

**On the taxonomy and zoogeography of *Paederus* V.
Two new species from Laos and China, a new synonymy, new
subgeneric assignments, and new records from the Palaearctic
region (Coleoptera: Staphylinidae: Paederinae)**

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ASSING V. 2020: On the taxonomy and zoogeography of *Paederus* V. Two new species from Laos and China, a new synonymy, new subgeneric assignments, and new records from the Palaearctic region (Coleoptera: Staphylinidae: Paederinae). *Acta Musei Moraviae, Scientiae biologicae* **105(1)**: 91–102. – *Paederus laoticus* sp. nov. (Northwest Laos: Bokeo province) and *P. (Harpopaederus) willersi* sp. nov. (China: Sichuan) are described and illustrated. A new synonymy is proposed: *Paederus riparius* (Linnaeus, 1758) = *P. melanurus* Aragon, 1830, syn. nov. *Paederus kambaitiensis* Scheerpeltz, 1965 is assigned to the subgenus *Heteropaederus* Scheerpeltz, 1957 and *P. tamulus* Erichson, 1840, previously in *Eopaederus* Scheerpeltz, 1957, is removed from this subgenus and treated as *Paederus* incertae sedis. The aedeagus of *P. kambaitiensis* is illustrated for the first time. New records of nine species are reported, among them a new record from the Palaearctic region, two from China, and two new province records from China. The revised distributions of eight species of the subgenus *Harpopaederus* Scheerpeltz, 1957 are mapped.

Keywords. Coleoptera, Staphylinidae, Paederinae, *Paederus*, taxonomy, new species, new synonymy, new subgeneric assignments, new records, Palaearctic region, Oriental region, Laos, China, zoogeography

Introduction

The speciose genus *Paederus* Fabricius, 1775 is distributed in all major zoogeographic regions and currently includes more than 530 species worldwide (NEWTON 2019). It is represented in the Palaearctic region by 128 species in eight subgenera, with 45 of the species listed as incertae sedis (SCHÜLKE & SMETANA 2015, ASSING 2017, WILLERS 2018). As many as 51 and 25 species, most of them micropterous and locally endemic, have been recorded from mainland China and Taiwan, respectively (ASSING 2017). The subgeneric system currently in use is problematic and requires revision based on a phylogenetic analysis. Moreover, preliminary studies have revealed that some taxa presently regarded as distinct genera may eventually have to be included in *Paederus*.

Since the latest contribution, additional material has been examined, this material including two new species from Laos and China, revealing a new synonymy for the West Palaearctic fauna, two new subgeneric assignments, and yielding additional records of nine species, among them a new record from the Palaearctic region sensu SCHÜLKE & SMETANA (2015), two new records from China, and two new province records from China.

Material and methods

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

MMB	.....	Moravian Museum Brno (P. Baňář)
MNB	.....	Museum für Naturkunde Berlin (incl. coll. Schülke; J. Frisch, B. Jaeger, M. Schülke, J. Willers)
NHMB	.....	Naturhistorisches Museum Basel (M. Borer)
NHMW	.....	Naturhistorisches Museum Wien (H. Schillhammer)
NMP	.....	National Museum of Natural History, Prague (J. Hájek)
cAss	.....	author's private collection
cFel	.....	private collection Benedikt Feldmann, Münster

The morphological studies were conducted using Stemi SV 11 (Zeiss) and Discovery V12 (Zeiss) microscopes, and a Jenalab compound microscope (Carl Zeiss Jena). The images were created using digital cameras (AxioCam ERc 5s, Nikon Coolpix 995), as well as Labscope and Picolay software. The map was created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the labrum to the posterior margin of tergite VIII, the length of the forebody from the anterior margin of the labrum to the posterior margin of the elytra, head length from the anterior margin of the frons to the posterior constriction of the head, head width across and including the eyes, 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 apices of the parameres 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

Paederus (Paederus) balcanicus Koch, 1938

Material examined. Greece: 2♂♂, 2♀♀, Anthili, 5 km SSE Lamia, 38°52'N, 22°30'E, river bank, 6.II.2015, leg. Mainda (MNB, cAss); 1♂, Thessalia, Pinios, 3.II.2015, leg. Mainda (MNB).

This species is widespread from the Alps and Germany across Southeast Europe eastwards to Ukraine, the Russian South European territory, Turkey, and Iran (SCHÜLKE & SMETANA 2015).

Paederus (Paederus) riparius (Linnaeus, 1758)

Paederus melanurus Aragona, 1830: 13; **syn. nov.**

Paederus ruficeps Baudi di Selve, 1848: 138.

New material examined. Greece: 2♂♂, 2♀♀, Anthili, 5 km SSE Lamia, 38°52'N, 22°30'E, river bank, 6.II.2015, leg. Mainda (MNB, cAss).

