Five new species of the genus *Carpelimus* Leach, 1819, from the Oriental region (Coleoptera: Staphylinidae: Oxypelini)

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ABSTRACT: Five new species of the genus *Carpelimus* are described from the Oriental biogeographic region: *Carpelimus* (Trogophloeus) *asperus*, sp.n. from South China, *Carpelimus* (Trogophloeus) *fuligus*, sp.n. from North India, *Carpelimus* (Trogophloeus) *geminus*, sp.n. from Nepal, *Carpelimus* (Trogophloeus) *guillaumei*, sp.n. from South China and Thailand, and *Carpelimus* (Bucephalinus) *rubrus*, sp.n. from North India and Nepal.

**Introduction**

The members of the genus *Carpelimus* Leach, 1819 are abundant on the shores of various water bodies. The *Carpelimus* fauna of the Palaearctic and tropical Africa has now been generally well-studied [Gildenkov, 2001a, b; 2002; 2003a, b; 2007a, b; 2011a, b; 2012; 2013a, b, d; 2015 b; 2016a, b; 2017]. In contrast, the fauna of the Oriental biogeographic region remains largely unexplored, although much work has already been done [Gildenkov, 2013c, d, e; 2014a, b, c, d; 2015a, b; 2016b]. For instance, one of the taxonomically most challenging is the «taprobanae» species group, whose members can often be clearly distinguished only by the morphology of the aedeagus.

This paper is based on the specimens deposited in the following collections: BNHM — Natural History Museum (London, Great Britain); cGR — private collection of Guillaume de Rougemont (Oxford, Great Britain); cMG — private collection of M. Gildenkov (Smolensk, Russia); cMSch — private collection of Michael Schülke (Berlin, Germany); FMNH — Field Museum of Natural History (Chicago, USA); NHMW — Naturhistorisches Museum Wien (Austria); ZFMK — Naturkundemuseum Erfurt (Germany); ZFMK — Zoologisches Forschungsinstitut und Museum Alexander Koenig (Bonn, Germany).

In the present study, standard methods were used for the taxonomic research of insects; the preparations were made on an MBS-10 binocular microscope. The genital preparations were processed using 10% KOH and then fixed in euparal. In the descriptions and diagnoses, the following standard units were used for the length-to-width ratio of the head, pronotum, and elytra: 7 standard units = 0.1 mm; thus, 1 standard unit is about 0.0143 mm. Photographs were taken with a Canon EOS 5D Mark III camera and a Canon MP-E 65 mm objective using the extended focus technology.

**Carpelimus (Trogophloeus) asperus**

Gildenkov, sp.n.

Figs. 1, 5–7.


DESCRIPTION (holotype). Length 2.0 mm. Colouration brown. Head and pronotum dark brown, abdomen black-brown, elytra reddish brown; legs and antennae yellowish brown, antennal segments 1 and 9–11 much paler than others. Integument slightly shining, body with short light-coloured hairs.

Head transverse, with wide base, ratio of head length (from neck mid-length to anterior margin of clypeus) to its maximum width about 20:26. Neck constriction prominent. Eyes small, slightly convex. Temples well-developed, round, eye diameter in dorsal view slightly smaller than temple length. Head widest across temples (Fig. 1). Head surface densely shagreened. Antennae short, antennal segments 1–3 elongate; segments 4–6 slightly transverse; segments 7–10 transverse; segment 11 elongate, conical. Last 3 segments more massive than others and form loose club (Fig. 1).

Pronotum widest about 2/3 its length from base, then narrowed. Lateral margin with small notch near base (Fig. 1).

Figs 1–2. Carpelimus spp., holotypes, males, dorsal view: 1 — Carpelimus (Trogophloeus) asperus, sp.n.; 2 — Carpelimus (Trogophloeus) fuligus, sp.n.

