

# A revision of the *Megalopaederus* species of Taiwan (Coleoptera: Staphylinidae: Paederinae)

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## Abstract

*Megalopaederus* Scheerpeltz, 1957, previously regarded as a distinct genus, is assigned to the genus *Paederus* Fabricius, 1775 as a subgenus. The *Megalopaederus* species of Taiwan are revised. In all, eighteen named locally endemic species belonging to two species groups are recognized, thirteen of them are described and illustrated for the first time: *Paederus (Megalopaederus) virgifer* n. sp. (Nantou, Chiai); *P. (M.) incurvatus* n. sp. (Kaohsiung); *P. (M.) adiectus* n. sp. (Pingtung); *P. (M.) aequilobatus* n. sp. (Pingtung); *P. (M.) furcispinosus* n. sp. (Nantou); *P. (M.) excisissimus* n. sp. (Pingtung); *P. (M.) trihamatus* n. sp. (Taoyuan); *P. (M.) bivirgatus* n. sp. (Hualien); *P. (M.) anmamontis* n. sp. (Taichung); *P. (M.) semiflavus* n. sp. (Taitung); *P. (M.) alesi* n. sp. (Hualien); *P. (M.) discurrens* n. sp. (Taichung); *P. (M.) incisus* n. sp. (Nantou). Rescriptions and illustrations of the five previously described species, as well as of *P. (M.) lewisi* Cameron, 1930 from Japan and *P. biacutus* Li et al., 2013 from mainland China are provided, and *P. (M.) bucculentus* n. sp. (Japan: Honshu: Nagano Prefecture) is described. The latter three species were included in the revision to tentatively assess the phylogenetic affiliations of Taiwanese *Megalopaederus*. *Paederus fulvocaudatus* Adachi, 1939, previously considered a subspecies of *P. kosempoensis* Bernhauer, 1922, represents a distinct species. A lectotype is designated for *P. kosempoensis* Bernhauer, 1922. Additional material composed exclusively of females and probably representing six undescribed species is listed. The available information on the natural history of Taiwanese *Megalopaederus* is compiled. A key to the named species of Taiwan is provided. Their distributions are mapped.

**Key words:** Coleoptera, Staphylinidae, Paederinae, *Paederus*, *Megalopaederus*, Palaearctic region, Taiwan, Japan, taxonomy, zoogeography, new species, new status, species groups, lectotype designation, key to species, distribution maps.

## Zusammenfassung

*Megalopaederus* Scheerpeltz, 1957, bisher als eigenständige Gattung betrachtet, wird als Untergattung in die Gattung *Paederus* Fabricius, 1775 gestellt. Die *Megalopaederus*-Arten Taiwans werden revidiert. Insgesamt achtzehn benannte Arten in zwei Artengruppen werden erkannt. Davon werden dreizehn erstmals beschrieben und abgebildet: *Paederus (Megalopaederus) virgifer* n. sp. (Nantou, Chiai); *P. (M.) incurvatus* n. sp. (Kaohsiung); *P. (M.) adiectus* n. sp. (Pingtung); *P. (M.) aequilobatus* n. sp. (Pingtung); *P. (M.) furcispinosus* n. sp. (Nantou); *P. (M.) excisissimus* n. sp. (Pingtung); *P. (M.) trihamatus* n. sp. (Taoyuan); *P. (M.) bivirgatus* n. sp. (Hualien); *P. (M.) anmamontis* n. sp. (Taichung); *P. (M.) semiflavus* n. sp. (Taitung); *P. (M.) alesi* n. sp. (Hualien); *P. (M.) discurrens* n. sp. (Taichung); *P. (M.) incisus* n. sp. (Nantou). Die fünf zuvor beschriebenen Arten sowie *P. (M.) lewisi* Cameron, 1930 aus Japan, *P. (M.) bucculentus* n. sp. (Japan: Honshu: Nagano) und *P. biacutus* Li et al., 2013 aus China werden redeskribiert bzw. beschrieben und abgebildet. Die drei letztgenannten Arten wurden in die Revision mit einbezogen, um die morphologischen Merkmale und den systematischen Status der *Megalopaederus*-Arten Taiwans bewerten zu können. Bei *Paederus fulvocaudatus* Adachi, 1939, bisher Unterart von *P. kosempoensis* Bernhauer, 1922, handelt es sich um eine eigenständige Art. Für *P. kosempoensis* Bernhauer, 1922 wird ein Lectotypus designiert. Insgesamt sechs weitere Arten, von denen ausschließlich Weibchen verfügbar waren, bleiben unbenannt. Daten zu Lebensweise und Verbreitung der *Megalopaederus*-Arten Taiwans werden zusammengefasst. Eine Bestimmungstabelle wird erstellt. Die Verbreitung der Arten wird anhand von Karten illustriert.

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## 1 Introduction

The speciose genus *Paederus* Fabricius, 1777 sensu lato currently includes over 600 species worldwide (NEWTON et al. 2001), which have been assigned to numerous subgenera and genera of uncertain status, or which are currently treated as species incertae sedis. Some of the subgenera and genera were erected by SCHEERPELTZ (1957), who provided copious descriptions. However, he neither provided arguments justifying the status of the new taxa, nor did he indicate clear diagnostic characters distinguishing them from *Paederus* sensu strictu. One of the new genera described in this article is *Megalopaederus* Scheerpeltz, 1957, to which he assigned three species from Japan, with *Paederus poweri* Sharp, 1874 as the type species. In a revision of the Japanese species, which includes the description of a fourth species, WATANABE (1986) redescribed *Megalopaederus*, but did not provide conclusive evidence justifying the generic status of the taxon either.

A first modern study of the phylogenetic affiliations within *Paederus* sensu lato, based exclusively on morphological characters and generally confined to the fauna of China, was attempted by LI & ZHOU (2009). They concluded that some taxa currently considered subgenera and genera, including *Megalopaederus*, were monophyletic, but the remainder of *Paederus* vastly paraphyletic.

According to SMETANA (2004), *Megalopaederus* was previously represented in the Palaearctic region by eight species and one subspecies, four species from Japan and four species and one subspecies from Taiwan. One of the species from Japan, *M. poweri* (Sharp, 1874), was subsequently reported also from Shanxi, mainland China, by HAO et al. (2003), but in view of the otherwise highly restricted distributions of *Megalopaederus* species, this record is almost certainly based on a misidentification. According to WATANABE (1986), the distribution of *M. poweri* is confined to the Kii Peninsula, southern Honshu. In contrast to the *Megalopaederus* species of Japan, the Taiwanese representatives of this taxon have not been revised.

Taiwan is reputed for its biodiversity, comprising a high proportion of island and local endemics. This is true also of the Staphylinidae, as is revealed in recent revisions of several taxa, e.g., *Quediina* of the Staphylinini (SMETANA 1995, 1996), *Othius* Stephens, 1829 of the Othiini (ASSING 1999), *Lathrobiina* of the Paederinae (ASSING 2010), and *Leptusa* Kraatz, 1856 of the Aleocharinae (ASSING 2002; PACE 1995, 1996). Nevertheless, according to SMETANA (2004) and an updated version by SCHÜLKE (unpublished), the inventory of the staphylinid fauna currently includes “only” some 1160 species and subspecies. However, numerous taxa have not been revised and the true diversity can be expected to be significantly greater,

probably comprising several thousand species, a conclusion also confirmed by the results of the present paper.

While the habitats at lower elevations are inhabited mainly by taxa of Oriental affiliations, the montane and subalpine regions of Taiwan primarily host a Palaearctic fauna with numerous endemics. For details on the (zoo-) geography, climate, habitats, and other data pertaining to Taiwan, including colour photographs, see SMETANA (1995).

The present study is based primarily on material of *Megalopaederus* collected by ALEŠ SMETANA (Ottawa) during several field trips to Taiwan in the 1990s. Additional material, including types of the previously described species, came from various museum collections. In order to tentatively assess the phylogenetic affiliations of *Megalopaederus* from Taiwan, two *Megalopaederus* species from Japan and one species of the *Paederus biacutus* group from mainland China were included in the study.

## Acknowledgements

I am indebted to the colleagues indicated in the material section for the loan of material under their care. SHUHEI NOMURA and YASUTOSHI SHIBATA (both Tokyo) were of invaluable help in locating and organizing a loan of the type material of the species described by ADACHI (1939). Special thanks are due to ALEŠ SMETANA (Ottawa) for the generous permission to retain four holotypes and for providing detailed locality data for his samples. XIAO-YAN LI (currently Copenhagen) contributed some *Megalopaederus* material which she had accumulated from various collections and which she had planned to include in her studies of *Paederus* sensu lato from China. YASUTOSHI SHIBATA and ALEŠ SMETANA helped with the identification of some localities. AL NEWTON (Chicago) checked the new names against his unpublished world catalogue of Paederinae. BENEDIKT FELDMANN (Münster) proof-read and reviewed the manuscript. The helpful comments of the second reviewer, MICHAEL SCHÜLKE (Berlin), are appreciated.

## 2 Material and methods

The material treated in this study is deposited in the following public institutions and private collections:

BMNH	The Natural History Museum, London (R. G. BOOTH)
cAss	author's private collection
cOhn	private collection MASAO OHNO, Tokyo (via Y. SHIBATA)
cSme	private collection ALEŠ SMETANA, Ottawa
FMNH	Field Museum of Natural History, Chicago (via L. H. HERMAN and X.-Y. LI)
MHNG	Muséum d'Histoire Naturelle, Genève (G. CUCCODORO)
MNHUB	Museum für Naturkunde der Humboldt-Universität Berlin (J. FRISCH, J. WILLERS)
NHMW	Naturhistorisches Museum Wien (H. SCHILLHAMMER)
NSMT	National Science Museum, Tokyo (via X.-Y. LI)
USNM	National Museum of Natural History, Smithsonian Institution, Washington D. C. (via X.-Y. LI)

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). The images of the body parts in dry preparation were created using a photographing device constructed by ARVED LOMPE (Nienburg) and CombineZ software. For the photographs of body parts in transparent light a digital camera (Nikon Coolpix 995) was used. The maps were created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the labrum to the posterior margin of the abdominal segment 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 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 longer paramere 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.

The individual labels of type specimens are separated by slashes; they are cited in the original spelling and format, except that slashes were replaced with commas and that capitalized geographic names of countries are given in standard format (i. e., “Taiwan” rather than “TAIWAN”). Moreover, the following adaptations were made according to the general format requirements of the journal: names of persons (except authors of species) in small capitals, scientific names of genera and species in italics, dates with the months always in Roman numbers.

### 3 Results

#### 3.1 Taxonomy, diversity, and zoogeography

As many as eighteen named *Megalopaederus* species are now known from Taiwan, the five previously described taxa, one of which is raised to species rank, and thirteen newly described species. Six unnamed, most likely additional undescribed species are represented exclusively by females. Therefore, and since all the *Megalopaederus* species of Taiwan have highly restricted, local distributions, it appears likely that a significant number of species still remains to be described and that the actual diversity may amount to around 30 species.

The species are distinguished not only by the male sexual characters, such as the shape and chaetotaxy of the male sternite VII, the shape of the male sternite VIII, and the morphology of the aedeagus (shapes of ventral process, dorsal plate, parameres, and internal structures), but also some, partly conspicuous, external characters. The latter include the coloration of the pronotum, the elytra, the legs, the antennae, and of the abdominal segments VIII–X, as well as the microsculpture of the head and the pronotum (see key in section 3.4). In externally similar and closely related species, however, the internal structures of the aedeagus often offer the best diagnostic characters. In view of this observation it seems rather unfortunate that in the vast majority of previous descriptions of *Paederus*

species, even in more recent ones, these structures have neither been assessed nor illustrated.

#### 3.2 Systematic and phylogenetic conclusions

A comparison of morphological characters of the Taiwanese *Megalopaederus* species, of two *Megalopaederus* species from Japan, of a *Paederus* species of the *P. biacutus* group from mainland China (see section 3.7), and of West Palaearctic *Paederus* species yielded no evidence whatsoever that *Megalopaederus* should represent a basal lineage in the *Paederus* sensu lato complex, a conclusion supporting the results by LI & ZHOU (2009). Thus, the status of this taxon as a distinct genus is no longer justified. Moreover, it is not even clear if, or likely that, the species currently assigned to *Megalopaederus* form a monophyletic group. This, however, can be clarified more conclusively only based on a more comprehensive phylogenetic approach, which is not within the scope of the present study. In any case, in view of the available evidence and in the interest of the stability of nomenclature, it appears most appropriate to assign *Megalopaederus* to *Paederus* as a subgenus.

Based on the examined species and on the morphological characters, the Taiwanese *Megalopaederus* species are represented by two lineages, the *P. kosempoensis* group and the *P. formosanus* group. The former comprises three named species, *P. kosempoensis*, *P. discurrens*, and *P. incisus*, and is characterized by a slender habitus, the absence of microsculpture on the head and pronotum, slender antennae (antennomeres IV–VIII distinctly more than three times as long as broad), a male sternite VII with a pair of clusters of dense setae, and an aedeagus with a broad, apically not elongated dorsal plate, with somewhat irregularly arranged and/or ill-defined basal internal structures, and with an oblong dorso-apical internal structure. The remaining named species form the *P. formosanus* group and share a more robust body, a mostly microsculptured pronotum (exceptions: *P. formosanus*, *P. alesi*), less slender antennae, a male sternite VII with one cluster of dense setae or with unmodified pubescence, and an aedeagus with an apically elongated dorsal plate, with two to four clearly defined, more or less spine- or rod-shaped basal internal structures, and with a broad-based dorso-apical internal structure, which may be completely reduced in some species.

#### 3.3 Natural history

All the *Megalopaederus* species of Taiwan are apparently strictly locally endemic. The species of the *P. formosanus* group were collected at altitudes between 1500



and 2920 m, with the vast majority of records between 2000 and 2700 m. The species of the *P. kosempoensis* group appear to occur at lower elevations (930–1510 m); however, altitudes were indicated only on the labels of *P. discurrens* (930 m) and of two unnamed species (1400 and 1510 m, respectively). The material was generally found in more or less moist habitats. Most of the specimens were sifted from leaf litter, debris, humus, moss, dead wood, etc. on the forest floor of various kinds of forests (broad-leaved evergreen, mixed, coniferous), occasionally also in shrub habitats. Some specimens were collected from fungi, one from human faeces, and one was caught with a yellow pan trap. The observation that numerous specimens were swept from vegetation and one was found in a flight interception trap suggests pronounced climbing activity. The examined material was found from February through November, mostly from April through June. Some specimens collected in May and August are teneral. Several specimens are infested with Laboulbeniales.

According to WATANABE (1986), the Japanese *Megalopaederus* species “are found on shrub or bamboo in mountainous areas”.

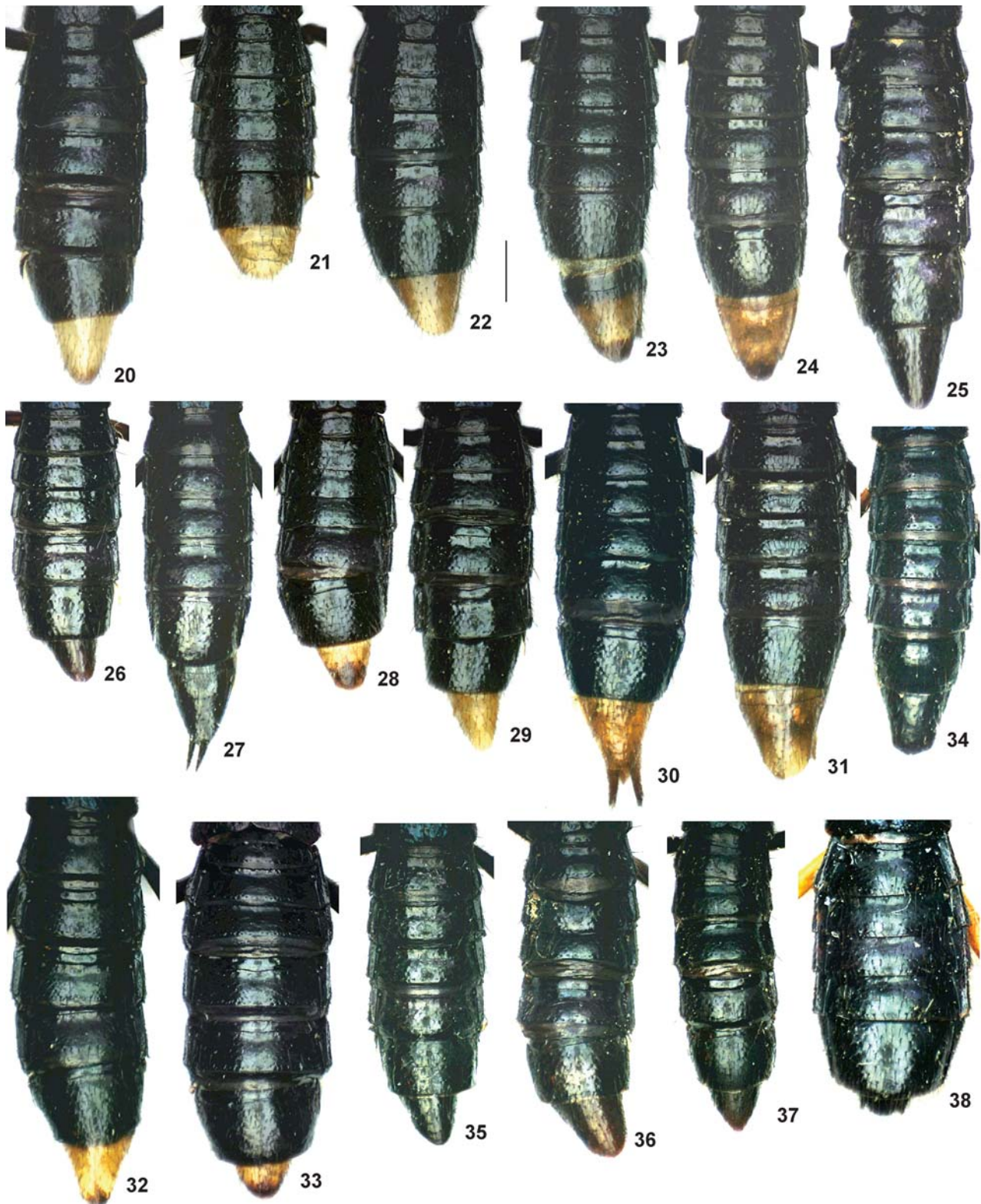
### 3.4 Key to the named *Megalopaederus* species of Taiwan