The original description is based on an unspecified number of syntypes collected “prope Ticinum Regium, in sylvis a Ticino”, i.e., in South Switzerland (ARAGONA 1830). Since

then, it has most often been reported from North Italy (ASSING 2012), with additional records from the southern Balkans (Albania, Greece) (SCHÜLKE & SMETANA 2015). The specific status was doubted by ASSING (2012), who stated that the aedeagus was practically identical to that of *P. riparius* and who suspected *P. melanurus* to represent either a subspecies or simply a colour morph of that species. At that time, only material from North Italy was available, so that *P. melanurus* was nevertheless treated as a valid species. An examination of the above material confirmed that the aedeagus also of males from Greece is identical to that of *P. riparius*. The highly discontinuous distribution pattern (see above) clearly rules out a subspecific status of *P. melanurus* and renders the hypothesis that *P. melanurus* merely represents a colour morph the most plausible option. In consequence, this name is placed in synonymy with the senior name *P. riparius*.

***Paederus (Heteropaederus) kambaitiensis* Scheerpeltz, 1965** (Figs 1–4)

Type material examined. Syntypes: 1♂: “N. E. Burma, Kambaiti 7000 ft., 1/5 1934, R. Malaise / Schwedische Indien-Burma-Expedition 1934 / ex coll. Scheerpeltz / Cotypus *Paederus kambaitiensis* O. Scheerpeltz” (NHMW); 1♀: “N. E. Burma, Kambaiti, 2000 m, 20/3.1934, Malaise / Schwedische Indien-Burma-Expedition 1934 / ex coll. Scheerpeltz / Allotypus / Typus *Paederus kambaitiensis* O. Scheerpeltz” (NHMW); 1♂: “N. E. Burma, Kambaiti 7000 ft., 25/3 1934, R. Malaise / Schwedische Indien-Burma-Expedition 1934 / ex coll. Scheerpeltz / Cotypus *Paederus kambaitiensis* O. Scheerpeltz” (NHMW).

Additional material examined. China: Yunnan: 3♂♂, 2♀♀, Gaoligong Shan NNR, E Kongshu, 25°43'N, 98°38'E, 2035–2230 m, 1.VII.2017, leg. Hájek & Růžička (NMP, cAss).

In the original description, which is based on seven type specimens from the Burmese side of the Kambaiti pass, SCHEERPELTZ (1965) did not assign *P. kambaitiensis* to any of the subgenera he had introduced eight years before (SCHEERPELTZ 1957). Based on the similarly derived morphology of the aedeagus (Figs 1–4), however, the species is undoubtedly a close relative of *P. fuscipes* Curtis, 1826, the type species of the subgenus *Heteropaederus* Scheerpeltz, 1957.

The above material from Yunnan represents the first record from China and the Palearctic region sensu SCHÜLKE & SMETANA (2015).

***Paederus tamulus* Erichson, 1840**

Material examined. China: Yunnan: 1♂, Tongbiguan env., 24°36'N, 97°35'E, 1340–1380 m, 24–26.VI.2016, leg. Hájek & Růžička (NMP); 1♂, W Tongbiguan, 24°36'N, 97°35'E, 1290–1325 m, broadleaved tropical forest, 25–27.VI.2016, leg. Hájek & Růžička (cAss).

SCHÜLKE & SMETANA (2015) list *P. tamulus* in the subgenus *Eopaederus* Scheerpeltz, 1957. However, a comparison with *P. caligatus* Erichson, 1840, the type species of *Eopaederus*, yielded no evident synapomorphies suggesting that both species should be closely related to each other. Therefore, *P. tamulus* is regarded as *Paederus incertae sedis* for the time being.

Paederus tamulus is widespread from Iran to China, Japan, and the Oriental region (SCHÜLKE & SMETANA 2015). The above specimens represent the first records from the Chinese province Yunnan.

***Paederus nepalicus* Coiffait, 1977**

Material examined. Nepal: 1♂, Bagmati zone, Godawari to Phulchoki, 27°35'N, 85°22'E, 1550–2750 m, [date not indicated], leg. Fouque (cAss).

According to WILLERS (2018), the distribution of this micropterous species is confined to Central Nepal.

***Paederus laoticus* sp. nov.**

(Figs 5–12)

Type material examined. Holotype ♂: “LAOS – Bokeo prov., 5 km W Ban Toup, Bokeo Nature Reserve, 20°27–28'N, 100°45'E, 500–700 m, 4–18.V.2011, leg. Brancucci *et al.* / Holotypus ♂ *Paederus laoticus* sp. n., det. V. Assing 2020” (NHMB). Paratype ♂: same data as holotype (cAss).