Рис. 1–2. Carpelimus spp., глотипы, самцы, сверху: 1 — Carpelimus (Trogophloeus) asperus, sp.n.; 2 — Carpelimus (Trogophloeus) fuligus, sp.n.
Ratio of pronotum length to its maximum width about 20:30. Surface of pronotum densely shagreened, similarly to head surface. Base of pronotal disc with shallow, symmetrical, round depressions. Central part of disc with almost indistinct symmetrical, round depressions (Fig. 1).

Ratio of length of elytra to their combined width about 31:36. Scutellum with shallow round depressions (Fig. 1). Elytra with rather distinct, fine and dense punctuation. Diameter of punctures about equal to that of eye facet. Distances between punctures significantly smaller than diameter puncture, interspaces smooth, slightly shining.

Abdomen delicately shagreened.

Aedeagus of characteristic structure (Figs 5–6).

Female. Sexual dimorphism absent, female morphologically similar to male. Spermatheca of characteristic structure (Fig. 7).

COMPARATIVE REMARKS. The new species belongs to the “taprobanae” species group. In this group, the new species is most similar in size and densely shagreened surface of the head and pronotum to a closely related species, Carpelimus (Trogophloeus) flavomustachus Gildenkov, 2013. The new species differs markedly by its shorter elytra and can be clearly distinguished by the structure of the aedeagus. The new species differs markedly by its shorter elytra and can be clearly distinguished by the structure of the aedeagus.

DESCRIPTION (holotype). Length 2.0 mm. Colouration black, legs and antennae black-brown. Integument slightly shining, body with short light-coloured hairs.

Head transverse, with wide base, ratio of head length (from neck mid-length to anterior margin of clypeus) to its maximum width about 21:30. Neck constriction prominent. Eyes rather large, slightly convex. Temples well-developed, round, eye diameter in dorsal view about twice as long as temple length. Head widest across eyes (Fig. 2). Head surface with delicate, fine and dense punctuation. Diameter of punctures about 3 times as small as eye facet. Distances between punctures slightly smaller than their diameter, interspaces smooth, slightly shining. Antennae rather long, antennal segments 1–7 elongate; segments 8–10 about as long as wide; segment 11 elongate, conical. Last 3 segments more massive than others and form loose club (Fig. 2).

Pronotum widest about 2/3 its length from base, then narrowed. Lateral margin smoothly rounded (Fig. 2). Ratio of pronotum length to its maximum width about 23:28. Surface of pronotum with delicate, distinct, fine, and dense punctuation, distances between punctures smaller than their diameter, interspaces smooth, slightly shining. Punctuation similar to that on head. Base of pronotal disc with prominent, symmetrical, widely crescent-shaped depressions. Central part of disc with rather deep, oval depressions merging across midline to single butterfly-shaped depression (Fig. 2).

Ratio of length of elytra to their combined width about 36:40. Scutellum with shallow rounded depressions (Fig. 2). Elytra with delicate, fine and dense punctuation. Diameter of punctures about 1.5 times as small as eye facet. Distances between punctures slightly smaller than their diameter, interspaces smooth, slightly shining.

Abdomen delicately shagreened.

Aedeagus of characteristic structure (Figs 8–9).

Female. Sexual dimorphism absent, female morphologically similar to male. Spermatheca of characteristic structure (Fig. 10).

COMPARATIVE REMARKS. The new species is somewhat similar to Carpelimus guillemi sp. n., which is described below. It differs in a darker colouration, somewhat more developed eyes, and longer antennae. It can be clearly distinguished by the structure of the aedeagus.

DESCRIPTION. South China.

ETYMOLOGY. From Latin fuligo (soot) referring to the black colouration of the beetle.

Carpelimus (Trogophloeus) fuligus Gildenkov, sp. n.

Figs 2, 8–10.


DESCRIPTION (holotype). Length 1.8 mm. Colouration brown, legs and antennae yellowish brown, antennal segments 1 and 9–11 slightly paler than others. Integument slightly shining, body with short light hairs.