- 1 Pronotum bright reddish to dark reddish-brown..... 2
- Pronotum black..... 12
- 2 Head and pronotum without trace of microsculpture, glossy (Figs. 15–17). Antennae conspicuously slender; antennomeres IV–VIII distinctly more than three times as long as broad (Figs. 53–55). ♂: sternite VII with pair of clusters of dense setae, in median portion without, or with very sparse, setae (e. g., Figs. 204, 207); aedeagus strongly sclerotized, with broad and apically not elongated dorsal plate, and with oblong dorso-apical internal structure..... 3
- Head and pronotum at least with shallow microsculpture and with more or less reduced shine. Antennae less slender; antennomeres IV–VIII usually less than three times as long as broad, rarely (*P. aequilobatus*) approximately three times as long as broad. ♂: sternite VII with unmodified pubescence or with one cluster of dense setae, in median portion with dense setae; aedeagus mostly less strongly sclerotized, with apically elongated dorsal plate, and with broad-based dorso-apical structure..... 5
- 3 Scutellum black; femora black with the bases more extensively yellowish to brownish; antennae reddish with antennomeres IV–VI(VII) more or less distinctly darker (Fig. 53). ♂: sternite VII less transverse, in the middle of postero-median impression with sparse setae (Fig. 204); aedeagus with parameres of different length and with apically broadly concave ventral process (Figs. 108–110). ♀: posterior process of sternite VIII relatively narrow and apically acute (Fig. 206). – Chia Hsien..... *kosempoensis*
- Scutellum reddish with darker margins; femora black with the bases mostly very narrowly paler; antennae uniformly reddish. ♂: sternite VII more transverse, in the middle of postero-median impression without setae; aedeagus with parameres of subequal length and with apically narrowly concave ventral process..... 4
- 4 ♂: sternite VII with more extensive clusters of setae (Fig. 207); aedeagus (Figs. 111–113) with stouter and apically less acute parameres reaching slightly beyond apex of dorsal plate, with apically concave ventral process (Fig. 211), and with internal structures of distinctive shapes arranged in very disordered fashion (Figs. 209–210). ♀: unknown. – Tai-chung Hsien..... *discurrens*
- ♂: sternite VII with less extensive clusters of setae (Fig. 212); aedeagus (Figs. 117–119) with more slender and apically more acute parameres extending farther beyond apex of dorsal plate, with apically strongly excised ventral process (Fig. 215), and with internal structures of different shapes (Fig. 214). ♀: posterior process of sternite VIII convex apically (Fig. 216). – Nantou Hsien..... *incisus*
- 5 Abdominal segment VIII completely black..... 6
- Abdominal segment VIII at least partly yellowish..... 8
- 6 Abdominal segments IX and X yellowish anteriorly (Fig. 65); tibiae black. ♂: posterior excision of sternite VIII conspicuously deep, more than 0.6 times as deep as length of sternite (Fig. 176); aedeagus (Figs. 96–98) with strongly asymmetric parameres and ventral process, without dorso-apical internal structure and basal internal spines of distinctive shapes (Fig. 177). ♀: posterior median process of sternite VIII conspicuously narrow and long (Fig. 178). – Pingtung Hsien..... *excisissimus*
- Abdominal segments IX and X dark-brown to black anteriorly. ♂: posterior excision of sternite VIII less than 0.6 times as deep as length of sternite; aedeagus of different morphology. ♀: posterior median process of sternite VIII shorter and broader..... 7
- 7 Large and robust species; length of forebody 6.2–6.3 mm. Tibiae black; elytra black, only with indistinct bluish hue (Fig. 6). ♂: sternite VII with an extensive cluster of numerous moderately short setae in postero-median portion (Fig. 166); aedeagus (Figs. 123–125) strongly sclerotized, 2.9 mm long, with a dorsal plate, four basal and one dorso-apical internal structures of distinctive shapes (Figs. 168–169). ♀: sternite VIII as in Fig. 170. – Pingtung Hsien..... *aequilobatus*
- Much smaller species; length of forebody 4.8–5.2 mm. Tibiae yellowish; elytra with pronounced bluish hue (Fig. 8). ♂: pubescence of sternite VII unmodified (Fig. 171); aedeagus (Figs. 93–95) less strongly modified, 2.2–2.3 mm long, with apically tridentate ventral process, without dorso-apical internal spine and with two basal internal spines of distinctive shapes (Fig. 173). ♀: posterior median process of sternite VIII short and broad (Fig. 174). – Nantou Hsien..... *furcispinosus*
- 8 Tibiae completely black; antennomeres III–V usually more or less distinctly infuscate apically..... 9
- Tibiae at least in apical portion paler, not black; antennae uniformly reddish..... 10
- 9 Abdominal segment VIII distinctly bicoloured, with the middle yellowish and the base and the apex blackish (Figs. 23, 158, 161). ♂: aedeagus (Figs. 87–89) approximately 2.5 mm long and with internal structures of distinctive shapes (Figs. 159–160). – Kaohsiung Hsien..... *incurvatus*
- Abdominal segment VIII uniformly yellowish or with somewhat infuscate apex, base always yellowish (Figs. 24, 163). ♂: aedeagus (Figs. 90–92) smaller, approximately 2.3 mm long and with internal structures of different shapes (Figs. 164–165). – Pingtung Hsien..... *adictus*
- 10 Head and pronotum with shallow microreticulation and somewhat glossy. Pronotum bright reddish; elytra with vivid bluish hue (Fig. 2); tibiae yellowish. ♂: aedeagus



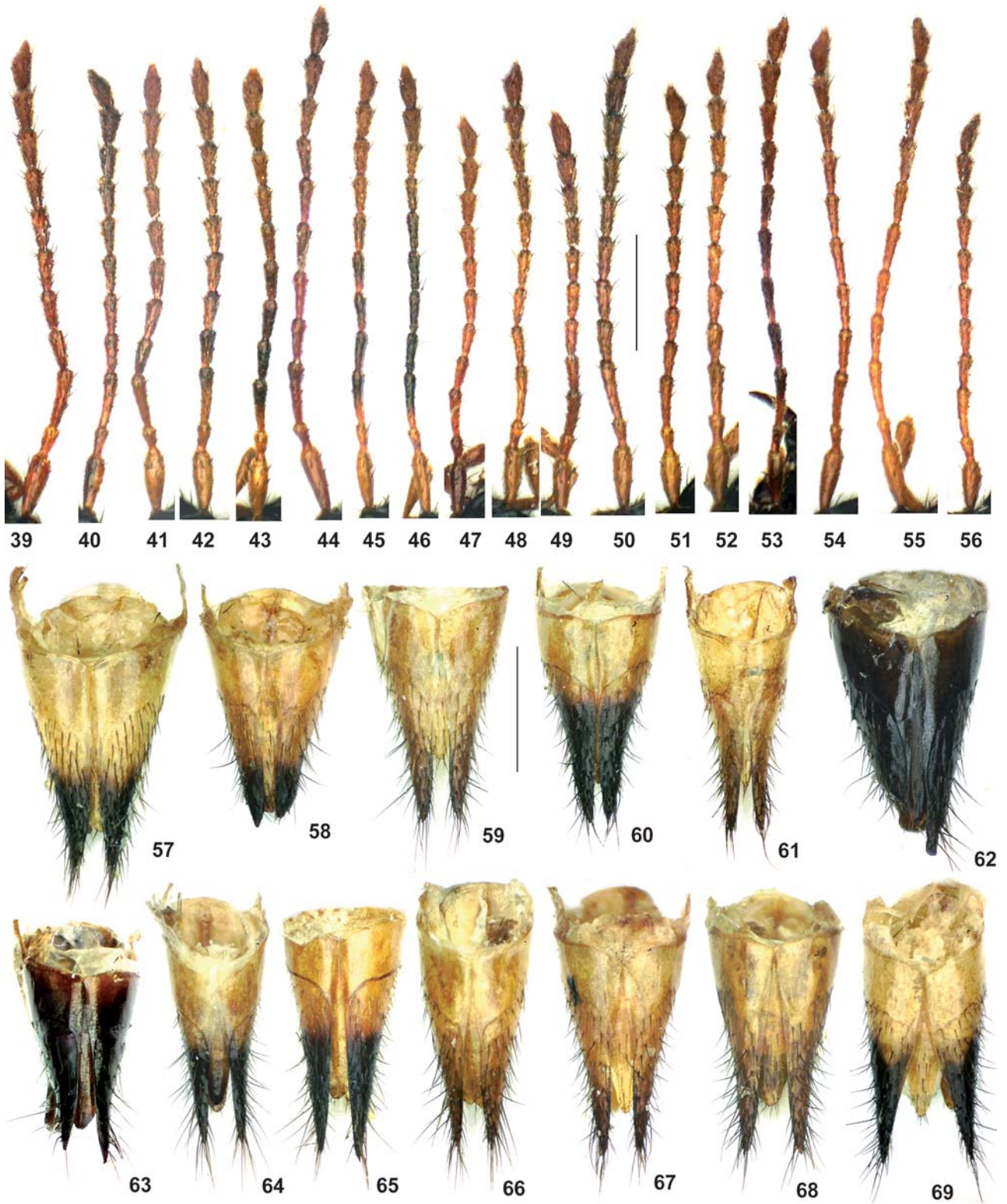
**Figs. 1–19.** Forebody. – 1. *P. flavoterminatus*, paratype. 2. *P. fulvocaudatus*, holotype. 3. *P. virgifer*. 4. *P. incurvatus*. 5. *P. adiectus*. 6. *P. aequilobatus*. 7. *P. furcispinosus*. 8. *P. excisissimus*. 9. *P. formosanus*, paratype. 10. *P. trihamatus*. 11. *P. bivirgatus*. 12. *P. annamontis*. 13. *P. semiflavus*. 14. *P. alesi*. 15. *P. kosempoensis*, lectotype. 16. *P. discurrens*. 17. *P. incisus*. 18. *P. biacutus*. 19. *P. lewisi*, holotype. – Scale bar: 1.0 mm.





**Figs. 20–38.** Abdomen. – 20. *P. flavoterminalis*, paratype. 21. *P. fulvocaudatus*, holotype. 22. *P. virgifer*. 23. *P. incurvatus*. 24. *P. adiectus*. 25. *P. aequilobatus*. 26. *P. furcispinosus*. 27. *P. excisissimus*. 28. *P. formosanus*, paratype. 29. *P. trihamatus*. 30. *P. bivirgatus*. 31. *P. anmamontis*. 32. *P. semiflavus*. 33. *P. alesi*. 34. *P. kosempoensis*, lectotype. 35. *P. discurrens*. 36. *P. incisus*. 37. *P. biacutus*. 38. *P. lewisi*, holotype. – Scale bar: 1.0 mm.





**Figs. 39–69.** Antenna (39–56) and male tergites IX–X (57–69). – 39, 57. *P. flavoterminalis*, paratype. 40, 58. *P. fulvocaudatus*, holotype. 41, 59. *P. virgifer*. 42, 60. *P. incurvatus*. 43, 61. *P. adiectus*. 44, 62. *P. aequilobatus*. 45, 63. *P. furcispinosus*. 46, 64. *P. excisissimus*. 47, 65. *P. formosanus*. 48, 66. *P. trihamatus*. 49, 67. *P. bivirgatus*. 50, 68. *P. anmamontis*. 51, 69. *P. semiflavus*. 52. *P. alesi*. 53. *P. kosempoensis*, lectotype. 54. *P. discurrens*. 55. *P. incisus*. 56. *P. biacutus*. – Scale bars: 1.0 mm.



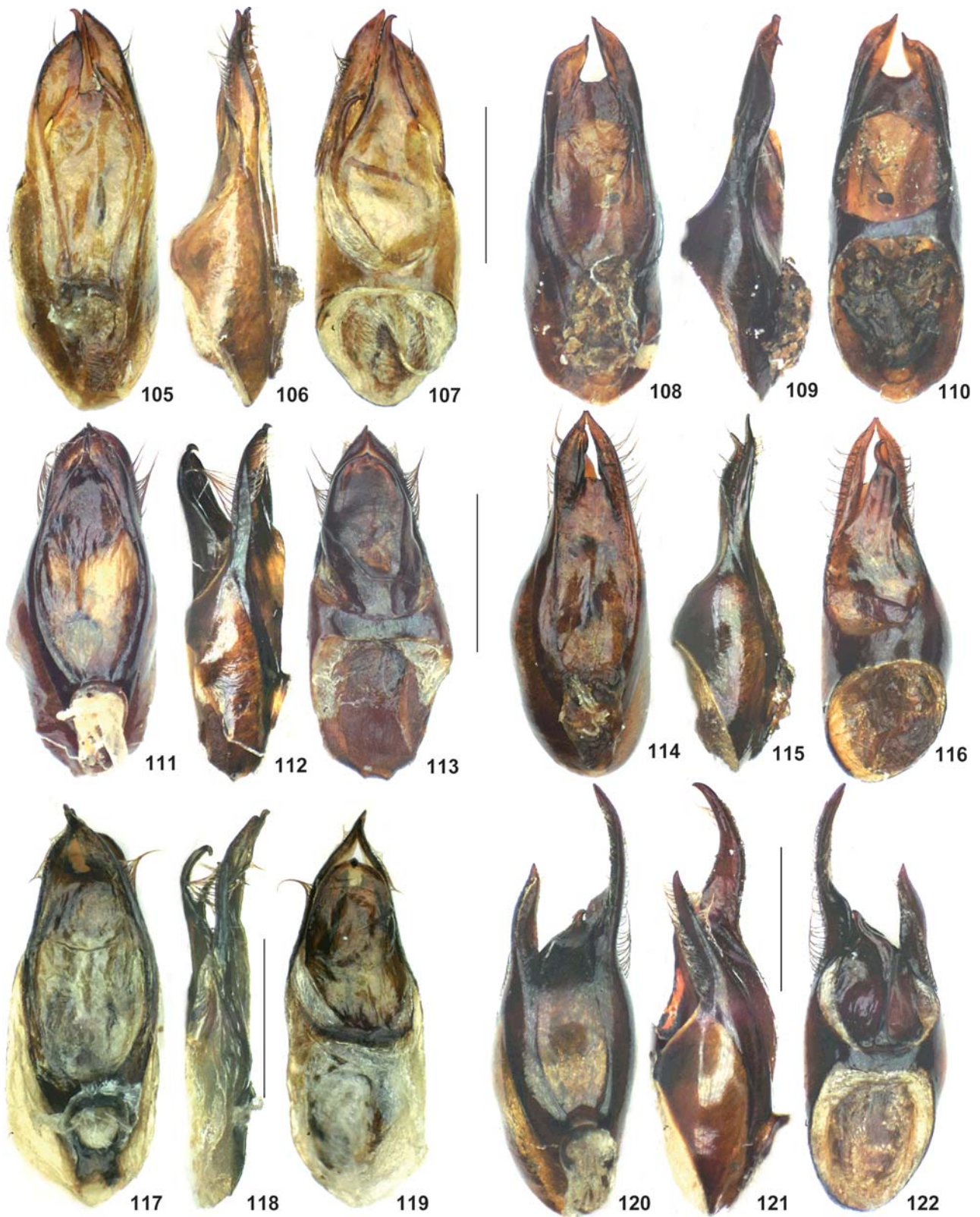
**Figs. 70–86.** Male tergites IX–X (70–74), female tergites IX–X (75), aedeagus in ventral (76, 80, 83), lateral (77, 81, 84), and dorsal view (78, 82, 85), apical portion of aedeagus in dorsal view (79, 86). – 70. *P. alesi*. 71. *P. kosempoensis*, lectotype. 72. *P. discourrens*. 73. *P. biacutus*. 74–75. *P. lewisi*. 76–79. *P. flavotermiatus*, paratype. 80–82. *P. fulvocaudatus*, holotype. 83–86. *P. virgifer*. – Scale bars: 1.0 mm.





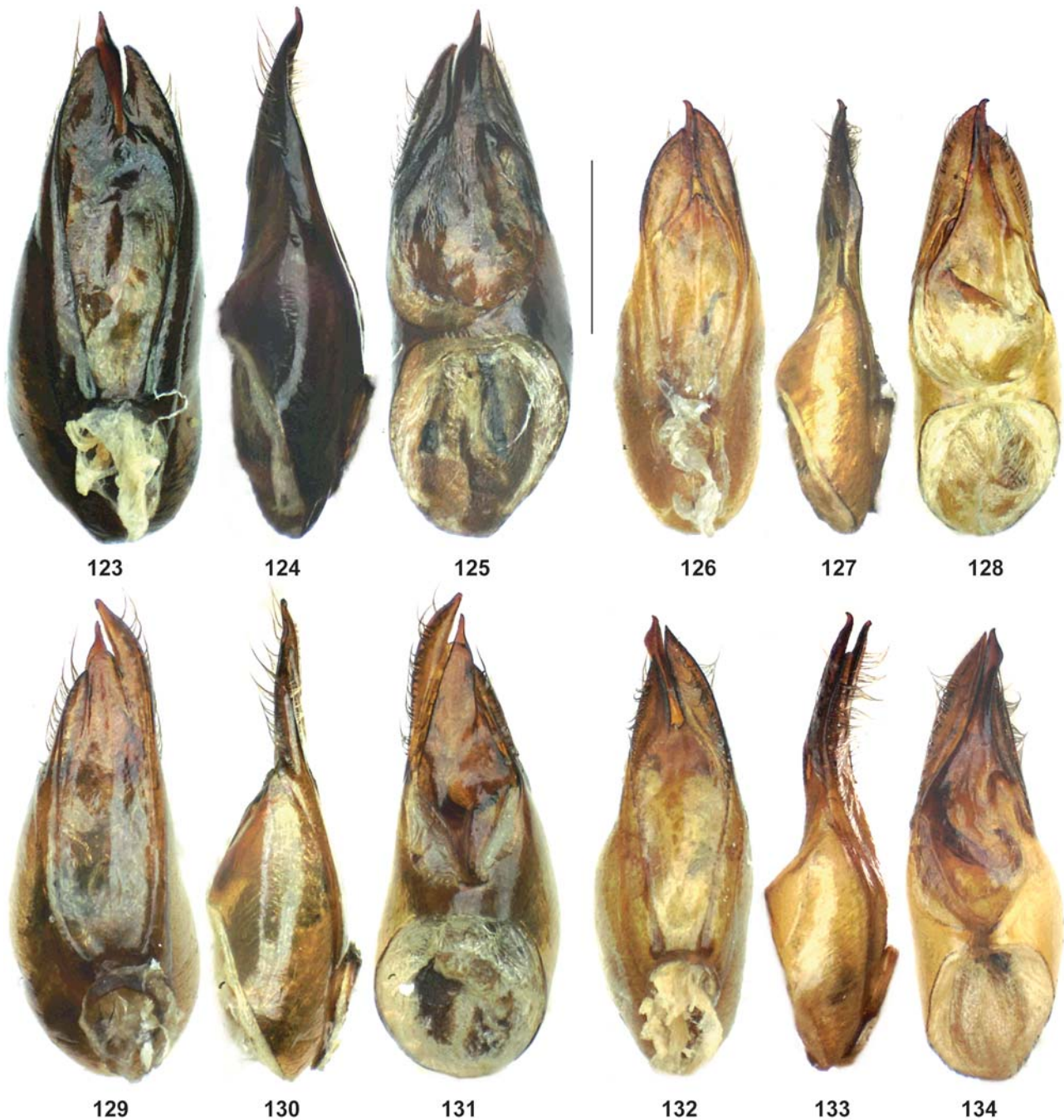
**Figs. 87–104.** Aedeagus in ventral (87, 90, 93, 96, 99, 102), lateral (88, 91, 94, 97, 100, 103), and in dorsal view (89, 92, 95, 98, 101, 104). – 87–89. *P. incurvatus*. 90–92. *P. adiectus*. 93–95. *P. furcispinosus*. 96–98. *P. excisissimus*. 99–101. *P. formosanus*, holotype. 102–104. *P. trihamatus*. – Scale bar: 1.0 mm.