Description. Small species; body length 6.1–6.4 mm; length of forebody 3.1–3.4 mm. Habitus as in Fig. 5. Coloration (Fig. 5) conspicuous: head, pronotum, abdominal tergites III–VI, legs, antennae, and maxillary palpi pale-reddish; elytra black with bluish hue; abdominal apex (segments VII–X) blackish.

Head (Fig. 7) distinctly transverse, 1.21–1.24 times as broad as long, tapering behind eyes, with two irregular transverse series of punctures between eyes; remainder of median dorsal surface only with scattered punctures; punctation of postero-lateral portions denser; setae long, erect, and blackish. Eyes strongly convex, as long as, or slightly longer than postocular region in dorsal view. Antenna approximately 2.0 mm long and moderately slender; antennomeres IV–VIII or IV–IX weakly to moderately oblong, IX–X or only X approximately as broad as long. Anterior margin of labrum with small and broadly V-shaped median excision. Mandibles each with an apically bifid molar tooth.

Pronotum (Fig. 6) 1.03–1.05 times as long as broad and 0.94–0.95 times as broad as head, strongly convex in cross section, and without lateral keel; punctation rather sparse; midline broadly impunctate; setae similar to those of head.

Elytra (Fig. 6) 1.08–1.10 times as long as pronotum; punctation rather coarse and moderately dense; surface with double setation: with moderately dense pale, thin, and suberect setae and with interspersed long, dark, and erect setae. Hind wings present. Metatarsomere I longer than the combined length of metatarsomeres II and III.

Abdomen narrower than elytra; microsculpture composed of long transverse meshes on tergites III–VI and of shorter meshes on tergite VII; tergites with long, dark, and erect setae; posterior margin of tergite VIII with palisade fringe.

♂: protarsomeres I–IV distinctly dilated; aedeagus (Figs 8–12) 0.7 mm long, with apically acute ventral process, symmetric parameres, a basally broad and apically acute dorsal plate, and a basally broad and apically acute, somewhat asymmetric apico-internal sclerotized structure.

♀: unknown.

Comparative notes. Among the *Paederus* species known from the Palaearctic and Oriental regions, *P. laoticus* is most similar to *P. nigripennis* CAMERON, 1924, a species recorded from North India, Nepal, the Chinese island Hainan, and parts of the Oriental region (NEWTON 2019). It is distinguished from this species by uniformly pale-reddish

antennae (*P. nigripennis*: at least antennomeres IV–X partly darkened) and by a smaller aedeagus of different shape. For illustrations of *P. nigripennis* see those of *P. bilobus* LI *et al.*, 2014 in LI X.-Y. *et al.* (2014: figures 1A–G), a name synonymized with *P. nigripennis* by WILLERS (2018).

Comment. *Paederus laoticus* represents the first published record of the genus from Laos. Joachim Willers (pers. comm.) has examined Laotian material of *Paederus almorensis*, *P. alternans* WALKER, 1858, *P. extraneus* WIEDEMANN, 1825, *P. fuscipes* CURTIS, 1826, and *P. sondaicus* FAUVEL, 1895, but these records have never been published.

Distribution and natural history. The type locality is situated in Bokeo province, Northwest Laos. The specimens were collected on the wing, probably with a Malaise trap, at an altitude of 500–700 m.

Etymology. The specific epithet is an adjective derived from Laos, where this species was discovered.

Paederus (Gnathopaederus) bursavacua Willers, 2001

New material examined. China: Sichuan: 2♂♂, 2♀♀, Huanglong Shan, Sanluogou vill., 32°47'N, 103°55'E, 2610 m, 15–17.VI.2018, leg. Reuter (cFel, cAss).

This species was previously known from Chongqing and Guizhou provinces, China (LI Q.-L. *et al.* 2016; PENG *et al.* 2015). The above specimens represent the first record from Sichuan.

Paederus (Harpopaederus) antennocinctus Willers, 2001 (Map 1)

New material examined. China: Sichuan: 2♂♂, 5♀♀, Jiuzhaigou env., Zhongchacun, 33°17'N, 103°50'E, 2400–3000 m, 9–13.VII.2017, leg. Konvička (MMB, cAss).

Paederus antennocinctus has been reported from Sichuan and Gansu (WILLERS 2001, LI & ZHOU 2007, ASSING 2015). The currently known distribution is illustrated in Map 1.

Paederus (Harpopaederus) chinensis Bernhauer, 1931 and *Paederus (Harpopaederus) depectens* Assing, 2015

A revision of the type material *P. depectens* revealed that the specimens from Wolong (China: Sichuan), from where only females had been seen personally, belong to *P. chinensis*, as can be inferred from the fact that males subsequently reported from this region (ASSING 2017) all belong to *P. chinensis*. Specimens from Wolong are distinguished from material of *P. chinensis* seen from other localities by smaller body size (in this respect similar to *P. depectens*) and a slightly smaller aedeagus, but otherwise no differences were found which would suggest that they belong to a distinct species. The revised distributions of *P. chinensis* and *P. depectens* are illustrated in Map 1.