Head transverse, with wide base, ratio of head length (from neck mid-length to anterior margin of clypeus) to its maximum width about 18:24. Neck constriction prominent. Eyes rather large, slightly convex. Temples well-developed, round, eye diameter in dorsal view only slightly longer than temple length. Head widest across temples (Fig. 3). Head surface with rather distinct, fine and dense punctuation. Diameter of punctures about twice as small as that of eye facet. Distances between punctures much smaller than their diameter, interspaces smooth, slightly shining. Antennae rather short, antennal segments 1–5 elongate; segments 6–7 about as wide as long; segments 8–10 slightly transverse; segment 11 elongate, conical. Last 3 segments more massive than others and form loose club (Fig. 3).

Pronotum widest about 2/3 its length from base, then narrowed. Lateral margin smoothly rounded (Fig. 3). Ratio of pronotum length to its maximum width about 19:26. Surface of pronotum with rather distinct, fine and dense punctuation. Diameter of punctures about twice as small as eye facet. Distances between punctures much smaller than their diameter, interspaces smooth, slightly shining. Punctuation similar to that on head. Base of pronotal disc with almost indistinct, symmetrical, round depressions.

Ratio of length of elytra to their combined width about 25:32. Elytra with shallow longitudinal depressions extending from scutellum along suture to slightly beyond midline.
(Fig. 3). Elytra with distinct, fine and dense punctuation. Diameter of punctures only slightly smaller than eye facet. Distances between punctures much smaller than puncture diameter, interspaces smooth, slightly shining.

*Abdomen* delicately shagreened.

*Aedeagus* of characteristic structure (Figs 11–12).

*Female*. Sexual dimorphism absent, female morphologically similar to male. Spermatheca of characteristic structure (Fig. 13).

**COMPARATIVE REMARKS.** The new species belongs to the “*taprobanae*” species group. In this group, the new species is very similar in size, colouration and punctuation to a closely related species, *Carpelimus (Trogophloeus) taprobanae* (Walker, 1859), from which it can be clearly distinguished only by the structure of the aedeagus [Gildenkov, 2015b, p. 385, figs. 19: 10–11]. It differs from *Carpelimus (Trogophloeus) vagans* (Cameron, 1930) by its larger size, longer antennae and can be clearly distinguished by the structure of parameres and the morphology of sclerites in the central part of the sac of aedeagus [Gildenkov, 2015b, p. 396, figs. 19: 13].

**DISTRIBUTION.** Nepal.

**ETYMOLOGY.** From Latin *gemini* (twins) referring to a significant similarity to *C. taprobanae*.

Figs 3–4. *Carpelimus* spp., males, dorsal view: 3 — *Carpelimus (Trogophloeus) geminus*, *sp.n.* (holotype); 4 — *Carpelimus (Trogophloeus) guillaumi*, *sp.n.* (paratype, Hong Kong).

Рис. 3–4. *Carpelimus* spp., самцы, сверху: 3 — *Carpelimus (Trogophloeus) geminus*, *sp.n.* (голотип); 4 — *Carpelimus (Trogophloeus) guillaumi*, *sp.n.* (паратип, Гонконг).
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*Carpeilmus (Trogophloeus) guillaumei* Gildenkov, sp.n.

**Figs. 4, 14–16.**


**Figs 5–16.** Genitalia of *Carpelimus*: 5–7 — *C. asperus*, sp.n.; 8–10 — *C. fuligus*, sp.n.; 11–13 — *C. geminus*, sp.n.; 14–16 — *C. guillaumei*, sp.n.; 5, 8, 11, 14 — aedeagus, ventral view (holotypes); 6, 9, 12, 15 — aedeagus lateral view (holotypes); 7, 10, 13, 16 — spermatheca (paratypes). Scale bar: 0.25 mm.