**Figs. 105–122.** Aedeagus in ventral (105, 108, 111, 114, 117, 120), lateral (106, 109, 112, 115, 118, 121), and in dorsal view (107, 110, 113, 116, 119, 122). – **105–107.** *P. anmamontis*. **108–110.** *P. kosempoensis*, lectotype. **111–113.** *P. discurrens*. **114–116.** *P. biacutus*. **117–119.** *P. incisus*. **120–122.** *P. lewisi*. – Scale bars: 1.0 mm (all species, except *P. lewisi*, to scale).





**Figs. 123–134.** Aedeagus in ventral (123, 126, 129, 132), lateral (124, 127, 130, 133), and in dorsal view (125, 128, 131, 134). – 123–125. *P. aequilobatus*. 126–128. *P. bivirgatus*. 129–131. *P. alesi*. 132–134. *P. semiflavus*. – Scale bar: 1.0 mm.

(Figs. 80–82) with apex of dorsal plate far from reaching apex of right paramere and with internal structures of distinctive shapes (Figs. 143–147). – Nantou Hsien. ....  
 ..... *fulvicaudatus*  
 – Head and pronotum with pronounced microreticulation and nearly matt. Pronotum usually dark-reddish to brown, rarely bright reddish; elytra with weak bluish hue; tibiae dark red-

dish with the basal portion more or less extensively blackish. ♂: aedeagus with apex of dorsal plate extending at least to apex of right paramere (ventral view) and with internal structures of different shapes.....**11**  
**11** Body on average more robust and of larger size; length of forebody 5.4–6.5 mm. Apex of tergite VIII usually more or less distinctly infusate (Fig. 20); tibiae less extensively

- infusate in basal portion. ♂: aedeagus (Figs. 76–79) larger, 2.7–2.8 mm long, with apical portion of dorsal plate shorter and less slender, and with internal structures of distinctive shapes (Figs. 137–138). ♀: sternite VIII shaped as in Fig. 139. – Nantou Hsien.....*flavoterminalis*
- Body on average smaller; length of forebody 5.4–5.8 mm. Tergite VIII uniformly yellowish (Fig. 21); tibiae more extensively infusate in basal portion. ♂: aedeagus (Figs. 83–86) smaller, 2.3–2.5 mm long, with apical portion of dorsal plate longer and more slender, and with internal structures of different shapes (Figs. 151–155). ♀: sternite VIII shaped as in Fig. 156. – Nantou Hsien.....*virgifer*
- 12** Head and pronotum without trace of microreticulation.... **13**
- Head and pronotum at least with shallow microreticulation.... **14**
- 13** Large and robust species; length of forebody 6.0 mm. Head large and strongly transverse, nearly 1.2 times as broad as long and broader than pronotum. Eyes small, approximately one-third as long as postocular region from posterior margin of eye to neck in dorsal view. Elytra short, only 0.5 times as long as pronotum (Fig. 14). ♂: sternite VII conspicuously transverse, with unmodified pubescence (Fig. 201); aedeagus (Figs. 129–131) 2.75 mm long, with ventral process, dorsal plate, and with one dorso-apical and four basal internal structures of distinctive shapes (Fig. 203). ♀: unknown. – Hualien Hsien.....*alesi*
- Smaller and less robust species; length of forebody 4.9–5.2 mm. Head smaller and less transverse, approximately 1.1 times as broad as long. Eyes relatively larger, half as long as postocular region from posterior margin of eye to neck in dorsal view. Elytra 0.55–0.60 times as long as pronotum (Fig. 9). ♂: sternite VII less transverse, with unmodified pubescence (Fig. 79); aedeagus (Figs. 99–101) 2.4–2.5 mm long, with ventral process, dorsal plate, and with one dorso-apical and three basal internal structures of different shapes (Figs. 181–183). ♀: sternite VIII as in Fig. 184. – Taoyuan Hsien.....*formosanus*
- 14** Head and pronotum with pronounced microsculpture, nearly matt.....**15**
- Head and especially pronotum with weakly pronounced microsculpture, usually more or less glossy.....**17**
- 15** Tibiae completely black; segment VIII distinctly bicoloured, yellowish with base of sternite VIII, as well as base and apex of tergite VIII blackish (Figs. 32, 199); posterior portion of hemitergites IX blackish (Fig. 69). ♂: aedeagus with ventral process, dorsal plate, and internal structures of distinctive shapes (Figs. 132–134, 200). – Taitung Hsien.....*semiflavus*
- Tibiae paler (yellowish to dark-reddish) at least in apical portion; segment VIII uniformly yellowish (Fig. 194); posterior portion of hemitergites IX yellowish to moderately infusate. ♂: aedeagus with ventral process, dorsal plate, and internal structures of different shapes.....**16**
- 16** Body smaller; length of forebody 5.4 mm. Tibiae dark-yellowish; hemitergites IX moderately infusate in posterior portion; elytra with weak bluish hue. ♂: unknown. – Nantou Hsien.....*alutithorax*
- Body larger; length of forebody 5.4–6.1 mm. Tibiae blackish in basal half and dark-yellowish in apical half; posterior portion of hemitergites very weakly infusate at most (Fig. 68); elytra with more distinct dark-bluish hue (Fig. 12). ♂: aedeagus with ventral process, dorsal plate, and internal structures of distinctive shapes (Figs. 105–107, 195–196). ♀: sternite VIII as in Fig. 197. – Taichung Hsien.....*anmamontis*
- 17** Pronotum less oblong and broader, approximately 1.05 times as long as broad (Fig. 11). ♂: sternite VIII more transverse;

- aedeagus (Figs. 126–128) larger, approximately 2.5 mm long, with parameres of different lengths, an apically more elongated and more slender dorsal plate, with a relatively longer left basal and an apically shorter, more slender, and nearly straight dorso-apical internal structure (Fig. 191). ♀: sternite VIII as in Fig. 192. – Hualien Hsien.....*bivirgatus*
- Pronotum more oblong and more slender, 1.08–1.10 times as long as broad (Fig. 10). ♂: sternite VIII less transverse; aedeagus (Figs. 102–104) smaller, approximately 2.2 mm long, with parameres of subequal length, an apically less elongated and less slender dorsal plate, and with a shorter left basal, and a medially distinctly angled, stouter, and longer dorso-apical structure (Fig. 187). ♀: sternite VIII as in Fig. 188. – Taoyuan Hsien.....*trihamatus*

### 3.5 The *Megalopaederus* species of Taiwan

*Paederus (Megalopaederus) flavoterminalis* Cameron, 1949

(Figs. 1, 20, 39, 57, 76–79, 135–139, 226)

*Paederus flavoterminalis* CAMERON 1949: 466.

#### Type material examined

Paratype ♂: “♂ / Musha, Formosa. V-21-32 / L. GRESSITT Collector / *Paederus flavoterminalis* Cam, Cotype / Co-Type / M. CAMERON. Brequest. B. M. 1955-147. / *Paederus flavoterminalis* Cameron, det. V. ASSING 2014” (BMNH). – Additional paratypes: see type material of *P. virgifer*.

#### Additional material examined

Taiwan: 2 ♂♂, 1 ♀, Nantou Hsien, Meifeng, 2130 m, 3.V.1991, leg. SMETANA [T61] (cSme, cAss); 1 ♀, Nantou Hsien, Meifeng, 2130 m, 3.V.1991, leg. SMETANA [T62] (cSme); 1 ♂, Nantou Hsien, Meifeng, 23.III.1998, leg. SUGAYA (MNHUB); 1 ♂, 1 ♀, Nantou Hsien, Nienkaoshan trail, Yuenhai Hut, 2350 m, 4.V.1992, leg. SMETANA [T112] (cSme, cAss); 6 ♀♀, Nantou Hsien, Houhuan-shan, 2300–2500 m, 15.V.1990, leg. LESAGE (cSme, cAss).

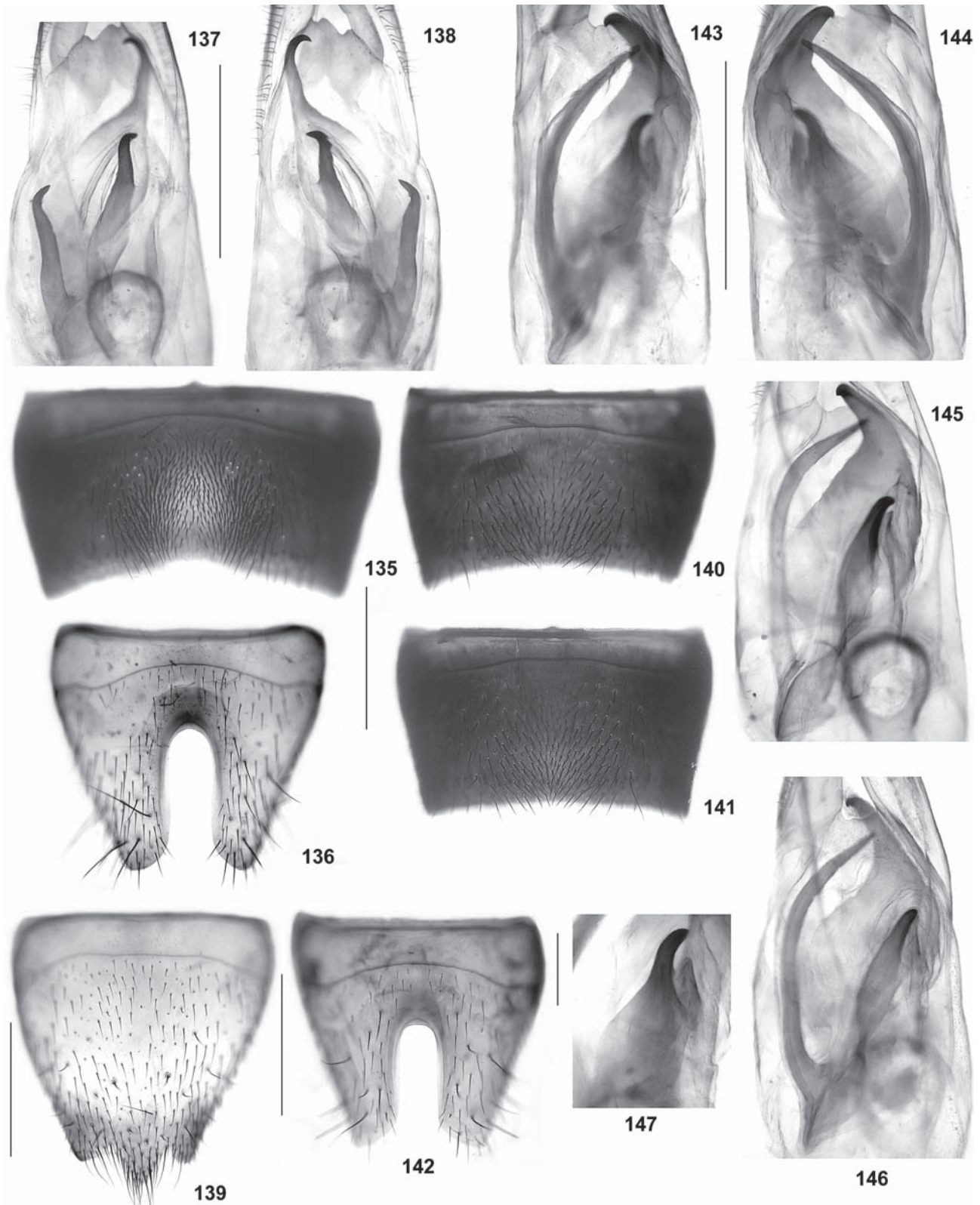
#### Comment

The original description is based on a holotype and 17 paratypes from “Formosa, Musha (V-20-32), Arisan (VI-4-32, V-25-34)”; the type locality is “Formosa, Musha” (today Jenai; 24°02’N, 121°08’E) (CAMERON 1949). Three paratypes, a male from “Musha” in the CAMERON collection and two paratypes (a male and a female) from “Arisan” deposited in USNM, were examined. The latter two specimens are not conspecific with the paratype (and evidently the holotype) from the type locality.

#### Redescription

Large and robust species. Body length 10.0–14.0 mm; length of forebody 5.4–6.5 mm. Coloration (Figs. 1, 20, 39, 57): head black; pronotum bright-reddish to dark-reddish; elytra black with distinct bluish hue; abdomen: segments III–VII black, segments VIII and X pale-yellowish with the extreme apex of tergite VIII usually more or less distinctly





**Figs. 135–147.** *Paederus flavoterminalis* (135–139; 135–138: paratype) and *P. fulvocaudatus* (140–147; 140, 142–144, 147: holotype). – 135, 140–141. Male sternite VII. 136, 142. Male sternite VIII. 137, 143, 145–147. Internal structures of aedeagus in ventral view. 138, 144. Internal structures of aedeagus in dorsal view. 139. Female sternite VIII. – Scale bars: 1.0 mm (135–146), 0.2 mm (147).

infusate, hemitergites IX bicoloured with the anterior half pale-yellowish and the posterior half blackish; legs with the femora black and the remainder (except for the more or less distinctly and more or less extensively infusate bases of the metatibiae) reddish; antennae reddish.

Head (Fig. 1) distinctly transverse, 1.12–1.15 times as broad as long; contours of posterior portion (behind eyes) broadly convex in dorsal view; punctation relatively fine and sparse; interstices much broader than diameter of punctures, with pronounced fine microreticulation; dorsal surface nearly matt. Eyes strongly convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 39) 3.8–4.4 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 1) approximately 1.05 times as long as broad and 1.02–1.05 times as broad as head, strongly convex in cross-section; punctation sparse and slightly more distinct than that of head; midline broadly impunctate; microsculpture similar to that of head, dorsal surface nearly matt.

Elytra (Fig. 1) approximately 0.6 times as long as pronotum and of distinctly trapezoid shape (i. e., strongly dilated posteriad); humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 20) approximately 1.15 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with distinct fine microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 135) moderately strongly transverse, with pronounced impression in postero-median portion, this impression with conspicuously dense and short setae, posterior margin distinctly concave; sternite VIII (Fig. 136) distinctly transverse, nearly 1.2 times as broad as long, posterior excision U-shaped and deep, nearly 0.6 times as deep as length of sternite; tergites IX and X as in Fig. 57; aedeagus (Figs. 76–79) large, 2.7–2.8 mm long; ventral process apically tridentate; right paramere distinctly longer than left paramere, apically acute; left paramere truncate; dorsal plate slightly asymmetric, apically elongated and weakly hooked; internal sac (Figs. 137–138) with two basal and one apical sclerotized spines of distinctive shapes, all spines apically hooked.

♀: sternite VIII (Fig. 139) oblong, posteriorly with distinct process of acutely triangular shape.

#### Comparative notes

*Paederus flavoterminalis* is characterized particularly by the coloration, the large and robust body, the mor-

phology of the aedeagus, and by the shape and chaetotaxy of the male sternite VII.

#### Distribution and natural history

This species is currently known from several localities in Nantou Hsien (Fig. 226); the type locality is situated at 24°02'N, 121°08'E. The specimens were collected at altitudes of 2130–2350 m, partly together with the sympatric *P. fulvocaudatus*, in March and May. The material collected by A. SMETANA and L. LESAGE was sifted from debris among lush vegetation along a deserted forest road (T61) and from moss and humus on and under huge fallen trees (T62) in a broad-leaved forest, sifted from lush vegetation and litter along a small stream in a broad-leaved evergreen forest with mixed pine trees (T112), and swept from vegetation along a highway in Houhouanshan, respectively (SMETANA pers. comm.).

*Paederus (Megalopaederus) fulvocaudatus* Adachi, 1939, **n. stat.**

(Figs. 2, 21, 40, 58, 80–82, 140–147, 227)

*Paederus kosempoensis* var. *fulvocaudatus* ADACHI 1939: 166.

#### Type material examined

Holotype ♂: “Musha-Tatsutaka [today Sunkang; 24°03'N, 121°10'E], Formosa, 24.May.1927, K. YOKOYAMA. / ♂ / Holotype / *Paederus kosempoensis* Bernh. var. *fulvocaudatus* Adachi, det. T. ADACHI / *Paederus fulvocaudatus* Adachi, det. V. ASSING 2014” (cOhn). – Paratype: see type material of *P. virgifer*.

#### Additional material examined

Taiwan: 1 ♂, Nantou Hsien, Meifeng, 2130 m, 10.VII.1993, leg. SMETANA [T146] (cSme); 1 ♂, Nantou Hsien, Meifeng, 2130 m, yellow pan traps, 10–17.VII.1993, leg. SMETANA [T147] (cAss); 4 ♂♂, 7 ♀♀, Nantou Hsien, Meifeng, 23.III.1998, leg. SUGAYA (MNHUB, cAss); 1 ♂, Nantou Hsien, Nan-shan-hsi [“Nanchanchi”; 24°00'N, 121°04'E], 24.VI.1998, leg. SUGAYA (cAss); 1 ♂, 2 ♀♀, Nantou Hsien, Sunkang-Tsifeng, 2000–2300 m, 29.VI.1965, leg. NAKANE (NSMT); 4 ♀♀ [one teneral; two infested with Laboulbeniales], Nantou Hsien, Rueiyan River Major Wildlife Habitat, 24°06'N, 121°11'E, 2100 m, from small bracket fungi, 8.VIII.2008, leg. MENDEL & BARCLAY (BMNH, cAss); 1 ♀, Nantou Hsien, 24°03'N, 121°13'E, 1920 m, 6.VIII.2008, leg. BARCLAY, MENDEL & EVERS (BMNH).

#### Comment

The original description is based on a male holotype from “Formosa: Musha” and a female paratype from “Formosa: Mt. Ari” (= Ali Shan) deposited in “YOKOYAMA’S collection ... in Tokyo Agricultural University” and in “col. HIROSHI INOUE”, respectively (ADACHI 1939). The two type specimens, which were found in the private collection of MASAO OHNO, are not conspecific; the paratype belongs to *P. virgifer* (see the following section). An examination of the holotype revealed that *P. fulvocaudatus* represents a



distinct species that is more closely allied to *P. flavoterminatus* and the following species than to *P. kosempoensis*.

#### Redescription

Body length 10.0–11.5 mm; length of forebody 5.4–5.7 mm. Coloration (Figs. 2, 21, 40, 58): head black; pronotum bright reddish; elytra black with distinct bluish hue; abdomen: segments III–VII black, segments VIII and X pale-yellowish, tergite VIII sometimes slightly infuscate at apex, hemitergites IX bicoloured with the anterior half pale-yellowish and the posterior half blackish; legs with the femora black and the remainder reddish; antennae reddish.

Head (Fig. 2) distinctly transverse, 1.07–1.10 times as broad as long; contours of posterior portion (behind eyes) weakly convex (nearly straight) in dorsal view, converging towards neck from posterior margin of eyes, posterior angles obsolete; punctation moderately coarse and sparse, in median and anterior dorsal portions very sparse; interstices much broader than diameter of punctures, with distinct fine microreticulation. Eyes strongly convex, slightly less than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 40) 3.8–4.0 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 2) 1.07–1.10 times as long as broad and 0.97–1.02 times as broad as head, strongly convex in cross-section; punctation sparse and slightly more distinct than that of head; midline broadly impunctate; microsculpture shallow, dorsal surface glossy.

