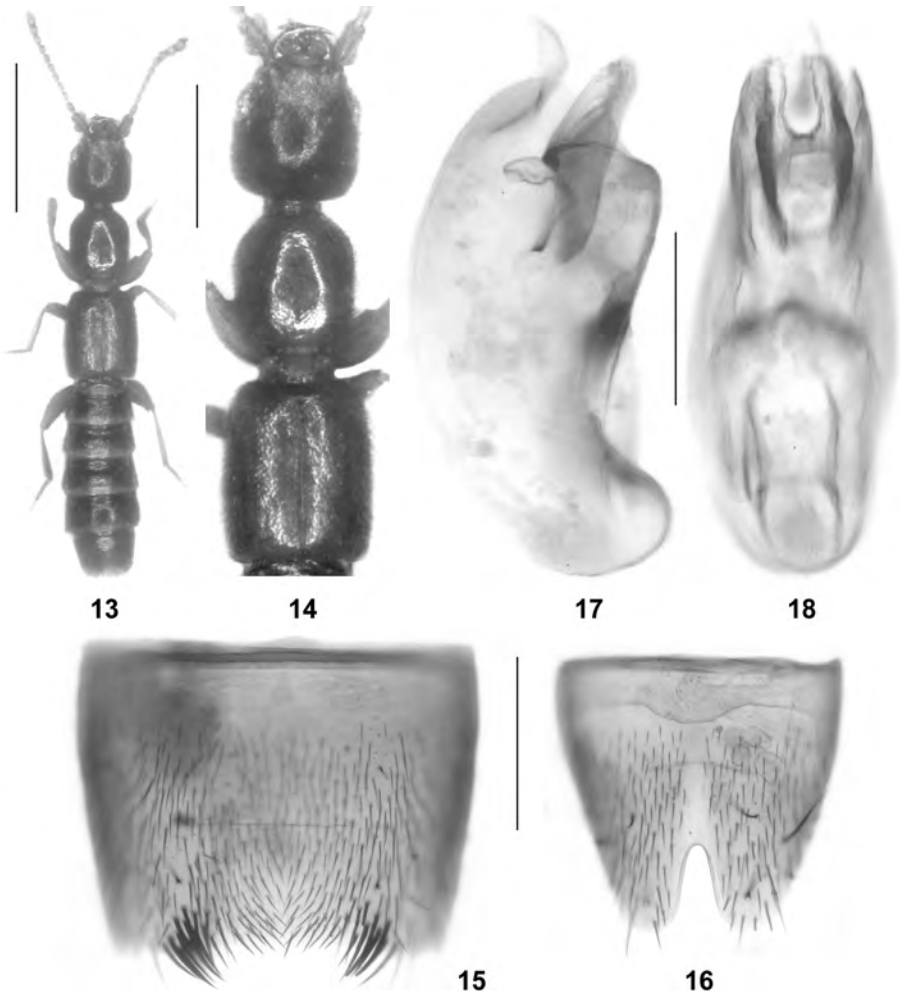
**Figs 7-12:** *Trisunius conlectus* nov.sp.: (7) habitus; (8) forebody; (9) male sternite VII; (10) male sternite VIII; (11-12) aedeagus in lateral and in ventral view. Scale bars: 7: 1.0 mm; 8: 0.5 mm; 9-10: 0.2 mm; 11-12: 0.1 mm.

***Trisunius penicillatus* nov.sp. (Figs 13-18)**

**Type material:** Holotype ♂: "THAILAND [58] - Doi Pha Hom, Huay Nam Saw, 20°04'N, 99°11'E, 1530 m, along stream, 23.I.2014, leg. Ob / Holotypus ♂ *Trisunius penicillatus* sp. n. det. V. Assing 2015" (cAss).

**Etymology:** The specific epithet is an adjective derived from the Latin noun *penicillum* (brush) and alludes to the conspicuous pair of clusters of black setae at the posterior margin of the male sternite VII.