Рис. 5–16. Гениталии *Carpelimus*: 5–7 — *C. asperus*, sp.n.; 8–10 — *C. fuligus*, sp.n.; 11–13 — *C. geminus*, sp.n.; 14–16 — *C. guillaumei*, sp.n.; 5, 8, 11, 14 — эдеагус, снизу (голотип); 6, 9, 12, 15 — эдеагус, сбоку (голотип); 7, 10, 13, 16 — сперматека (парапастьма). Масштаб: 0.25 мм.
**ETYMOLOGY.** Named after Guillaume de Rougemont, a well-known beetle collector and expert on Staphylinidae, who kindly provided the material for the study.

**DISTRIBUTION.** South China, West Thailand.

**DESCRIPTION (holotype).** Length 2.0 mm. Colouration dark brown, legs and first 2 antennal segments yellowish brown. Integument slightly shining, body with short light-coloured hairs.

**Head** transverse, with wide base, ratio of head length (from neck mid-length to anterior margin of clypeus) to its maximum width about 20:26. Neck constriction prominent. Eyes rather large, slightly convex. Temples well-developed, round, eye diameter in dorsal view slightly longer than temple length. Head widest across eyes (Fig. 4). Head surface with rather distinct, fine and dense punctuation. Puncture diameter on vertex about twice as small as eye facet. Punctures on frons slightly longer and more densely set. Distances between punctures slightly smaller than their diameter, interspaces smooth, slightly shining. Antennae rather short, antennal segments 1–6 elongate; segments 7 and 8 about as wide as long; segments 9–10 slightly transverse; segment 11 elongate, conical. Last 3 segments more massive than others and form loose club (Fig. 4).

**Pronotum** widest about 2/3 its length from base, then narrowed. Lateral margin with small notch near base (Fig. 4). Ratio of pronotum length to its maximum width about 21:29. Surface of pronotum with rather distinct, fine and dense punctuation, distances between punctures slightly smaller than their diameter, interspaces smooth, slightly shining. Punctuation similar to that on vertex. Pronotal disc with 2 pairs of prominent, symmetrical depressions: 1 pair of narrowly crescent-shaped depressions on base and 1 pair of longitudinal, oval depressions in central part (Fig. 4).

**Ratio of length of elytra** to their combined width about 33:40. Elytra with shallow longitudinal depressions extending from scutellum along suture to slightly beyond midline (Fig. 4). Surface of elytra with rather distinct, fine and dense punctuation. Diameter of punctures about 1.5 times as small as eye facet, punctures slightly larger than those on pronotum and head. Distances between punctures smaller than their diameter, interspaces smooth, slightly shining. Antennae long, antennal segments 1–9 elongate; segment 10 about as wide as long; segment 11 elongate, conical. Last 3 segments more massive than others and form loose club (Fig. 17).

**Aedeagus** of characteristic structure (Figs 14, 15).

**Female.** Sexual dimorphism absent, female morphologically similar to male. Spermatheca of characteristic structure (Fig. 16).

**COMPARATIVE REMARKS.** The new species is similar to *Carpelimus (Trogophloeus) torrentum* (Cameron, 1930) in colouration, size, punctuation patterns and head structure. It differs by slightly more developed eyes, more lightly-coloured legs and an entirely different structure of the aedeagus [Gildenkov, 2015b, p. 396, figs. 30: 8].

**ETYMOLOGY**. From Latin rubro (red) referring to a unique body colouration of this species.

**DISTRIBUTION.** North India, Nepal.

**ETYMOLOGY.** From Latin rubro (red) referring to a unique body colouration of this species.
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**Figs 17–20.** *Carpelimus* (*Trogophloeus*) *rubrus*, sp.n.: 17 — habitus, dorsal view; 18 — aedeagus, ventral view; 19 — aedeagus, lateral view; 20 — spermatheca; 17–19 — holotype, male; 20 — paratype, female. Scale bar: 0.25 mm.

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