Elytra (Fig. 2) 0.65–0.70 times as long as pronotum and of distinctly trapezoid shape (i. e., strongly dilated posteriorly); humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I shorter than the combined length of II and III.

Abdomen (Fig. 21) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with distinct fine microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Figs. 140–141) moderately strongly transverse, with shallow impression in postero-median portion, this impression with moderately dense and moderately short setae, posterior margin weakly concave; sternite VIII (Fig. 142) distinctly transverse, 1.15 times as broad as long, posterior excision U-shaped and deep, 0.55 times as deep as length of sternite; tergites IX and X as in Fig. 58; aedeagus (Figs. 80–82) approximately 2.5 mm long; right paramere slightly longer than left paramere, both parameres acute; dorsal plate slightly asymmetric, apically elongated and weakly hooked; internal sac (Figs. 143–147) with two basal and one apical scler-

otized spines of distinctive shapes, the left basal spine (ventral view) long, strongly curved, and rod-shaped.

♀: sternite VIII of similar shape as in *P. flavoterminatus*.

#### Intraspecific variation

The shape of the right basal internal structure of the aedeagus is subject to some intraspecific variation. Moreover, the apex of the abdominal tergite VIII may be yellowish or somewhat infuscate.

#### Comparative notes

From the similarly coloured and geographically close *P. flavoterminatus*, *P. fulvocaudatus* is distinguished by the smaller and less robust body, the differently shaped head, the on average paler coloration of the pronotum, the uniformly yellowish tergite VIII (but see above), the shorter metatarsomere I, the less strongly microsculptured glossy pronotum, the less transverse male sternite VII with a shallower postero-median impression and with a weakly modified chaetotaxy, as well as by the smaller aedeagus with internal structures of different shapes (particularly the rod-like basal structure).

#### Distribution and natural history

The species is known from several localities in Nantou Hsien (Fig. 227). The specimens were found from March through August, partly together with the sympatric *P. flavoterminatus*. The specimens collected by A. SMETANA were sifted from moss on fallen trees, rotting wood, leaf litter, and other debris (T146) and caught with a yellow pan trap (T147) in a primary broad-leaved evergreen forest (SMETANA pers. comm.). Some specimens were found on fungi. The altitudes range from 1920 to 2300 m. One specimen collected in August is teneral, two are infested with Laboulbeniales.

#### *Paederus (Megalopaederus) virgifer* n. sp.

(Figs. 3, 22, 41, 59, 83–86, 148–156, 226)

*Paederus kosempoensis* var. *fulvocaudatus*, partim: ADACHI (1939); misidentification.

*Paederus flavoterminatus*, partim: CAMERON (1949); misidentification.

#### Type material

Holotype ♂: “Taiwan Chiai Hsien, Yushan N. P., Mun-Li Cliff, 2700 m 27.IV.1990, A. SMETANA [T28] / Holotypus ♂ *Paederus virgifer* sp. n., det. V. ASSING 2014” (cSme).

Paratypes: 2 ♂♂, 1 ♀ [1 ♂ slightly teneral]: same data as holotype (cSme, cAss); 1 ♀: “Taiwan Nantou Hsien, Yushan N. P., Mun-Li Cliff, 2700 m 18.V.91, A. SMETANA [T86]” (cSme); 1 ♂, 4 ♀♀: “Taiwan: Alishan, Chiai Hsien, 2180 m, 24.IV.1990 Sister Ponds. Fauch. forêt, LESAGE 90-24” (cSme, cAss); 1 ♂, 2 ♀♀: “Taiwan Chiai Hsien, Alishan, 2200 m 26.IV.1990, A. SMETANA [T25]” (cAss); 1 ♀: “Mt. Ari (2.200 m) Formosa, 9-June-1938.

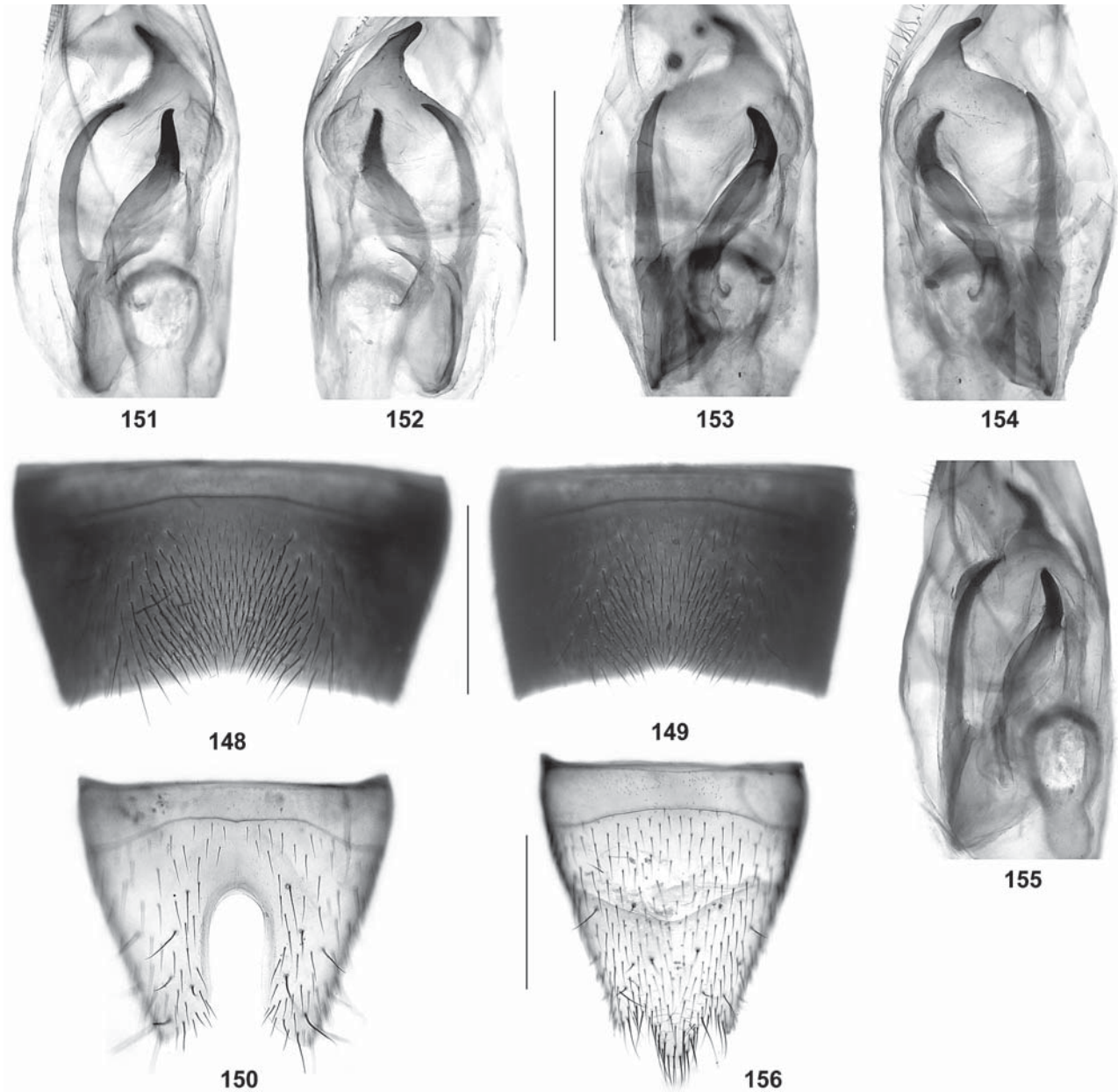
Coll. HIROSHI INOUE. / ♀ / Allotype / *Paederus kosempoensis* Bernh. var. *fulvocaudatus* Adachi, det. T. ADACHI” (cOhn); 1 ♂, 1 ♀: “Formosa, Arisan, V25°34 / JLGRESSIT Collector / Paratype [of *P. flavoterminalis*] No. 53738, USNM” (USNM); 1 ♀: “Taiwan, Alishan, 2300 m, Nantou Hsien, 5–6.VII.1965, leg. T. YAMASAKI” (NSMT); 1 ♀: “Taiwan: Chiayi Co., Alishan, Nat. Scen. Area, Rd 18, km 85 / + Rd to Youth Activ. Center, ca. 2000 m, for. litter, 11.IV.2009, S. Vit” (MHNG); 2 ♂♂: “Taiwan, Nantou/Chiayi Co., SE of Alishan, 2300 m, 23°28'20"N, 120°51'E, L. DEMBICKÝ leg., 6.–8.XI.2008, BMNH 2008-85” (BMNH, cAss).

#### Etymology

The specific epithet (Latin, adjective: carrying a rod) alludes to the rod-shaped basal internal structure of the aedeagus.

#### Comment

*Paederus virgifer* has been confounded with the two preceding species. The paratypes listed above include previously misidentified paratypes of *P. flavoterminalis* and *P. fulvocaudatus*.



**Figs. 148–156.** *Paederus virgifer* (148, 150–152: Yushan; 149, 153–154, 156: Alishan; 155: paratype of *P. flavoterminalis*). – **148–149.** Male sternite VII. **150.** Male sternite VIII. **151, 153, 155.** Internal structures of aedeagus in ventral view. **152, 154.** Internal structures of aedeagus in dorsal view. **156.** Female sternite VIII. – Scale bars: 1.0 mm.



## Description

Body length 10.0–13.0 mm; length of forebody 5.4–5.8 mm. Coloration (Figs. 3, 22, 41, 59): head black; pronotum dark-reddish to dark reddish-brown; elytra black with distinct bluish hue; abdomen: segments III–VII black, segments VIII and X pale-yellowish, hemitergites IX pale-yellowish, posteriorly weakly infusate at most; legs with the femora black, the tibiae dark-reddish with the basal portion more or less extensively blackish-brown to blackish, and the tarsi reddish; antennae reddish.

Head (Fig. 3) distinctly transverse, 1.12–1.15 times as broad as long; contours of posterior portion (behind eyes) strongly convex in dorsal view, posterior angles weakly marked; punctation rather fine and sparse, in median and anterior dorsal portions somewhat sparser; interstices much broader than diameter of punctures, with pronounced fine microreticulation rendering the dorsal surface nearly matt. Eyes strongly convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 41) 3.8–4.1 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 3) approximately 1.05 times as long as broad and 1.03–1.05 times as broad as head, strongly convex in cross-section; punctation sparse and slightly more distinct than that of head; midline broadly impunctate; microsculpture similar to that of head.

Elytra (Fig. 3) approximately 0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I shorter than the combined length of II and III.

Abdomen (Fig. 22) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with distinct fine microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Figs. 148–149) strongly transverse, with distinct impression in postero-median portion, this impression with very dense and short setae, posterior margin weakly concave; sternite VIII (Fig. 150) distinctly transverse, posterior excision U-shaped and deep, approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 59; aedeagus (Figs. 83–86) 2.3–2.5 mm long; right paramere longer than left paramere, both parameres acute apically; dorsal plate slightly asymmetric, apically strongly elongated and weakly hooked, extending at least to, usually beyond, apex of right paramere; internal sac (Figs. 151–155) with two basal and one apical sclerotized spines of distinctive shapes, the left basal spine (ventral view) long, smoothly curved, and rod-shaped.

♀: sternite VIII oblong, shaped as in Fig. 156.

## Comparative notes

*Paederus virgifer* is distinguished from the similarly coloured and geographically close *P. flavoterminalis* and *P. fulvocaudatus*, with which it was previously confounded, by the posteriorly less strongly darkened hemitergites IX, as well as by the apically more strongly elongated dorsal plate and the shapes of the internal structures of the aedeagus. It additionally differs from *P. fulvocaudatus* by the darker coloration of the pronotum, the darker tibiae, the more pronounced microsculpture on the head and pronotum, and by the more transverse male sternite VII with a more distinctly modified chaetotaxy, and from *P. flavoterminalis* by smaller average size and the uniformly yellowish tergite VIII.

## Distribution and natural history

The known distribution is confined to the Alishan and the Yushan regions in Nantou Hsien (Fig. 226). The altitudes range from 2000 to 2700 m. The material collected by A. SMETANA was found crawling on the rails of a narrow gauge forest railway (T25) and sifted from moss, old vegetation, and various forest floor debris in an original, mostly coniferous forest with dense undergrowth (T28, T86) (SMETANA pers. comm.). The specimens collected by L. LESAGE were swept from vegetation along a road (SMETANA pers. comm.).

*Paederus (Megalopaederus) incurvatus* n. sp.  
(Figs. 4, 23, 42, 60, 87–89, 157–161, 226)

## Type material

Holotype ♂: “Taiwan, Kaohsiung Hsien, Peinantashan trail, 2250 m, 4.VII.1993, A. SMETANA [T137] / Holotypus ♂ *Paederus incurvatus* sp. n., det. V. ASSING 2014” (cSme).

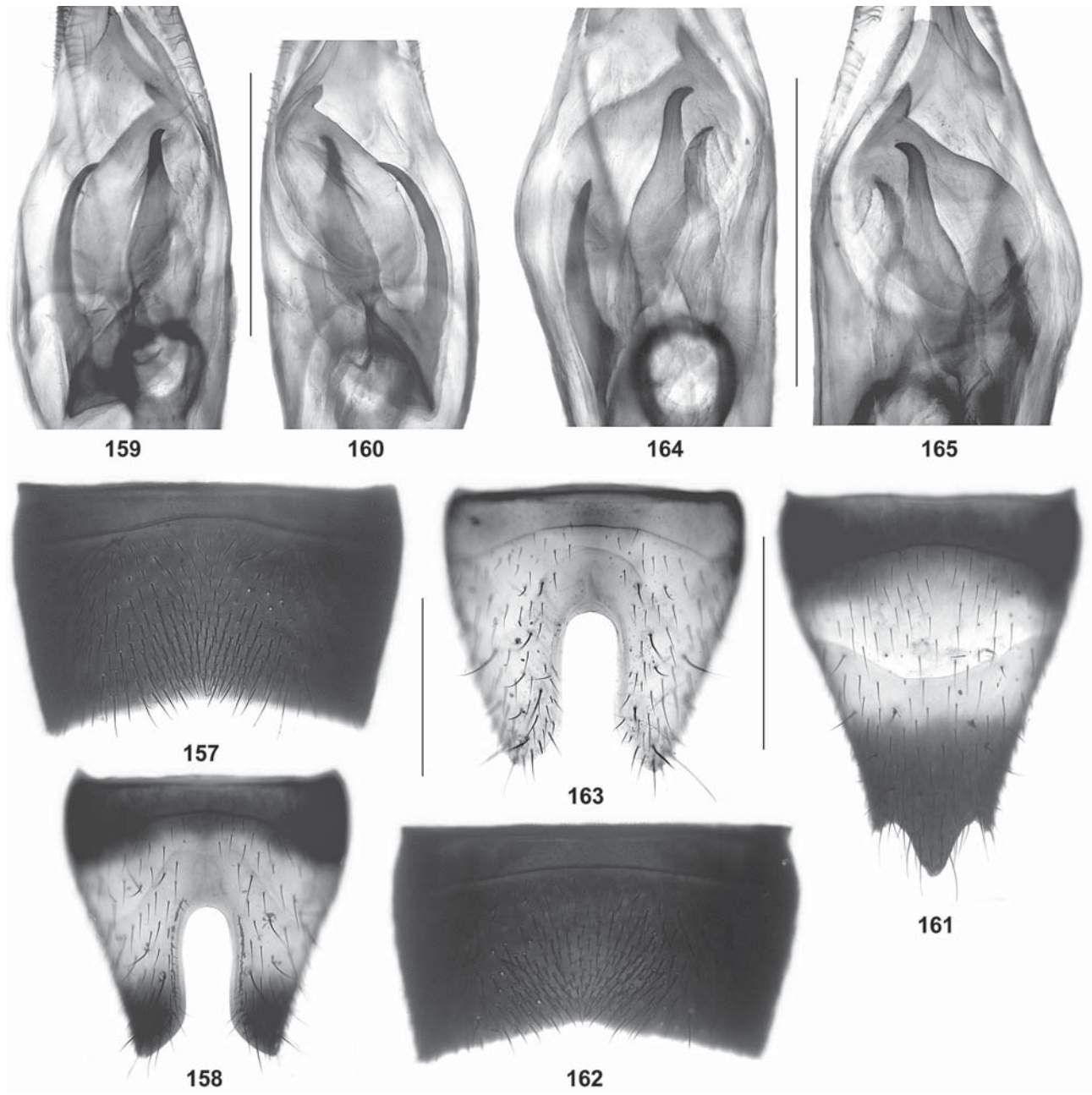
Paratypes: 2 ♂♂, 3 ♀♀: same data as holotype (cSme, cAss); 2 ♀♀: “Taiwan, Kaohsiung Hsien, Peinantashan trail, 2500 m, 4.VII.1993, A. SMETANA [T136]” (cSme); 1 ♀: “Taiwan, Kaohsiung Hsien, Peinantashan trail, 2065 m, 6.VII.1993, A. SMETANA [T140]” (cSme); 2 ♀♀: “Taiwan, Kaohsiung Hsien, Peinantashan trail, 2080 m, 6.VII.1993, A. SMETANA [T141]” (cSme); 2 ♂♂: “Taiwan, Kaohsiung Hsien, Peinantashan trail, 2020 m, 7.VII.1993, A. SMETANA [T143]” (cSme, cAss); 2 ♀♀: “Taiwan, Kaohsiung Hsien, Peinantashan trail, 2000 m, 7.VII.1993, A. SMETANA [T144]” (cSme, cAss); 2 ♂♂, 4 ♀♀: “Taiwan, Kaohsiung Hsien, Kuanshan trail at Kaunshanchi Riv., 2400 m, 20.IV.1992, A. SMETANA [T94]” (cSme, cAss).

## Etymology

The specific epithet is the past participle of the Latin verb *incurvare* (to bend) and alludes to the curved long basal internal structure of the aedeagus.

## Description

Body length 9.7–11.0 mm; length of forebody 5.0–5.6 mm. Coloration (Figs. 4, 23, 42, 60): head black; pro-



**Figs. 157–165.** *Paederus incurvatus* (157–161) and *P. adiectus* (162–165). – **157, 162.** Male sternite VII. **158, 163.** Male sternite VIII. **159, 164.** Internal structures of aedeagus in ventral view. **160, 165.** Internal structures of aedeagus in dorsal view. **161.** Female sternite VIII. – Scale bars: 1.0 mm.

notum reddish to dark-reddish; elytra black with distinct bluish hue; abdomen: segments III–VII black, segment VIII yellowish with the base and the apex brown to black, hemitergites IX yellowish anteriorly and black posteriorly, tergite X yellowish; legs black, with the tarsi slightly paler (brown to blackish brown); antennae reddish, with the apices of antennomeres III–V more or less distinctly darker.