Paederus willersi sp. nov.

(Figs 13–28, Map 1)

Type material examined. Holotype ♂: “China, N Sichuan, Xiao Zhaizi Nat. Nature Reserve, 4 km NNE of Qingpianxiang, Zhenghecun, 32°3′27″N 103°59′37″E, 23.–26.VI.2017, 1350–1850 m, lgt. Ondřej Konvička / Holotypus ♂ *Paederus willersi* sp. n., det. V. Assing 2020” (MMB). Paratypes: 1♀: same data as holotype (MMB); 4♀♀: “China, N Sichuan, Xiao Zhaizi Nat. Nature Reserve, 15 km W of Qingpianxiang, Dayaochang, 31°58′18″N 103°51′16″E, 1.–2.VII.2017, 1900–2100 m, lgt. Ondřej Konvička” (MMB, cAss).

Description. Body length 10.0–11.8 mm; length of forebody 5.4–5.9 mm. Habitus as in Figs 13–14. Coloration: head black; pronotum and scutellum red; elytra black with distinct bluish hue; abdomen with segments III–VI red and VII–X black; legs black with the tarsi more or less distinctly paler; antennae pale-reddish, sometimes with the apical seven antennomeres infusate.

Head (Figs 22–23) distinctly transverse, shape subject to sexual dimorphism; dorsal surface with coarse and moderately dense punctation; median dorsal portion sparsely punctate. Eyes approximately 0.6–0.7 times as long as distance from posterior margin of eye to posterior constriction of head in dorsal view. Antenna 3.4–3.6 mm long and slender; antennomeres IV approximately three times as long as broad and X nearly twice as long as broad. Labrum (Fig. 24) without evident sexual dimorphism; anterior margin with semi-circular median excision, on either side of this excision with a more or less acute projection, and laterally sinuate. Mandibles each with an apically bifid molar tooth.

Pronotum 1.08–1.14 times as long as broad and 1.00–1.05 times as broad as head, strongly convex in cross section; lateral carina distinct posteriorly and indistinct anteriorly; punctation moderately sparse and on average less coarse than that of head; midline broadly impunctate.

Elytra 0.65–0.68 times as long as pronotum, without distinct humeral angles; punctation moderately coarse and very dense. Hind wings completely reduced. Metatarsomere I barely as long as the combined length of metatarsomeres II and III.

Abdomen broader than elytra; punctation fine and dense; interstices with fine transverse microsculpture; posterior margin of tergite VIII without palisade fringe.

♂: head (Fig. 22) of transversely quadrangular shape, approximately 1.20 times as broad as long, only indistinctly tapering behind eyes; protarsomeres I–IV strongly dilated; tergite VIII strongly convex posteriorly; sternite VIII deeply and narrowly incised posteriorly; aedeagus (Figs 17–21) very large, 2.9 mm long; ventral process weakly sclerotized and apically convex; dorsal plate acute, apically distinctly extending beyond apex of ventral process, but not reaching apices of parameres, subapically with a conspicuous tooth at right margin (dorsal view) (Figs 25–26); parameres symmetric and apically acute; internal sac with a long and apically acute moderately sclerotized structure (Figs 27–28).