**Description:** Body length 3.3 mm; length of forebody 1.8 mm. Habitus as in Fig. 13. Coloration: head dark-brown; pronotum brown; elytra dark-brown, with the posterior and postero-sutural portion extensively and diffusely paler; abdomen dark-brown; legs pale yellowish-brown; antennae reddish.



**Figs 13-18:** *Trisunius penicillatus* nov.sp.: (13) habitus; (14) forebody; (15) male sternite VII; (16) male sternite VIII; (17-18) aedeagus in lateral and in ventral view. Scale bars: 13: 1.0 mm; 14: 0.5 mm; 15-16: 0.2 mm; 17-18: 0.1 mm.

Head (Fig. 14) approximately 1.05 times as long as broad; lateral margins behind eyes subparallel in dorsal view; punctation extremely fine and dense; interstices with pronounced microreticulation, particularly on frons, rendering the surface matt or nearly so. Eyes weakly protruding from lateral contours of head approximately 0.6 times as long as postocular region in dorsal view. Antenna 0.95 mm long.

Pronotum (Fig. 14) 1.17 times as long as broad and 0.9 times as broad as head; lateral margins distinctly converging posteriad in dorsal view; posteriorly with a fine median furrow; punctation very fine and dense, but slightly more distinct than that of head; impunctate midline indistinct; interstices without microsculpture and glossy.

Elytra (Fig. 14) slightly longer than pronotum; punctation very fine and dense; interstices without microsculpture. Metatarsomere I approximately as long as II.

Abdomen approximately as broad as elytra; punctation very fine and very dense; interstices with distinct microreticulation; posterior margin of tergite VII with palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternite VII (Fig. 15) distinctly transverse, with extensive, but not very deep postero-median impression, this impression with dense and rather long black pubescence in posterior portion, posterior margin with broad and very shallow posterior excision, on either side with a conspicuous dense cluster of long and stout black setae; sternite VIII (Fig. 16) weakly transverse, without pubescence in postero-median portion, posterior excision narrow and approximately 0.3 times as deep as length of sternite; aedeagus (Figs 17-18) small and compact, 0.25 mm long (0.32 mm including apical internal structures); ventral process short and apically truncate in ventral view; apical internal structures somewhat shaped like an "H" in ventral view.

**Comparative notes:** This species is characterized particularly by the distinctive shape and chaetotaxy of the male sternite VII and by the morphology of the aedeagus. Based on the similarly derived general morphology of the aedeagus (small size, very short and broad ventral process, internal sac with conspicuous apical structures, *T. penicillatus* is closely allied to *T. truncatus* ASSING, 2011 (China: western Yunnan), from which it differs by the more slender pronotum, the conspicuous modifications of the male sternite VII, and by the narrower posterior excision of the male sternite VIII. For illustrations of *T. truncatus* and other *Trisunius* species see ASSING (2011, 2012, 2013, 2014).

**Distribution and natural history:** The type locality is situated in Doi Pha Hom in the extreme north of Thailand, very close to the border with Burma. The holotype was sifted from leaf litter along a stream at an altitude of 1530 m.

### Acknowledgements

I am indebted to the colleagues indicated in the material section for making their material available for study, as well as to Oliver Betz, Tübingen, for very helpful contributions. Benedikt Feldmann (Münster) proof-read the manuscript.

### Zusammenfassung

Drei Arten der Gattung *Trisunius* ASSING, 2011 aus dem nördlichen Thailand werden beschrieben und abgebildet: *Trisunius scaphiformis* nov.sp. (Doi Inthanon), *T. conlectus* nov.sp. (Doi Inthanon) und *T. penicillatus* nov.sp. (Doi Pha Hom). Weitere Nachweise von vier Arten werden aus Ost-Yunnan, Thailand und Nordvietnam gemeldet. *Trisunius* war bisher aus Vietnam unbekannt. Die Gesamtverbreitung der Gattung sowie die Verbreitungsgebiete von drei weit verbreiteten Arten werden anhand von Karten illustriert. *Trisunius* enthält derzeit 22 Arten.

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