Head (Fig. 4) transverse and of rather variable shape, 1.07–1.15 times as broad as long, on average more transverse in male than in female; contours of posterior portion (behind eyes) usually converging from posterior margin of eyes, on average more convex in male than in female; posterior angles mostly weakly marked in male and obsolete in female; punctuation rather fine and sparse; interstices



several times as broad as diameter of punctures, with pronounced fine microreticulation rendering the dorsal surface nearly matt. Eyes moderately convex, usually slightly more than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 42) 3.5–4.0 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 4) 1.05–1.10 times as long as broad and approximately as broad as head, strongly convex in cross-section; punctation sparse and slightly more distinct than that of head; midline broadly impunctate; microsculpture similar to that of head.

Elytra (Fig. 4) approximately 0.65 times as long as pronotum and strongly dilated posteriad; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I shorter than the combined length of II and III.

Abdomen (Fig. 23) approximately 1.10–1.15 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with pronounced fine microsculpture composed of transverse meshes; tergite VII somewhat more glossy than anterior tergites; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 157) moderately strongly transverse, with shallow impression in postero-median portion, this impression with moderately dense and moderately short setae, posterior margin weakly concave; sternite VIII (Fig. 158) weakly transverse, posterior excision U-shaped and deep, nearly 0.55 times as deep as length of sternite; tergites IX and X as in Fig. 60; aedeagus (Figs. 87–89) approximately 2.5 mm long; right paramere longer than left paramere, both parameres acute apically; ventral process apically notched or unnotched; dorsal plate slightly asymmetric, apically strongly elongated and hooked, extending slightly beyond apex of right paramere; internal sac (Figs. 159–160) with two basal and one dorso-apical sclerotized spines of distinctive shapes, the left basal spine (ventral view) moderately long and strongly curved.

♀: sternite VIII distinctly oblong, shaped as in Fig. 161.

#### Intraspecific variation

The aedeagus of the male from Kuanshan is distinguished from those from Peinantashan by the apically unnotched ventral process and by the longer apical process of the dorso-apical internal structure. Since no other distinguishing characters were found, these differences are interpreted as intra- rather than interspecific variation.

#### Comparative notes

Among the species with a distinctly microsculptured reddish pronotum, *P. incurvatus* is characterized particularly by the bicoloured abdominal segment VIII (base

and apex infusate, middle yellow), the apically infusate antennomeres III–V, the black tibiae, and by the morphology of the aedeagus (shapes of dorsal plate and of internal structures).

#### Distribution and natural history

The type specimens were collected in several localities along the Peinantashan Trail and one in Kuanshan, Kaohsiung Hsien (Fig. 226), at altitudes of 2000–2500 m. They were found by sifting moss, dead vegetation, and humus among dense shrubs along a river (T94), by sifting moist to wet debris and leaf litter among dense shrubs (T136), by sifting leaf litter and various debris around tree stumps and along fallen trees in a secondary mixed forest (T137), by sifting various debris and leaf litter along the “in slope” wall of an old overgrown logging road in a broad-leaved evergreen forest (T141, T144), and by sifting mushrooms, moss, bark, and debris along large fallen trees in a mature broad-leaved evergreen forest (T143) (SMETANA pers. comm.).

#### *Paederus (Megalopaederus) adiectus* n. sp.

(Figs. 5, 24, 43, 61, 90–92, 162–165, 226)

#### Type material

**Holotype** ♂: “Taiwan, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2130 m, 27.IV.1992, A. SMETANA [T101] / Holotypus ♂ *Paederus adiectus* sp. n., det. V. ASSING 2014” (cSme).

**Paratypes**: 2 ♂♂: same data as holotype (cAss); 3 ♀♀: same data as holotype, but “30.IV.1992 ... [T109]” (cSme, cAss); 1 ♀: “Taiwan, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2125 m, 27.IV.1992, A. SMETANA [T102]” (cSme); 1 ♀: “Taiwan, Pingtung Hsien, Peitawushan ridge, 2800–2910 m, 28.IV.1992, A. SMETANA [T105]” (cSme); 1 ♂, 2 ♀♀: “Taiwan, Pingtung Hsien, Peitawushan, above Kuai-Ku Hut, 2750 m, 29.IV.1992, A. SMETANA [T107]” (cSme, cAss).

#### Etymology

The specific epithet is the past participle of the Latin verb *adicere* (to add) and alludes to the presence of an additional basal internal structure of the aedeagus.

#### Description

Body length 10.0–11.0 mm; length of forebody 5.0–5.5 mm. Coloration (Figs. 5, 24, 43, 61): head black; pronotum reddish; elytra black with distinct bluish hue; abdomen: segments III–VII black, segment VIII yellowish with the apex of tergite VIII often more or less distinctly infusate, hemitergites IX yellowish, sometimes infusate in posterior half, tergite X yellowish; legs black with brown tarsi; antennae reddish, with antennomeres III–V more or less distinctly darker.

Head (Fig. 5) transverse, 1.07–1.13 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, broadly convex;

posterior angles usually practically obsolete; punctation moderately fine and sparse; interstices much broader than diameter of punctures, with pronounced fine microreticulation rendering the dorsal surface nearly matt. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 43) 3.7–4.0 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 5) approximately 1.07 times as long as broad and 1.00–1.04 times as broad as head, strongly convex in cross-section; punctation and microsculpture similar to those of head; midline broadly impunctate.

Elytra (Fig. 5) approximately 0.6 times as long as pronotum and strongly dilated posteriad; humeral angles obsolete; punctation moderately coarse and moderately dense. Hind wings completely reduced. Metatarsomere I slightly shorter than the combined length of II and III.

Abdomen (Fig. 24) approximately 1.1–1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with distinct fine microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 162) strongly transverse, with moderately deep impression in postero-median portion, this impression with dense and moderately short setae, posterior margin weakly concave; sternite VIII (Fig. 163) moderately transverse, posterior excision U-shaped and deep, approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 61; aedeagus (Figs. 90–92) 2.3–2.4 mm long; right paramere longer than left paramere, both parameres acute apically; dorsal plate slightly asymmetric, apically strongly elongated and weakly hooked, extending to, or slightly beyond, apex of right paramere; internal sac (Figs. 164–165) with three basal and one dorso-apical sclerotized spines of distinctive shapes, the left basal spine (ventral view) relatively short and weakly curved, the right basal spine small and apically hooked.

♀: sternite VIII distinctly oblong, of similar shape as in *P. virgifer* and *P. incurvatus*.

#### Comparative notes

Among the species with a distinctly microsculptured reddish pronotum and a yellowish abdominal segment VIII, *P. adiectus* is characterized particularly by the morphology of the aedeagus, especially the shape of the dorsal plate, the presence of an additional basal structure, and the shapes of the other internal structures.

#### Distribution and natural history

The type specimens were found in several geographically close localities in the Peitawushan in Pingtung Hsien

(Fig. 226) at altitudes between approximately 2100 and 2900 m. They were collected by sifting forest floor debris (T101) and lush vegetation, debris, and moss (T102) in an original broad-leaved evergreen forest, by sifting various debris on the main ridge of Peitawushan with solitary fir trees, undergrowth of bamboo, juniper, and rhododendron (T105), and by sifting rotting garbage (T109) (SMETANA pers. comm.).

#### *Paederus (Megalopaederus) aequilobatus* n. sp.

(Figs. 6, 25, 44, 62, 123–125, 166–170, 226)

#### Type material

Holotype ♂: “Taiwan, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2125 m, 21.V.1991, A. SMETANA [T88] / Holotypus ♂ *Paederus aequilobatus* sp. n., det. V. ASSING 2014” (cAss).

Paratype: 1 ♀: same data as holotype (cSme).

#### Etymology

The specific epithet (Latin, adjective) alludes to the subequal length of the parameres, one of the characters distinguishing this species from most other Taiwanese *Megalopaederus* species with a reddish and microsculptured pronotum.

#### Description

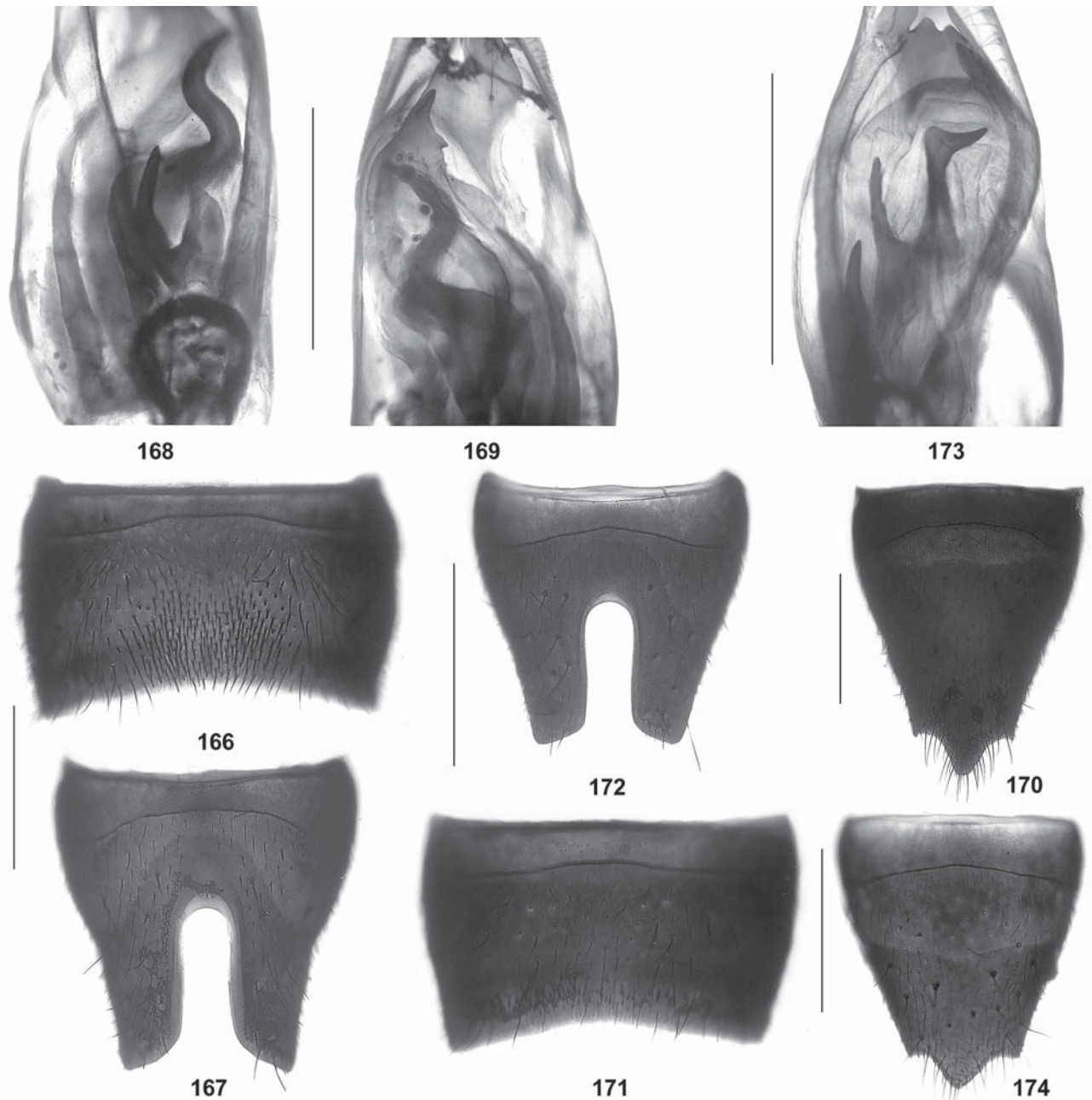
Large and robust species. Body length 12.0–13.0 mm; length of forebody 6.2–6.3 mm. Coloration (Figs. 6, 25, 44, 62): head black; pronotum reddish; elytra black with indistinct bluish hue; abdomen completely black; legs black with dark-brown tarsi; antennae reddish, with apices of antennomeres III–V indistinctly darker at most.

Head (Fig. 6) large, larger and more transverse in male than in female, 1.17 and 1.07 times as broad as long in male and in female, respectively; contours of posterior portion (behind eyes) converging from posterior margin of eyes, strongly convex in male and weakly convex in female in dorsal view; punctation moderately fine and moderately sparse; interstices much broader than diameter of punctures, with pronounced microreticulation rendering the dorsal surface nearly matt. Eyes moderately convex, slightly less than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 44) 4.4–4.7 mm long and slender, antennomeres IV–VIII approximately three times as long as broad.

Pronotum (Fig. 6) 1.09 times as long as broad, 0.94 times as broad as head in male, and approximately as broad as head in female; strongly convex in cross-section; punctation and microsculpture similar to those of head; midline broadly impunctate.

Elytra (Fig. 6) approximately 0.6 times as long as pronotum and strongly dilated posteriad; humeral angles obsolete; punctation moderately coarse and moderately dense. Hind wings completely reduced. Metatarsomere I slightly shorter than the combined length of II and III.





**Figs. 166–174.** *Paederus aequilobatus* (166–170) and *P. furcispinosus* (171–174). – **166, 171.** Male sternite VII. **167, 172.** Male sternite VIII. **168, 173.** Internal structures of aedeagus in ventral view. **169.** Internal structures of aedeagus in dorsal view. **170, 174.** Female sternite VIII. – Scale bars: 1.0 mm.

Abdomen (Fig. 25) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices distinctly broader than diameter of punctures, with pronounced microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 166) strongly transverse, with moderately deep impression in postero-median portion, this impression with a cluster of dense short stout setae, posterior margin weakly concave; sternite VIII (Fig. 167) very weakly transverse, posterior excision U-shaped and deep, approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 62; aedeagus (Figs. 123–

125) 2.9 mm long; parameres of subequal length and with rather blunt apices; dorsal plate slightly asymmetric, apically elongated and acute, extending beyond parameral apices; internal sac (Figs. 168–169) with four basal and one dorso-apical sclerotized spines of distinctive shapes, the left basal spine (ventral view) long and weakly curved, the two median basal structures stout and spine-shaped, and the right basal spine massive and shaped like a corkscrew.

♀: sternite VIII (Fig. 170) distinctly oblong, posteriorly with a median process of triangular shape.

#### Comparative notes

*Paederus aequilobatus* is readily distinguished from other species with a microsculptured reddish pronotum by its robust body, its coloration (elytra only with indistinct bluish hue; abdomen completely black), and by the morphology of the aedeagus (strongly sclerotized; parameres of subequal length; shapes of dorsal plate and of internal structures; presence of four basal structures).

#### Distribution and natural history

The type locality is situated in the Peitawushan in Pingtung Hsien (Fig. 226) at an altitude of 2125 m. The distribution overlaps with that of *P. adiectus*. The specimens were collected by sifting layers of accumulated moist leaf litter in a dry stream bed in an original broad-leaved evergreen forest (SMETANA pers. comm.).

#### *Paederus (Megalopaederus) furcispinosus* n. sp.

(Figs. 7, 26, 45, 63, 93–95, 171–174, 227)

#### Type material

**Holotype** ♂: “Taiwan: Shanlinhsi, 10.V.1990, Fauchage dans forêt primaire, L. LESAGE LL90-41 / Holotypus ♂ *Paederus furcispinosus* sp. n., det. V. ASSING 2014” (cSme).

**Paratypes**: 3 ♀♀: same data as holotype (cSme, cAss); 1 ♂: “Taiwan Nantou Hsien, Shanlinchi, 1650 m 16.V.1990, A. SMETANA [T60]” (cAss).

#### Etymology

The specific epithet is an adjective composed of the Latin noun furca (fork) and the Latin adjective spinosus (spiny). It alludes to the bifurcate right basal spine in the internal sac of the aedeagus.

#### Description

Slender and relatively small species. Body length 9.5–10.5 mm; length of forebody 4.8–5.2 mm. Coloration (Figs. 7, 26, 45, 63): head black; pronotum pale-reddish (orange); elytra black with pronounced bluish hue; abdomen completely black; legs: femora black with the bases more or less extensively yellowish to yellowish-brown, tibiae and tarsi yellowish to reddish-yellow; antennae red-

dish-yellow, with antennomeres III–VI(VII) more or less distinctly infuscate.

Head (Fig. 7) approximately 1.1 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex in dorsal view; posterior angles practically obsolete; punctation moderately fine and moderately sparse; interstices much broader than diameter of punctures, with moderately distinct microreticulation; dorsal surface with some shine. Eyes strongly convex, slightly more than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 45) 3.8–4.0 mm long and slender, antennomeres IV–VIII approximately three times as long as broad.

Pronotum (Fig. 7) 1.05–1.10 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation and microsculpture similar to those of head; dorsal surface with some shine; midline broadly impunctate.

Elytra (Fig. 7) approximately 0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 26) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices distinctly broader than diameter of punctures, with moderately pronounced microsculpture composed of transverse meshes, somewhat glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 171) strongly transverse, without distinct postero-median impression and with unmodified pubescence, posterior margin weakly concave; sternite VIII (Fig. 172) moderately transverse, posterior excision U-shaped and deep, approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 63; aedeagus (Figs. 93–95) 2.2–2.3 mm long; parameres of subequal length and apically very acute; ventral process with tridentate apex; dorsal plate slightly asymmetric, apically strongly elongated, acute, and with apex bent to the left (ventral view), extending slightly beyond parameral apices; internal sac (Fig. 173) without dorso-apical spine and with two basal spines of distinctive shapes, the left basal spine (ventral view) strongly sclerotized, moderately long, and bisinuate, the right basal spine asymmetrically bifurcate with the left apex spine-shaped and the right apex larger and conspicuously angled.

♀: sternite VIII (Fig. 174) distinctly oblong, triangular posterior process short and broad.

#### Comparative notes

This species is characterized by relatively small body size, its coloration (pale-reddish pronotum; black abdo-



men; pale tibiae and tarsi; elytra with pronounced bluish hue), relatively weakly pronounced microsculpture of the head and pronotum, by the unmodified pubescence of the male sternite VII, by the morphology of the aedeagus (strongly sclerotized; parameres of subequal length; distinctive shapes of dorsal plate and internal structures; dorso-apical spine absent), and by the broadly triangular posterior projection of the female sternite VIII.

#### Distribution and natural history

The type locality (Shanlinhsi = Shanlinchi = Shanlinxi; 23°38'N, 120°48'E) is situated in Nantou Hsien (Fig. 227). One of the paratypes was collected at an altitude of 1650 m. The specimens collected by L. LESAGE were swept from vegetation in a primary forest; the specimens collected by A. SMETANA was sifted from a thick layer of moist to wet debris, twigs, leaf litter, and old vegetation on bedrock and in depressions of bedrock benches in an original broad-leaved forest (SMETANA pers. comm.).

#### *Paederus (Megalopaederus) excisissimus* n. sp. (Figs. 8, 27, 46, 64, 96–98, 175–178, 226)

##### Type material

**H o l o t y p e** ♂: “Taiwan, Pingtung Hsien, Pietawushan [sic] trail at 2000 m 23.V.1991, A. SMETANA [T91] / Holotypus ♂ *Paederus excisissimus* sp. n., det. V. ASSING 2014” (cAss).

**P a r a t y p e s**: 2 ♀♀: “Taiwan Pingtung Hsien, Peitawushan trail at 1500 m 1.V.1992, A. SMETANA [T110]” (cSme, cAss).

##### Etymology

The specific epithet is the superlative of the Latin adjective *excisus* (excised) and alludes to the conspicuously deep posterior excision of the male sternite VIII.