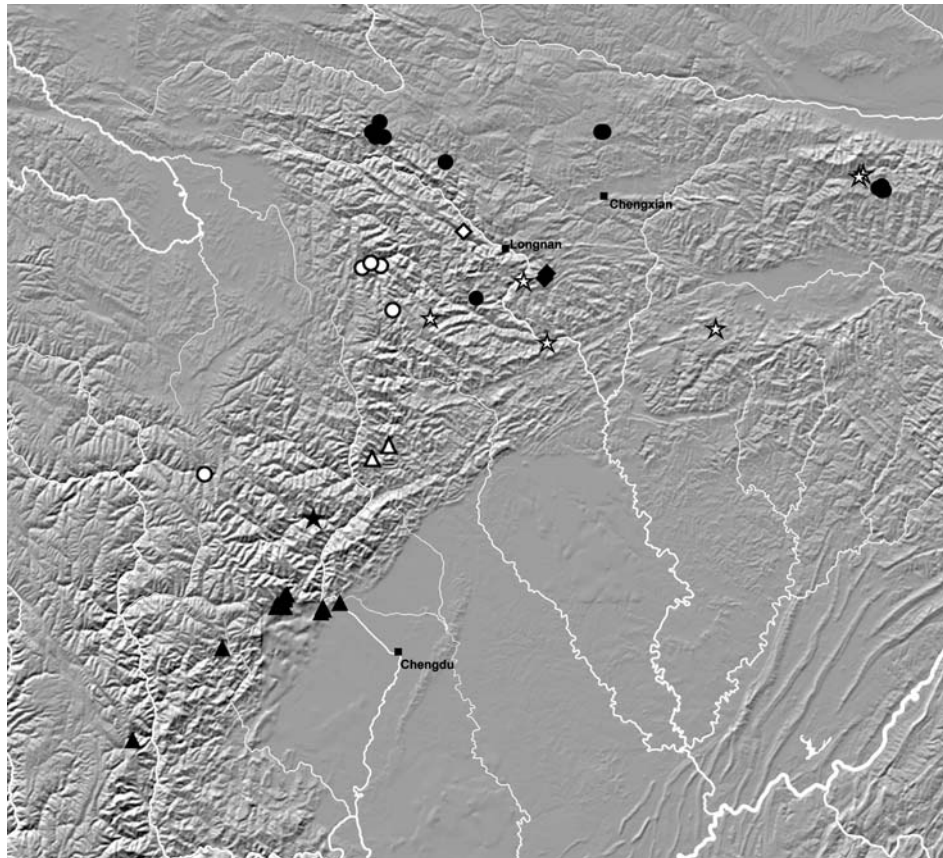
♀: head (Fig. 23) of sub-rhomboid shape, approximately 1.15 times as broad as long, and distinctly tapering behind eyes; protarsomeres I–IV distinctly dilated, but less so than in male; tergite VIII (Fig. 15) narrower than in male and nearly truncate posteriorly; posterior margin of sternite VIII (Fig. 16) acutely pointed in the middle.

Comparative notes. The geographically closest *Harpopaederus* species are *P. antennocinctus*, *P. deplectus*, and *P. chinensis* (Map 1). *Paederus willersi* is distinguished from them particularly by a much larger aedeagus of different morphology (dorsal plate

with conspicuous tooth in asymmetric position; shape of the internal structure), an apically broader and nearly truncate female tergite VIII, and an apically gradually tapering female sternite VIII. For illustrations of *P. antennocinctus* and *P. depectus* see ASSING (2015).

Distribution and natural history. This species is currently known from two localities in Northwest Sichuan, China (Map 1), where the specimens were collected at altitudes between 1350 and 2100 m. Additional data are not available.

Etymology. This species dedicated to Joachim Willers (MNB), specialist of *Paederus*, who was the first to discover the novelty of this species and kindly left its description to me.



Map 1. Revised distributions of *Harpopaederus* species in Sichuan, Gansu, and Shaanxi (updated from ASSING 2015: map 2): *Paederus chinensis* (black triangles); *P. depectens* (black star); *P. willersi* (white triangles); *P. antennocinctus* (white circles); *P. agnatus* Eppelsheim, 1889 (black circles); *P. minimus* Assing, 2015 (white diamond); *P. edentulus* (black diamonds); *P. gracilacutus* Li & Zhou, 2007 (white stars).

***Paederus (Paederomorphus) almorensis* Cameron, 1931**

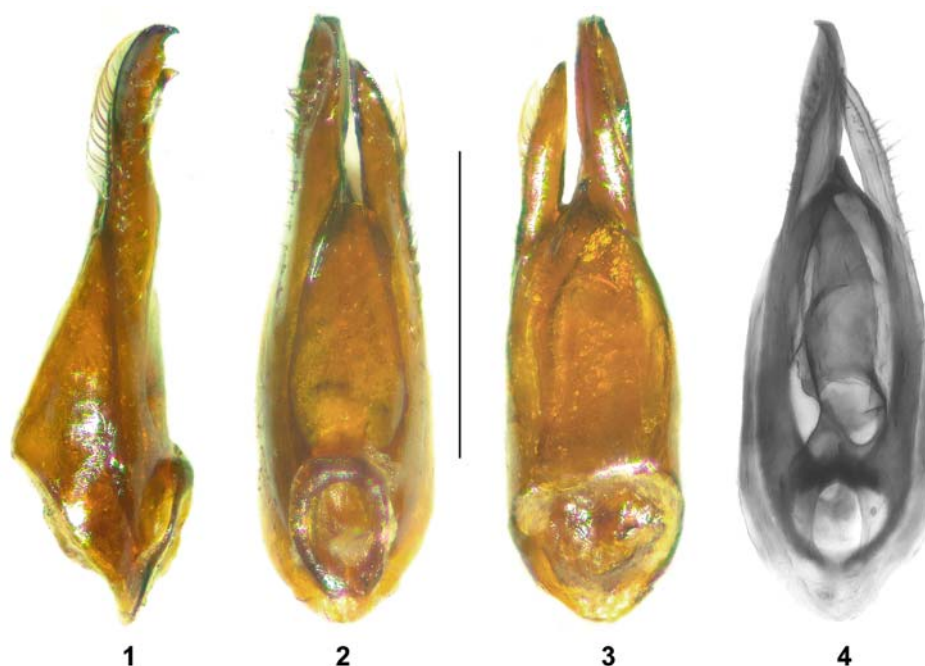
Material examined. China: Sichuan: 1♂, 1♀, 1 ex. [det. Willers, 1 teneral], S Yanyuan, Chuandongzi range, 27°21'N, 101°30'E, 3200 m, 8–19.VI.2017, leg. Reuter (cFel, cAss).

Paederus almorensis was previously known only from India and Nepal (WILLERS 2018, NEWTON 2019). The above specimens represent the first record from China.

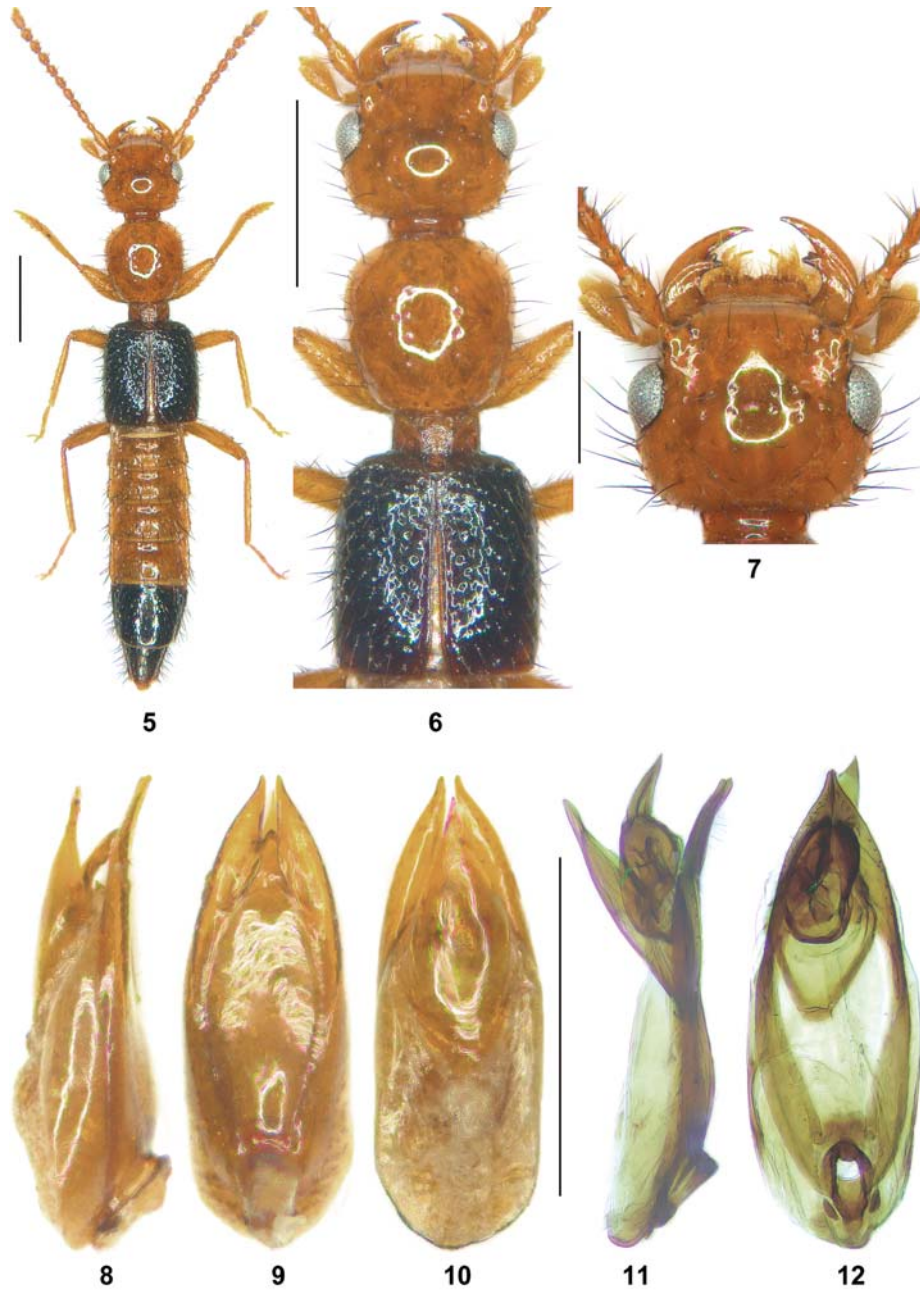
***Paederus describendus* Willers, 2001**

Material examined. China: Zhejiang: 1♂, 1♀, West Tianmu Shan Reserve, from “Blind Alley” to “Immortal Peak”, 30°20.5–21.0'N, 119°25.4–7'E, 1200–1500 m, 27–28.VI.2017, leg. Růžička & Hájek (NMP, cAss).