##### Description

Body length 10.5–11.5 mm; length of forebody 5.1–5.4 mm. Coloration (Figs. 8, 27, 46, 64): head black; pronotum bright reddish; elytra black with bluish hue; abdomen black, except for the yellowish anterior portion of the hemitergites IX and tergite X; legs black with brown tarsi; antennae reddish-yellow, with antennomeres III–VI(VII) more or less distinctly infusate.

Head (Fig. 8) approximately 1.07 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles practically obsolete; punctation fine and sparse; interstices much broader than diameter of punctures, with distinct microreticulation; dorsal surface with reduced shine. Eyes strongly convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 46) 3.8–4.0 mm long and slender, antennomeres IV–VIII approximately three times as long as broad.

Pronotum (Fig. 8) 1.07–1.10 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation denser and more distinct than that of head; microsculpture similar to that of head; dorsal surface with reduced shine; midline broadly impunctate.

Elytra (Fig. 8) approximately 0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 27) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices distinctly broader than diameter of punctures, with pronounced microsculpture composed of transverse meshes, weakly glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

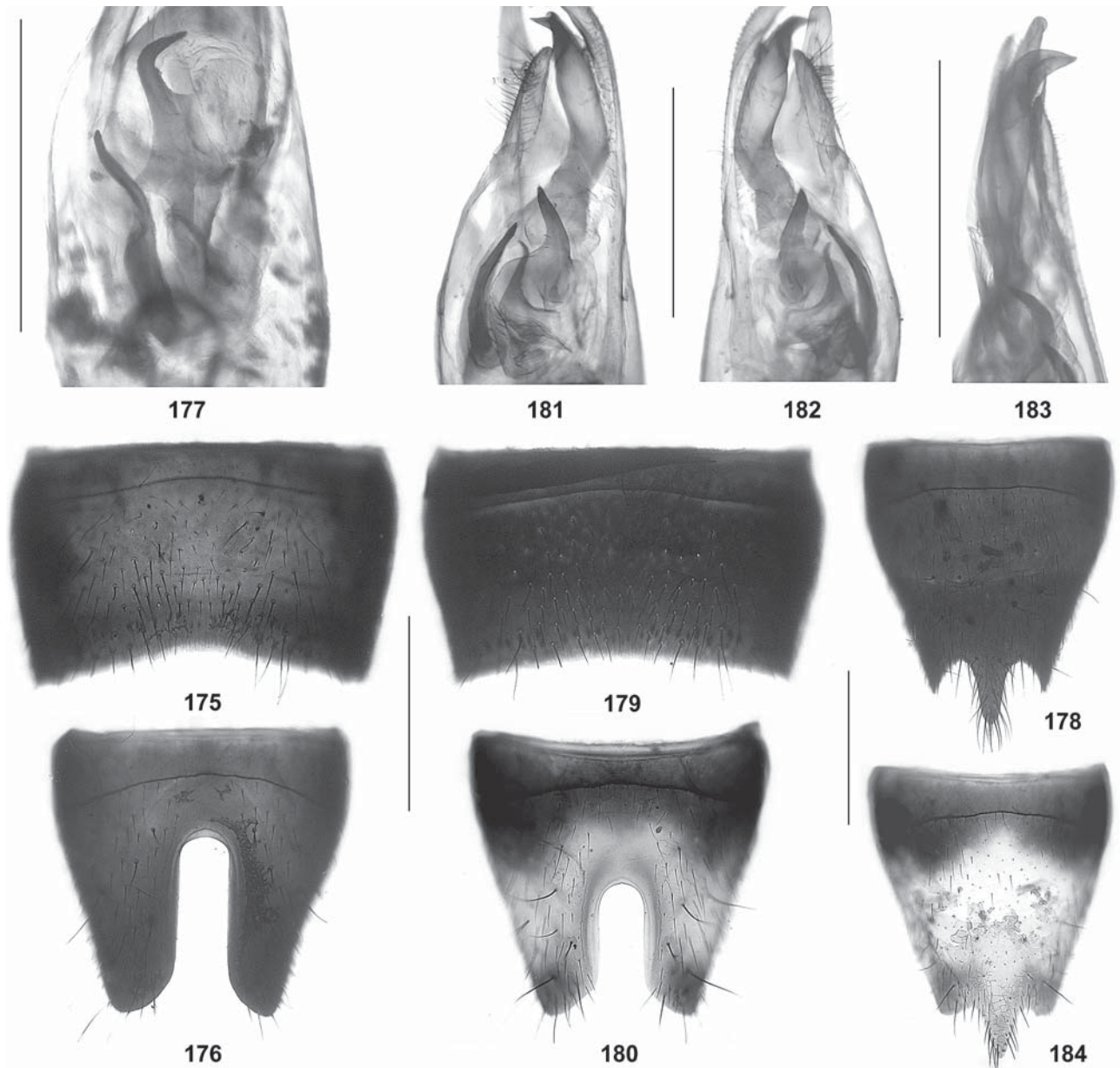
♂: sternite VII (Fig. 175) strongly transverse, without distinct impression in postero-median portion, pubescence unmodified, posterior margin weakly concave; sternite VIII (Fig. 176) distinctly transverse, posterior excision U-shaped and conspicuously deep, 0.62 times as deep as length of sternite; tergites IX–X as in Fig. 64; aedeagus (Figs. 96–98) 2.6 mm long; parameres strongly asymmetric; right paramere slightly longer than left paramere, both parameres acute apically; ventral process apically asymmetric and facing to the right in ventral view; dorsal plate slightly asymmetric, apically strongly elongated and spine-shaped, extending beyond apex of right paramere; internal sac (Fig. 177) without dorso-apical structure and with two basal sclerotized spines of distinctive shapes, the left basal spine (ventral view) moderately long, strongly sclerotized, and bisinuate, the right basal spine rather large and apically extending into a hook-shaped spine.

♀: sternite VIII (Fig. 178) moderately oblong, posterior median projection conspicuously narrow and long.

##### Comparative notes

From other species of similar size and with a distinctly microsculptured reddish pronotum, *P. excisissimus* is distinguished by the completely black femora and tibiae, by the chaetotaxy of the male sternite VII, by the deep posterior excision of the male sternite VIII, by the morphology of the aedeagus (parameres distinctly asymmetric; shapes of dorsal plate and internal structures; dorso-apical structure absent), and by the long and slender posterior projection of the female sternite VIII. From *P. aequilobatus* and *P. furcispinosus*, which too have the abdominal segments III–VIII completely black, *P. excisissimus* additionally differs by the anteriorly yellowish abdominal segments IX and X.

Some similar derived character states (unmodified chaetotaxy of the male sternite VII; bisinuate left basal



**Figs. 175–184.** *Paederus excisissimus* (175–178) and *P. formosanus* (179–184; 179–183: holotype, 184: paratype). – **175, 179.** Male sternite VII. **176, 180.** Male sternite VIII. **177, 181.** Internal structures of aedeagus in ventral view. **178, 184.** Female sternite VIII. **182.** Internal structures of aedeagus in dorsal view. **183.** Apical portion of aedeagus in lateral view. – Scale bars: 1.0 mm.

spine and modified shape of right basal spine in the internal sac of the aedeagus; dorso-apical spine absent) suggest that *P. excisissimus* is most closely allied to *P. furcispinosus*.

#### Distribution and natural history

The type specimens were collected in two localities along the Peitawushan trail, Pingtung Hsien (Fig. 226), at altitudes of 1500 and 2000 m. They were found by sift-

ing leaf litter, debris, and humus along large fallen trees in an old broad-leaved evergreen forest (T91) and by sifting vegetation, various debris, moss, and fallen leaves in wet areas along a forest trail (T110) (SMETANA pers. comm.).

*Paederus (Megalopaederus) alutithorax* Bernhauer, 1943  
(Fig. 226)

*Paederus alutithorax* BERNHAUER 1943: 176 f.



## Type material examined

Holotype ♀: “Rantaizan, 20.V.1928, Col. J. SONAN / *alutithorax* Brnh. Typus un. *Paederus* / *alutithorax* Brnh. n. sp. / *Paederus alutithorax* Bernhauer, det. V. ASSING 2014” (FMNH).

## Comment

The original description is based on a unique specimen (“Ein Stück”) from “Formosa: Rantaizan” (= Beiluanda Shan = Luan-ta Shan; 23°43'N, 120°57'E) (BERNHAEUER 1943). The holotype is unfortunately a female in rather poor condition.

## Redescription

Body length 10.2 mm; length of forebody 5.4 mm. Coloration: forebody black, elytra with bluish hue; abdomen: segments III–VII black, segment VIII and tergite X pale-yellowish, hemitergites IX yellowish, with the posterior processes somewhat infuscate; legs: femora black, tibiae and tarsi yellowish; antennae yellowish-red.

Head 1.05 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles obsolete; punctation moderately fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, with pronounced microreticulation; dorsal surface nearly matt. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna 4.0–4.2 mm long, antennomeres IV–VIII more than twice as long as broad.

Pronotum 1.09 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation slightly more distinct than that of head; microreticulation similar to that of head; midline broadly impunctate.

Elytra short, 0.67 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and rather dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen with fine and rather sparse punctation; interstices distinctly broader than diameter of punctures, with pronounced microsculpture composed of transverse striae; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: unknown.

♀: sternite VIII oblong, of similar shape as in the following species.

## Comparative notes

For characters distinguishing *P. alutithorax* from other species of similar coloration see the comparative notes in the following sections and the key to species (section 3.4).

## Distribution and natural history

The Beiluanda Shan (23°43'N, 120°57'E) is situated in Nantou Hsien (Fig. 226). Additional data are not available.

*Paederus (Megalopaederus) formosanus* Adachi, 1939  
(Figs. 9, 28, 47, 65, 99–101, 179–184, 226)

*Paederus formosanus* ADACHI 1939: 166.

## Type material examined

Holotype ♂: “Mt. Rara, Bunzan-Gun, North-Formosa, 18–20-June-1938. Coll. SIZUMU NOMURA / ♂ / Holotype / *Paederus formosanus* Adachi, det. T. ADACHI / *Paederus formosanus* Adachi, det. V. ASSING 2014” (cOhn). – Paratypes: 1 ♀: same data as holotype (cOhn); 1 ♀: same data as holotype, but “Coll. HIROSHI INOUE” (cOhn).

## Additional material examined

Taiwan: 1 ♂, same data as holotype, but labelled as “Metatype” (cOhn); 1 ♂, Hsuan-yuan [“Kayahara”; 24°38'N, 121°23'E], 23–24.VI.1941, leg. SĀTO (cOhn); 1 ♀, Taoyuan, Lala Shan, Takuan-shan Forest, 1650 m, 17.IV.1990, leg. SMETANA [T5] (cAss).

## Comment

The original description is based on a male holotype and two paratypes from “Formosa: Mt. Rara” (= Lala Shan; 24°45'N, 121°25'E) (ADACHI 1939). According to the description, the type material is deposited in the ADACHI collection. SHUHEI NOMURA kindly informed me that it is currently in the private collection of MASAO OHNO.

## Redescription

Body length 9.5–10.5 mm; length of forebody 4.9–5.2 mm. Coloration (Figs. 9, 28, 47, 65): forebody black, elytra with weak bluish hue; abdomen: segments III–VII black, segment VIII yellowish with the anterior and posterior portions blackish, hemitergites IX anteriorly yellowish and posteriorly infuscate, tergite X yellowish; legs black with reddish tarsi; antennae reddish.

Head (Fig. 9) 1.08–1.11 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex in dorsal view; posterior angles obsolete; punctation moderately fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation and distinctly glossy. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 47) approximately 3.5 mm long, antennomeres IV–VIII slightly more than twice as long as broad.

Pronotum (Fig. 9) approximately 1.12 times as long as broad and approximately 0.9 times as broad as head; strongly convex in cross-section; punctation very sparse, as fine as that of head; interstices without microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 9) 0.55–0.60 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 28) with fine and rather sparse punctation; interstices much broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 179) strongly transverse, without distinct impression in postero-median portion, pubescence unmodified; sternite VIII (Fig. 180) distinctly transverse, posterior incision approximately 0.5 times as deep as length of sternite; tergites IX–X as in Fig. 65; aedeagus (Figs. 99–101) 2.4–2.5 mm long; parameres distinctly asymmetric; right paramere (ventral view) much longer than left paramere and apically strongly curved; both parameres with blunt apices; ventral process apically asymmetric, obliquely convex; dorsal plate narrowly wedge-shaped in dorsal view, apically nearly extending to apex of right paramere; internal sac (Figs. 181–183) with three basal sclerotized spines of different shapes and with a long and massive, apically hooked dorso-apical spine.

♀: sternite VIII (Fig. 184) oblong, posterior triangular projection rather long and slender.

#### Comparative notes

Among the *Megalopaederus* species known from Taiwan with a black pronotum and without microsculpture on the head and pronotum, *P. formosanus* is characterized particularly by the coloration of the legs and the abdominal apex, the relatively slender pronotum, and by the derived morphology of the aedeagus (shapes of parameres, dorsal plate, and internal structures). For additional characters see the comparative notes in the section on *P. alesi*.

#### Distribution and natural history

*Paederus formosanus* is currently known from few localities in northern Taiwan (Fig. 226). The specimens were collected in April, May, and June. One of the specimens from the Lala Shan (T5) was collected by sifting debris and humus among lush vegetation in an original mixed forest with mostly broad-leaved evergreen trees (SMETANA pers. comm.) at an altitude of 1650 m, together with the type specimens of *P. trihamatus*.

*Paederus (Megalopaederus) trihamatus* n. sp.  
(Figs. 10, 29, 48, 66, 102–104, 185–188, 227)

#### Type material

**Holotype** ♂: “Taiwan Taoyuan Hsien, Takuanshan [= Lala Shan; 24°45'N, 121°25'E] For. 17.IV.90 1650 m, A. SMETANA [T5] / Holotypus ♂ *Paederus trihamatus* sp. n., det. V. ASSING 2014” (cAss).

**Paratype**: 1 ♀: same data as holotype (cSme).

#### Etymology

The specific epithet (Latin, adjective: with three hooks) alludes to the shapes of the three internal spines of the aedeagus.

#### Description

Body length 10.5–11.2 mm; length of forebody 5.1–5.4 mm. Coloration (Figs. 10, 29, 48, 66): forebody black, elytra with pronounced bluish hue; abdomen: segments III–VII black, segment VIII yellowish, segment IX yellowish with the posterior processes indistinctly infusate (dark-yellowish), tergite X yellowish; legs with black femora and dark-yellowish tibiae and tarsi; antennae yellowish-red.

Head (Fig. 10) 1.09 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex in dorsal view; posterior angles obsolete; punctation moderately fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, with microreticulation, but with some shine. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 48) 3.6–3.8 mm long, antennomeres IV–VIII slightly more than twice as long as broad.

Pronotum (Fig. 10) 1.08–1.10 times as long as broad and 0.97–1.10 times as broad as head; strongly convex in cross-section; punctation similar to that of head; microsculpture similar to that of head or shallower; midline broadly impunctate.

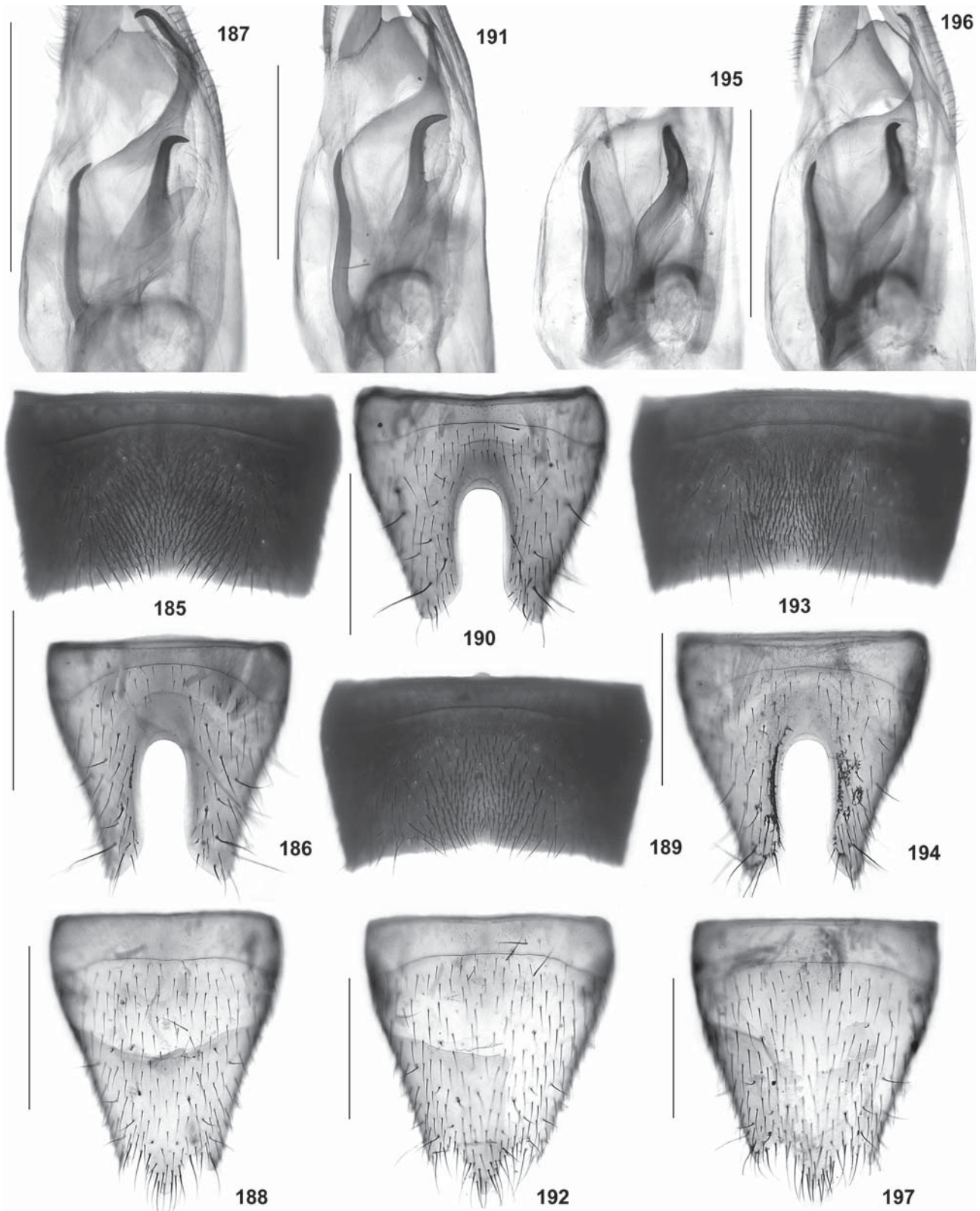
Elytra (Fig. 10) approximately 0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 29) with moderately fine and moderately dense punctation; interstices broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 185) strongly transverse, with rather shallow impression in postero-median portion, this impression with a cluster of dense moderately short setae; sternite VIII (Fig. 186) approximately as broad as long, posterior incision 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 66; aedeagus (Figs. 102–104) 2.2 mm long; parameres weakly asymmetric, of equal length, and apically moderately acute; ventral process apically truncate and weakly notched on the left (ventral view); dorsal plate of elongate triangular shape, apically extending into an asymmetric hook facing to the left (ventral view), and extending beyond apices of parameres; internal sac (Fig. 187) with two apically hooked basal sclerotized spines of different shapes and with long medially angled and apically hooked dorso-apical spine.