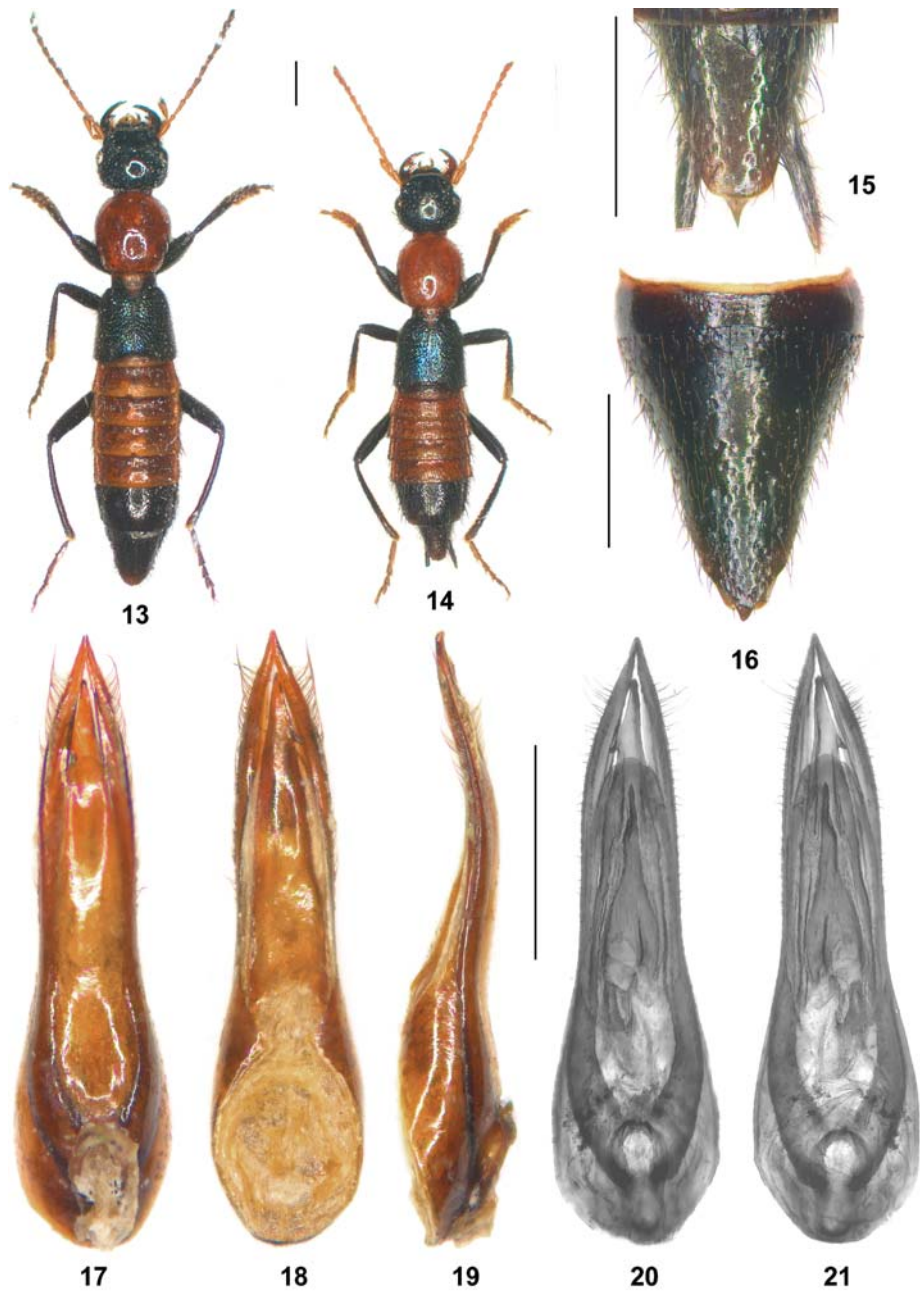
This species is still listed in *Harpopaederus* Scheerpeltz, 1957 by SCHÜLKE & SMETANA (2015), although it was correctly excluded from this subgenus by LI & ZHOU (2007) (ASSING 2015). Currently available evidence suggests that it is endemic to the Tianmu Shan region.