♀: sternite VIII (Fig. 188) oblong, posterior triangular projection moderately long and apically convex.





**Figs. 185–197.** *Paederus trihamatus* (185–188), *P. bivirgatus* (189–192), and *P. anmamontis* (193–197). – 185, 189, 193. Male sternite VII. 186, 190, 194. Male sternite VIII. 187, 191, 195–196. Internal structures of aedeagus in ventral view. 188, 192, 197. Female sternite VIII. – Scale bars: 1.0 mm.

### Comparative notes

Among the species with a black and microsculptured pronotum, *P. trihamatus* is most similar to *P. bivirgatus* (see the following section). It differs from the similar *P. alutithorax* by the less pronounced microsculpture of the head and pronotum, the more pronounced bluish hue of the elytra, and the less distinctly infuscate posterior processes of the hemitergites IX. From the sympatric and syntopic *P. formosanus*, the new species is distinguished by the broader and distinctly microsculptured pronotum, the coloration of the tibiae and the abdominal segments VIII and IX, the more pronounced bluish hue of the elytra, the less transverse male sternites VII and VIII, and by the completely different morphology of the aedeagus.

### Distribution and natural history

The type locality is situated in the Lala Shan, Taoyuan Hsien, northern Taiwan (Fig. 227). The specimens were collected by sifting debris and humus among lush vegetation in an original mixed forest with mostly broad-leaved evergreen trees (SMETANA pers. comm.) at an altitude of 1650 m, together with a female of *P. formosanus*.

*Paederus (Megalopaederus) bivirgatus* n. sp.  
(Figs. 11, 30, 49, 67, 126–128, 189–192, 226)

### Type material

**Holotype** ♂: “Taiwan Hualien Hsien, Taroko N. P., Nanhushi Hut, 2220 m 12.V.1990, A. SMETANA [T54] / Holotypus ♂ *Paederus bivirgatus* sp. n., det. V. ASSING 2014” (cSme).

**Paratypes**: 1 ♂, 1 ♀: same data as holotype, but “8.V.1990 ... [T48]” (cAss); 1 ♀: “Taiwan Hualien Hsien, Taroko N. P., Nanhunanfong trl. (west) 2700 m 9.V.90, A. SMETANA [T49]” (cSme); 1 ♀: “Taiwan Hualien Hsien, Taroko N. P., Chungyangtienshi (Riv.) Waterfall, 2300 m 10.V.1990, A. SMETANA [T50]” (cSme); 1 ♀: “Taiwan Hualien Hsien, Taroko N. P., Chungyangtienshi (Riv.) Waterfall, 2280 m 10.V.1990, A. SMETANA [T51]” (cSme).

### Etymology

The specific epithet (Latin, adjective: with two rods) alludes to the shapes of the two basal internal spines of the aedeagus.

### Description

Body length 10.0–11.8 mm; length of forebody 5.3–5.7 mm. Coloration (Figs. 11, 30, 49, 67): forebody black, elytra with moderate violet-bluish hue; abdomen: segments III–VII black, segment VIII yellowish, segment IX yellowish with the posterior processes indistinctly infuscate (dark-yellowish), tergite X yellowish; legs with black femora and reddish to reddish-brown tibiae and tarsi; antennae reddish.

Head (Fig. 11) approximately 1.12–1.15 times as broad as long; contours of posterior portion (behind eyes) con-

verging from posterior margin of eyes, weakly to distinctly convex in dorsal view; posterior angles mostly obsolete, rarely weakly indicated; punctation moderately fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, with more or less pronounced microreticulation, but with some shine. Eyes distinctly convex, slightly more than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 49) approximately 3.5–3.6 mm long, antennomeres IV–VIII slightly more than twice as long as broad.

Pronotum (Fig. 11) 1.04–1.05 times as long as broad and 1.01–1.04 times as broad as head; strongly convex in cross-section; punctation and microsculpture similar to those of head; midline broadly impunctate.

Elytra (Fig. 11) approximately 0.65–0.68 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I mostly slightly shorter than, more rarely as long as, the combined length of II and III.

Abdomen (Fig. 30) with moderately fine and moderately dense punctation; interstices broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 189) strongly transverse, with rather shallow impression in postero-median portion, this impression with a cluster of dense moderately short setae; sternite VIII (Fig. 190) moderately transverse, posterior incision approximately 0.58 times as deep as length of sternite; tergites IX–X as in Fig. 67; aedeagus (Figs. 126–128) approximately 2.5 mm long; parameres moderately asymmetric, right paramere (ventral view) longer than left paramere; both parameres apically moderately acute; ventral process apically truncate; dorsal plate strongly elongated and sclerotized apically, extending into an asymmetric hook facing to the left (ventral view), and extending slightly beyond apex of right paramere; internal sac (Fig. 191) with two long basal sclerotized spines of different lengths and shapes, and with apically slender and nearly straight dorso-apical spine.

♀: sternite VIII (Fig. 192) oblong, posterior triangular projection moderately long and apically acute.

### Comparative notes

*Paederus bivirgatus* differs from the similar *P. trihamatus* by the less oblong and broader pronotum, the less pronounced and more violet hue of the elytra, the slightly darker tibiae and tarsi, the more transverse male sternite VIII, and by the morphology of the aedeagus (shape of ventral process; parameres of different lengths; apically more elongated and more slender dorsal plate; shapes of internal structures).



### Distribution and natural history

The known distribution is confined to some localities in the Taroko National Park in Hualien, eastern Taiwan (Fig. 226). The specimens were collected at altitudes of 2220–2700 m. They were sifted from leaf litter, rotting wood, and bark along large fallen and standing trees in an old coniferous forest (T48), from rotting mushrooms and debris in a secondary pine forest with high grass undergrowth (T49), from moist to wet debris and leaf litter in an area permanently sprinkled with water near a waterfall (T50), from debris, leaf litter, and moss in the moist to wet inundated zone of a river with young broad-leaved trees (T51), and from moist to wet vegetation close to water, moss on large rocks, and flood debris near a stream in a mixed forest (T54) (SMETANA pers. comm.).

### *Paederus (Megalopaederus) anmamontis* n. sp. (Figs. 12, 31, 50, 68, 105–107, 193–197, 226)

#### Type material

**Holotype** ♂: “Taiwan Taichung Hsien, Anmashan, 2225 m 2.V.1990, A. SMETANA [T37] / Holotypus ♂ *Paederus anmamontis* sp. n., det. V. ASSING 2014” (cSme).

**Paratypes**: 6 ♂♂: same data as holotype (cSme, cAss); 1 ♀: “Taiwan Taichung Hsien, Anmashan, 2230 m 30.IV.–4.V.90, A. SMETANA [T32]” (cSme); 1 ♂ [teneral]: “Taiwan Taichung Hsien, Anmashan, 2120 m 1.V.1990, A. SMETANA [T35]” (cSme); 1 ♂: “Taiwan Taichung Hsien, Anmashan, 2225 m 2.V.1990, A. SMETANA [T38]” (cSme); 2 ♂♂: “Taiwan Taichung Hsien, Anmashan, 2230 m 4.V.1990, A. SMETANA [T43]” (cSme, cAss); 1 ♂, 2 ♀♀: “Taiwan, Taichung Hsien, Anmashan, Creek, 2135 m, 12.V.92, A. SMETANA [T125]” (cSme, cAss); 1 ♂: “Taiwan, Taichung Hsien, Anmashan, 2230 m, 12.V.92, A. SMETANA [T127]” (cAss); 3 ♂♂, 7 ♀♀: “Taiwan: Anmashan Cottage, 1.V.1990, 2235 m. Forêt primaire. L. LESAGE” (cSme, cAss); 1 ♂: “Taiwan: Anmashan, Taichung Hsien. 2235 m. 2.V.1990. For. primaire. L. LESAGE LL90-34” (cSme); 5 ♂♂, 6 ♀♀: “Taiwan: Anmashan, Taichung Hsien. 2100–2135 m. Fauch. forêt primaire. [date not indicated, probably 2.V.1990 or 3.V.1990] L. LESAGE LL90-35” (cSme, cAss); 4 ♂♂, 4 ♀♀: “Taiwan: Anmashan, Taichung Hsien. 2100 m. Route second. km 34. [date not indicated, probably 2.V.1990 or 3.V.1990] L. LESAGE LL90-36” (cSme, cAss); 3 ♀♀: “Taiwan: Anmashan, Taichung Hsien. 2100 m. km 38. Bord route. L. LESAGE LL90-37 / Date: 3.V.1990” (cSme, cAss); 1 ♂: “Taiwan: Anmashan, Taichung Hsien 2600–2690 m. 4.V.1990. Route for abandonnée, L. LESAGE LL90-39 / Dans excréments humains” (cAss); 1 ♂, 2 ♀♀: “Taiwan: Taichung, Anmachan [sic], 2000 m, 8.IV.2002, leg. H. SUGAYA” (MNHUB); 1 ♀: “Taiwan: Tai, Chung Lo, An Ma Shan, 2 km [sic], 24–26.VI.2003, Flight intercept trap, leg. CHUN LIN LI” (MNHUB).

#### Etymology

The specific epithet is a noun composed of the name of the mountain where the species was discovered and of the genitive of the Latin noun mons (mountain).

#### Description

Body length 10.5–12.5 mm; length of forebody 5.4–6.1 mm. Coloration (Figs. 12, 31, 50, 68): forebody black,

elytra with distinct bluish hue; abdomen: segments III–VII black, segment VIII yellowish, segment IX yellowish with the posterior processes indistinctly infusate (dark-yellowish), tergite X yellowish; legs black with the tarsi and the apical portion of the tibiae more or less extensively yellowish to reddish; antennae reddish.

Head (Fig. 12) approximately 1.05 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, distinctly convex in dorsal view; posterior angles mostly obsolete, rarely weakly indicated; punctuation moderately coarse and moderately sparse, sparser in anterior and median dorsal portions; interstices broader than diameter of punctures; microreticulation pronounced, rendering dorsal surface nearly matt. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 50) 3.9–4.3 mm long, antennomere IV nearly three times as long as broad, V–VIII more than twice as long as broad.

Pronotum (Fig. 12) 1.04–1.08 times as long as broad and 1.01–1.05 times as broad as head; strongly convex in cross-section; punctuation and microsculpture similar to those of head; midline broadly impunctate.

Elytra (Fig. 12) 0.60–0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctuation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III, or nearly so.

Abdomen (Fig. 31) with moderately fine and moderately dense punctuation; interstices broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 193) strongly transverse, with extensive impression in postero-median portion, this impression with numerous short stout setae; sternite VIII (Fig. 194) weakly transverse, posterior incision approximately 0.58 times as deep as length of sternite; tergites IX–X as in Fig. 68; aedeagus (Figs. 105–107) 2.6–2.8 mm long; parameres moderately asymmetric, right paramere (ventral view) longer than left paramere; both parameres apically moderately acute; ventral process apically weakly bisinuate; dorsal plate of narrowly and asymmetrically triangular shape, apically extending into an asymmetric hook facing to the left (ventral view), and extending slightly beyond apex of right paramere; internal sac (Figs. 195–196) with two long basal sclerotized spines of different lengths and shapes, and with apically slender and nearly straight dorso-apical spine.

♀: sternite VIII (Fig. 197) oblong, posterior triangular projection moderately long and apically acute.

#### Comparative notes

Among the species with a black microsculptured pronotum, *P. anmamontis* is characterized particularly by

large body size, the pronounced microsculpture of the head and pronotum, the coloration of the tibiae, the distinctly modified chaetotaxy of the male sternite VII, and by the morphology of the aedeagus (shapes of ventral process, dorsal plate, and internal structures).

#### Distribution and natural history

The known distribution is confined to the Anmashan (24°16'N, 121°01'E) in Taichung Hsien (Fig. 226). The altitudes range from 2000 to 2690 m. The specimens collected by A. SMETANA were caught with pitfall traps baited with chicken droppings in a broad-leaved evergreen forest (T32) and sifted from moist to wet debris and leaf litter along a small overgrown stream (T35), from layers of green leaves, wet debris, and small branches (T37), various moist debris along large fallen trees and around bases of standing trees (T38), and wet leaf litter, debris, and moss between large rocks on the forest floor (T43) in original mixed forests, from old vegetation, debris, humus, and moss among lush dense vegetation in a deep stream valley in an old mixed forest (T125), and from leaf litter, piles of twigs, and various other debris accumulated around stumps of huge trees in an old broad-leaved evergreen forest (T127) (SMETANA pers. comm.). Two specimens collected by CHUN LIN LI and L. LESAGE were caught with a flight interception trap and found in human faeces, respectively. All the other specimens found by L. LESAGE were swept from vegetation in a primary forest and along roads (SMETANA pers. comm.). The type material was collected in April and May. One specimen (May) is teneral.

#### *Paederus (Megalopaederus) semiflavus* n. sp. (Figs. 13, 32, 51, 69, 132–134, 198–200, 227)

##### Type material

**Holotype** ♂: “Taiwan, Taitung County, Yakou Country Inn, N23°16.063 E120°58.419, 2582 m, by hand, 11.viii.2008, H. MENDEL & MVL BARCLAY, BMNH(E) 2008-85 / Holotypus ♂ *Paederus semiflavus* sp. n., det. V. ASSING 2014” (BMNH).

**Paratype** ♂ [infested with Laboulbeniales]: same data as holotype (cAss).

##### Etymology

The specific epithet (Latin, adjective: half-yellow) alludes to the coloration of the abdominal segment VIII.

##### Description

Body length 10.5–12.0 mm; length of forebody 5.4–5.5 mm. Coloration (Figs. 13, 32, 51, 69): forebody black, elytra with distinct bluish hue; abdomen: segments III–VII black, tergite VIII yellowish, with the anterior and posterior portions more or less extensively blackish, ster-

nite VIII blackish in anterior third and yellowish in posterior two-thirds, hemitergites IX yellowish in anterior half and blackish in posterior half, sternite IX somewhat infuscate (brownish); legs black with yellowish-brown to dark-reddish tarsi; antennae reddish.

**Head** (Fig. 13) 1.12 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, moderately convex in dorsal view; posterior angles obsolete; punctation moderately fine and moderately sparse; interstices broader than diameter of punctures; microreticulation pronounced, rendering dorsal surface nearly matt. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 51) 3.7–3.9 mm long, antennomeres IV–VIII slightly more than twice as long as broad.

**Pronotum** (Fig. 13) 1.07–1.12 times as long as broad and 0.96–0.98 times as broad as head; strongly convex in cross-section; punctation and microsculpture similar to those of head; midline broadly impunctate.

**Elytra** (Fig. 13) 0.60–0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III, or nearly so.

**Abdomen** (Fig. 32) with moderately fine and moderately dense punctation; interstices broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 198) moderately strongly transverse, with shallow impression in postero-median portion, this impression with moderately dense and weakly modified setae; sternite VIII (Fig. 199) moderately transverse, posterior incision approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 69; aedeagus (Figs. 132–134) 2.5–2.6 mm long; parameres strongly asymmetric, right paramere (ventral view) distinctly longer than left paramere; both parameres apically moderately acute; ventral process apically concave; dorsal plate asymmetric, elongated, and apically hooked, extending slightly beyond apex of right paramere; internal sac (Fig. 200) with two basal sclerotized spines, the left spine long and slender and the right spine shorter and stouter, and one dorso-apical spine of characteristic shape.

♀: unknown.

##### Comparative notes

Among the species with a black microsculptured pronotum, *P. semiflavus* is characterized particularly by the coloration of the abdominal segment VIII and by the morphology of the aedeagus (shapes of ventral process, parameres, dorsal plate, and internal structures).



### Distribution and natural history

The type locality is situated in Taitung Hsien, south-eastern Taiwan (Fig. 227), at an altitude of nearly 2600 m. The paratype is infested with Laboulbeniales.

*Paederus (Megalopaederus) alesi* n. sp.  
(Figs. 14, 33, 52, 70, 129–131, 201–203, 226)

### Type material

**H o l o t y p e** ♂: “Taiwan Hualien Hsien, Taroko N. P., Duodyatunshan, 2650 m 8–13.V.90, A. SMETANA [T57] / Holotypus ♂ *Paederus alesi* sp. n., det. V. ASSING 2014” (cAss).

### Etymology

It is with great pleasure that I dedicate this distinctive species to ALEŠ SMETANA, who, with his scientific merits and amazing material, has contributed so much to the present knowledge of the Staphylinidae of Taiwan.

### Description

Large and robust species with a conspicuously large head. Body length 12.0 mm; length of forebody 6.0 mm. Coloration (Figs. 14, 33, 52, 70): forebody black; abdomen: segments III–VII black, tergite VIII with the anterior portion and the apex blackish, sternite VIII with the anterior half blackish and the posterior half yellowish, hemitergites IX yellowish in anterior half and infuscate in posterior half, tergite X yellowish; legs black with reddish tarsi; antennae reddish.

Head (Fig. 14) conspicuously large and transverse, 1.18 times as broad as long; somewhat dilated behind eyes and with moderately marked posterior angles in dorsal view; punctation fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microsculpture and glossy. Eyes small and moderately convex, approximately one-third as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 52) 3.9 mm long, antennomeres IV–IX slightly more than twice as long as broad.

Pronotum (Fig. 14) 1.05 times as long as broad and 0.95 times as broad as head; strongly convex in cross-section; punctation similar to that of head; midline broadly impunctate; interstices without trace of microsculpture and glossy.

Elytra (Fig. 14) very short, approximately 0.50 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather fine and sparse; interstices with microsculpture and subdued shine. Hind wings completely reduced. Metatarsomere I slightly shorter than the combined length of II and III.

Abdomen (Fig. 33) with very fine and rather sparse punctation; interstices broader than diameter of punctures,

with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 201) conspicuously transverse, without distinct impression in postero-median portion, pubescence not distinctly modified; sternite VIII (Fig. 202) distinctly transverse, posterior incision very deep, approximately 0.50 times as deep as length of sternite; tergites IX–X as in Fig. 70; aedeagus approximately 2.75 mm long; parameres asymmetric, right paramere (ventral view) much longer than left paramere; both parameres apically acute; ventral process apically strongly convex; dorsal plate narrowly wedge-shaped and apically acute, extending beyond apex of right paramere; internal sac (Fig. 203) with four distinctly sclerotized basal spines of different shapes and with dorso-apical structure of distinctive shape.

♀: unknown.

### Comparative notes

Among the *Megalopaederus* species known from Taiwan, *P. alesi* is highly distinctive and characterized by a large and robust body, the large and strongly transverse head, the coloration, the absence of microsculpture on the head and pronotum, the microsculptured and practically matt elytra, the absence of the bluish hue on the elytra, the conspicuously transverse male sternite VII without distinctly modified pubescence, and by the conspicuous morphology of the aedeagus (parameres of very different lengths; shape of dorsal plate; number and shapes of internal structures).