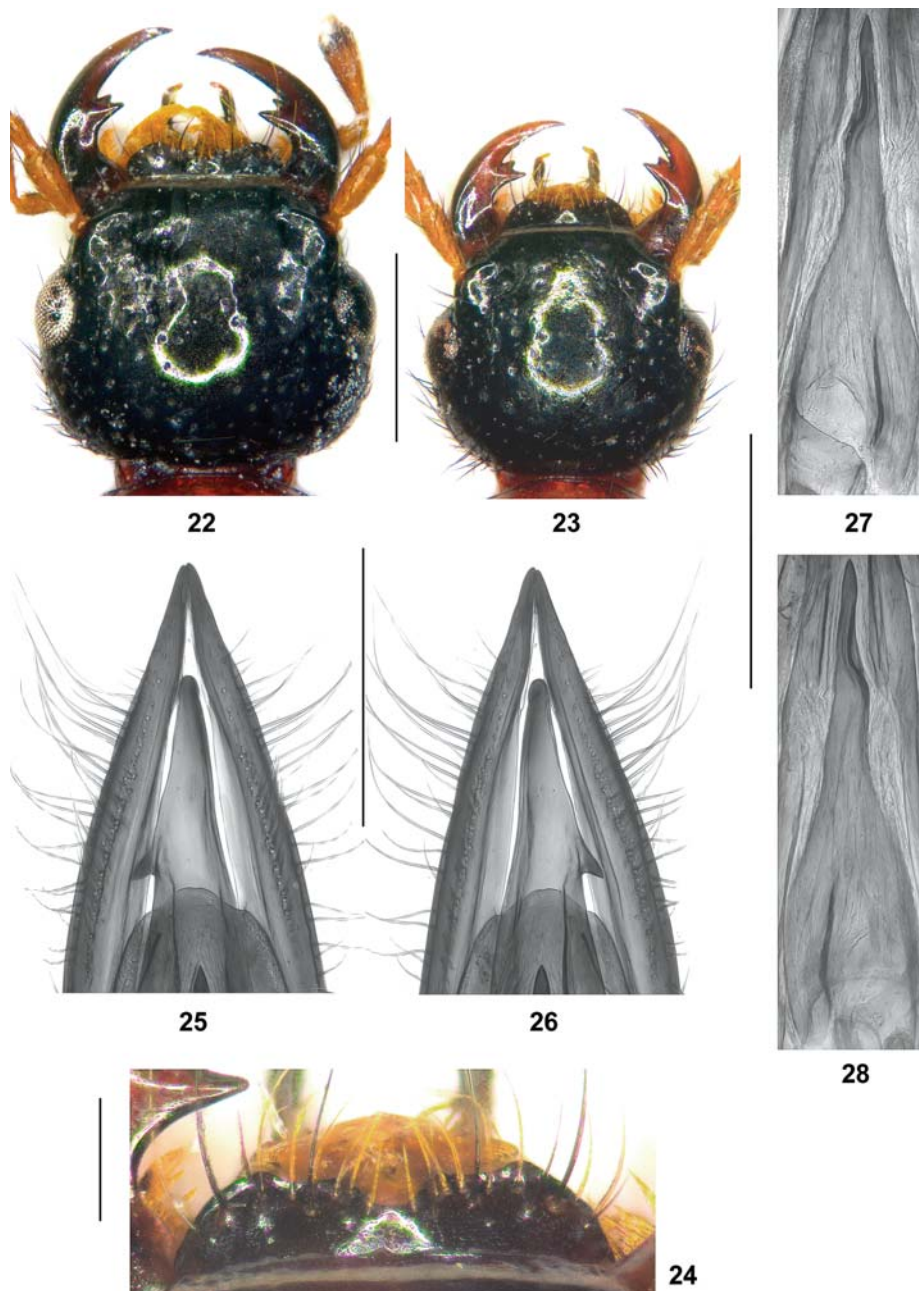
Figs 1–4. *Paederus kambaitiensis*, paratypes. Aedeagus in lateral (1), ventral (2, 4), and in dorsal view (3). Scale bar: 0.5 mm.



Figs 5–12. *Paederus laoticus*, holotype (5–7, 11–12) and paratype (8–10). 5 – habitus; 6 – forebody; 7 – head; 8–12 – aedeagus in lateral (8, 11), ventral (9, 12), and in dorsal view (10). Scale bars: 5–6: 1.0 mm; 7–12: 0.5 mm.



Figs 13–21. *Paederus willersi*. 13 – male habitus; 14 – female habitus; 15 – apical portion of female tergite VIII; 16 – female sternite VIII; 17–21 – aedeagus in ventral (17, 20), dorsal (18, 21), and in lateral view (19). Scale bars: 1.0 mm.



Figs 22–28. *Paederus willersi*. 22 – male head; 23 – female head; 24 – labrum; 25–26 – apical portion of aedeagus in ventral (25) and in dorsal view (26); 27–28 – internal structure of aedeagus in ventral (27) and in dorsal view (28). Scale bars: 22–23: 1.0 mm; 25–28: 0.5 mm; 24: 0.2 mm.

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