### Distribution and natural history

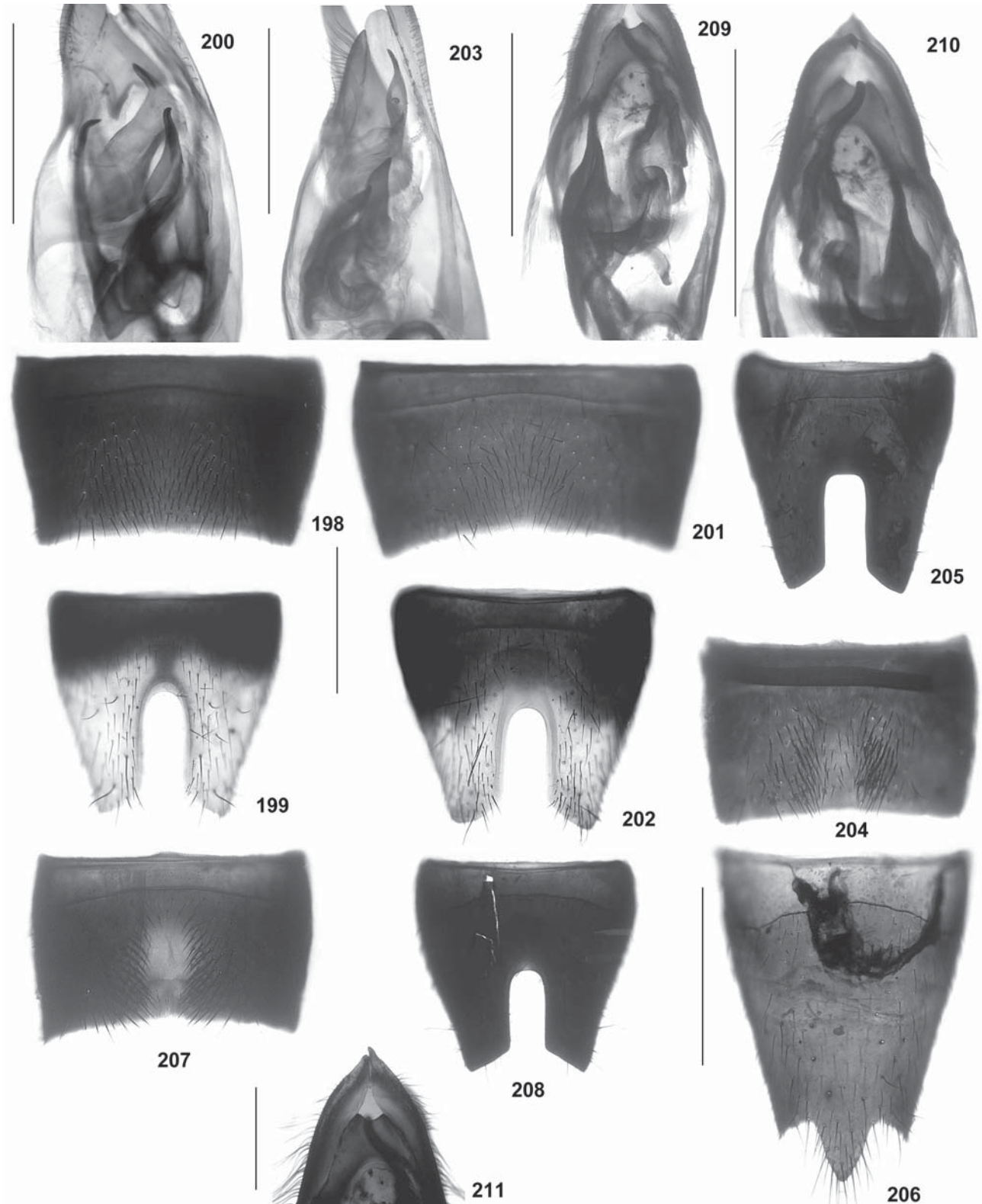
The type locality is situated in the Taroko National Park in Hualien, eastern Taiwan (Fig. 226). The holotype was collected with an unbaited pitfall trap in a coniferous forest (SMETANA pers. comm.) at an altitude of 2650 m.

*Paederus (Megalopaederus) kosempoensis* Bernhauer,  
1922  
(Figs. 15, 34, 53, 71, 108–110, 204–206, 228)

*Paederus kosempoensis* BERNHAUER 1922: 228.

### Type material examined

**L e c t o t y p e** ♂ [dissected prior to present study; internal sac and dorsal parts of aedeagus missing], present designation: “Kosempo (Formosa), H. SAUTER. 1911 / *kosempoensis* Bernh. Cotypus. / Chicago NHMus, M. BERNHAUER Collection / Lectotypus ♂ *Paederus kosempoensis* Bernhauer, desig. V. ASSING 2014 / *Paederus kosempoensis* Bernhauer, det. V. ASSING” (FMNH). – **P a r a l e c t o t y p e** ♀: “Kosempo (Formosa), H. SAUTER. 1911 / 22.VII. / *kosempoensis* Bernh. Typus. / Chicago NHMus, M. BERNHAUER Collection” (FMNH).



**Figs. 198–211.** *Paederus semiflavus* (198–200), *P. alesi* (201–203), *P. kosempoensis* (204–206), and *P. discurrens* (207–211). – **198, 201, 204, 207.** Male sternite VII. **199, 202, 205, 208.** Male sternite VIII. **200, 203, 209.** Internal structures of aedeagus in ventral view. **206.** Female sternite VIII. **210.** Internal structures of aedeagus in dorsal view. **211.** Apical portion of aedeagus in ventral view. – Scale bars: 1.0 mm (198–210), 0.5 mm (211).



### Comment

The original description is based on an unspecified number of syntypes from “Kosempo” (today Chia-hsien or Jiashian; 23°05'N, 120°35'E) (BERNHAEUER 1922). Two syntypes, a male and a female, were located in the BERNHAEUER collection at the FMNH. The male, whose aedeagus is in poor condition, is designated as the lectotype.

### Redescription

Species of relatively slender habitus. Body length 9.5–11.0 mm; length of forebody 5.0–5.3 mm. Coloration (Figs. 15, 34, 53, 71): head black; pronotum bright reddish; elytra black with bluish hue; scutellum black; abdomen completely black, except for the yellowish anterior half of segment IX and all of tergite X; legs: femora black with yellowish to yellowish-brown bases; tibiae and tarsi yellowish to reddish; antennae reddish-yellow to reddish, with apex of antennomere III and antennomeres IV–VI(VII) more or less distinctly infuscate.

Head (Fig. 15) very weakly transverse, only 1.01–1.03 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles obsolete; punctation moderately fine and moderately sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation; dorsal surface glossy. Eyes strongly convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 53) 4.0–4.2 mm long and conspicuously slender, antennomeres IV–VII nearly four times as long as broad.

Pronotum (Fig. 15) slender, 1.13–1.14 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation slightly more distinct than that of head; interstices without trace of microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 15) short, 0.55–0.57 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 34) approximately 1.15 times as broad as elytra at posterior margin; punctation rather coarse and moderately dense; interstices distinctly broader than diameter of punctures, with microsculpture composed of transverse striae and very transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 204) strongly transverse, with impression along middle, this impression with sparse weakly modified setae in the middle and with a cluster of dense weakly modified setae on either side, posterior margin weakly concave; sternite VIII (Fig. 205) weakly

transverse, posterior excision U-shaped and deep, approximately 0.5 times as deep as length of sternite; tergites IX–X as in Fig. 71; aedeagus (Figs. 108–110) 2.6 mm long, strongly sclerotized; right paramere longer than left paramere, both parameres somewhat twisted and apically acute; apex of ventral process broadly and weakly concave; dorsal plate and internal structures not available (missing in lectotype).

♀: sternite VIII (Fig. 206) distinctly oblong, posteriorly with median process of narrowly triangular shape.

### Comparative notes

From the species with a reddish pronotum treated above, *P. kosempoensis* is readily distinguished by the complete absence of microsculpture on the head and pronotum, by the coloration of the abdomen (black, except for the yellowish tergite X and anterior half of segment IX), the slender habitus (weakly transverse head; distinctly oblong pronotum; slender elytra), the conspicuously slender antennae, the chaetotaxy of the male sternite VII, and by the morphology of the aedeagus (parameres twisted; ventral process apically concave).

Together with the following two species, *P. kosempoensis* forms an evidently monophyletic group constituted by several synapomorphies: antennae conspicuously long and slender; male sternite VII with pronounced median impression without, or with very sparse, setae; aedeagus strongly sclerotized. The aedeagus of the lectotype of *P. kosempoensis* is incomplete, but it can be inferred from the conditions in the aedeagi of the two following species that this species group also shares an aedeagus with a strongly sclerotized, broad (not elongated), and apically hooked dorsal plate, a set of variably shaped basal internal structures, and an elongated dorso-apical structure. Externally, this group is additionally distinguished from all other named *Megalopaederus* species known from Taiwan by a reddish pronotum without microsculpture and a slender habitus.

### Distribution and natural history

The type locality is situated in Chia Hsien, southwestern Taiwan (Fig. 228). Additional data are not available.

### *Paederus (Megalopaederus) discurrens* n. sp. (Figs. 16, 35, 54, 72, 111–113, 207–211, 228)

#### Type material

Holotype ♂ [with Laboulbeniales on the left antennomere III]: “Taiwan, Taichung County, Dong-Shi, Basianshan National Forest, Recreation Area / N24°11.431 E121°00.890, 27.v.2007, 926 m, G. MARTIN & D. L. J. QUICKE, BMNH(E) 2007-43 / Holotypus ♂ *Paederus discurrens* sp. n., det. V. ASSING 2014” (BMNH).

### Etymology

The specific epithet is the present participle of the Latin verb *discurrere* (to run in a disordered or confused fashion) and alludes to the seemingly disordered arrangement of the internal structures of the aedeagus.

### Description

Body length 10.7 mm; length of forebody 5.5 mm. Coloration (Figs. 16, 35, 54, 72): head black; pronotum bright reddish; elytra black with pronounced bluish hue; scutellum reddish with darker margins; abdomen: segments III–VIII black, hemitergites IX yellowish with the posterior portion black, sternite IX blackish-brown; legs with the femora blackish and the tibiae and tarsi reddish; antennae reddish.

Head (Fig. 16) weakly transverse, 1.04 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles obsolete; punctation moderately fine and sparse, sparser and finer in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation; dorsal surface glossy. Eyes strongly convex, less than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 54) 4.3 mm long and conspicuously slender, antennomeres IV–VII nearly four times as long as broad.

Pronotum (Fig. 16) 1.10 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation similar to that of head; interstices without trace of microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 16) short, 0.6 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and rather dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 35) approximately 1.15 times as broad as elytra at posterior margin; punctation rather coarse and moderately dense; interstices distinctly broader than diameter of punctures, with microsculpture composed of transverse striae and very transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 207) strongly transverse, with impression along middle, this impression without setae in the middle and with a large cluster of dense long setae on either side, posterior margin indistinctly concave in the middle; sternite VIII (Fig. 208) distinctly transverse, posterior excision U-shaped and deep, approximately 0.5 times as deep as length of sternite; tergites IX–X as in Fig. 72; aedeagus (Figs. 111–113) 2.3 mm long, strongly sclerotized; parameres of subequal length; right paramere apically more acute than left paramere and hooked;

apex of ventral process narrowly concave (Fig. 211); dorsal plate strongly sclerotized and broad, apically hooked in the middle, far from reaching apices of parameres; internal sac (Figs. 209–210) with sclerotized basal structures arranged in disordered fashion and with oblong dorso-apical structure.

♀: unknown.

### Comparative notes

From the similar and closely related *P. kosempoensis*, *P. discurrens* is distinguished by the uniformly reddish antennae, the reddish scutellum, the darker coloration of the femoral bases, the different chaetotaxy of the male sternite VII, the broader male sternite VIII, and by the morphology of the aedeagus (parameres of subequal length, ventral process of aedeagus apically narrowly concave).

### Distribution and natural history

The type locality is situated in Taichung Hsien, western Taiwan (Fig. 228). The holotype was collected at an altitude of approximately 930 m in May. It is infested with Laboulbeniales.

### *Paederus (Megalopaederus) incisus* n. sp.

(Figs. 17, 36, 55, 117–119, 212–216, 228)

### Type material

Holotype ♂: “Nanshanchi, Nantou, Taiwan, 4.VI.1998, H. SUGAYA leg. / Holotypus ♂ *Paederus incisus* sp.n., det. V. ASSING 2014” (MNHUB).

Paratypes: 1 ♀: “Taiwan: Nanshanchi, Nantou, 1–2. II.1998, leg. H. SUGAYA” (MNHUB); 2 ♀♀: “Taiwan: Nantou, Hueisun Exp. Forest [ca. 24°06'N, 121°02'E], 22–24.X.1998, leg. W. MEY, EBERT” (MNHUB, cAss); 1 ♀: “Hori-Musha, Formosa, 22. May. 1927, K. YOKOYAMA / *Paederus kosempoensis* Bernh., det. T. ADACHI” (cOhn); 1 ♀: “Chosen-lintao, Nantou, Taiwan, 26.VI.1998, H. SUGAYA leg.” (MNHUB).

### Etymology

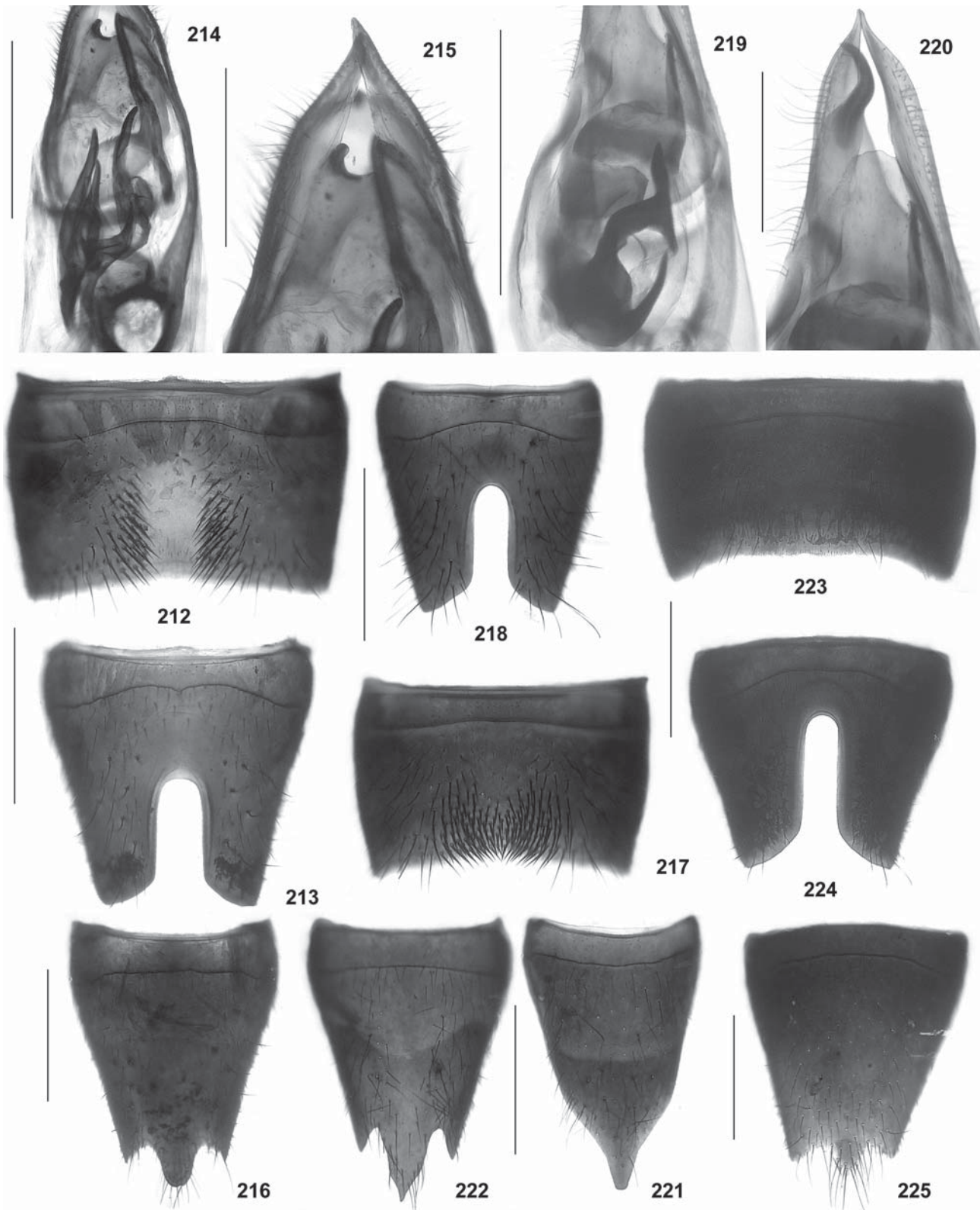
The specific epithet (Latin, adjective) alludes to the strongly incised apex of the ventral process of the aedeagus.

### Description

Body length 9.5–11.5 mm; length of forebody 5.0–5.5 mm. External characters (Figs. 17, 36, 55) as in *P. discurrens*.

♂: sternite VII (Fig. 212) strongly transverse, with impression along middle, this impression without setae in the middle and with a cluster of dense long setae on either side, posterior margin weakly concave; sternite VIII (Fig. 213) moderately transverse, posterior excision U-shaped and deep, approximately 0.5 times as deep as length of sternite; aedeagus (Figs. 217–219) 2.6 mm long, strongly sclerotized; parameres of subequal length and





**Figs. 212–225.** *Paederus incisus* (212–216), *P. biacutus* (217–222), *P. lewisi* (223–225). – 212, 217, 223. Male sternite VII. 213, 218, 224. Male sternite VIII. 214, 219. Internal structures of aedeagus in ventral view. 215, 220. Apical portion of aedeagus in ventral view. 216, 222, 225. Female sternite VIII. 221. Female tergite VIII. – Scale bars: 1.0 mm (212–214, 216–219, 221–225), 0.5 mm (215, 220).

apically acute; ventral process with pronounced apical incision (Fig. 215); dorsal plate strongly sclerotized and broad (dorsal view), strongly curved lateral view, and apically hooked in the middle; internal sac (Fig. 214) with four strongly sclerotized basal structures of different shapes and with long, strongly sclerotized dorso-apical structure.

♀: sternite VIII (Fig. 216) distinctly oblong; posterior projection rather long and apically convex (not acute).

#### Comparative notes

Based on the similarly derived shape and chaetotaxy of the male sternite VII and on the similarly derived morphology of the aedeagus, *P. incisus* is most closely related to *P. discurrens*, from which it differs by the less extensive clusters of setae on the male sternite VII and by the morphology of the aedeagus (parameres more slender, apically more acute, and reaching farther beyond apex of dorsal plate; ventral process apically strongly incised; dorsal plate of different shape both in lateral and in dorsal view; internal sclerotized structures of different shapes and arrangement).

#### Distribution and natural history

The species was collected in some localities in Nantou Hsien (Fig. 228) in February, May–June, and October. Additional data are not available.

#### 3.6 Unnamed species

The following probably undescribed species are represented only by females and remain unnamed:

##### *Paederus (Megalopaederus) sp. 1*

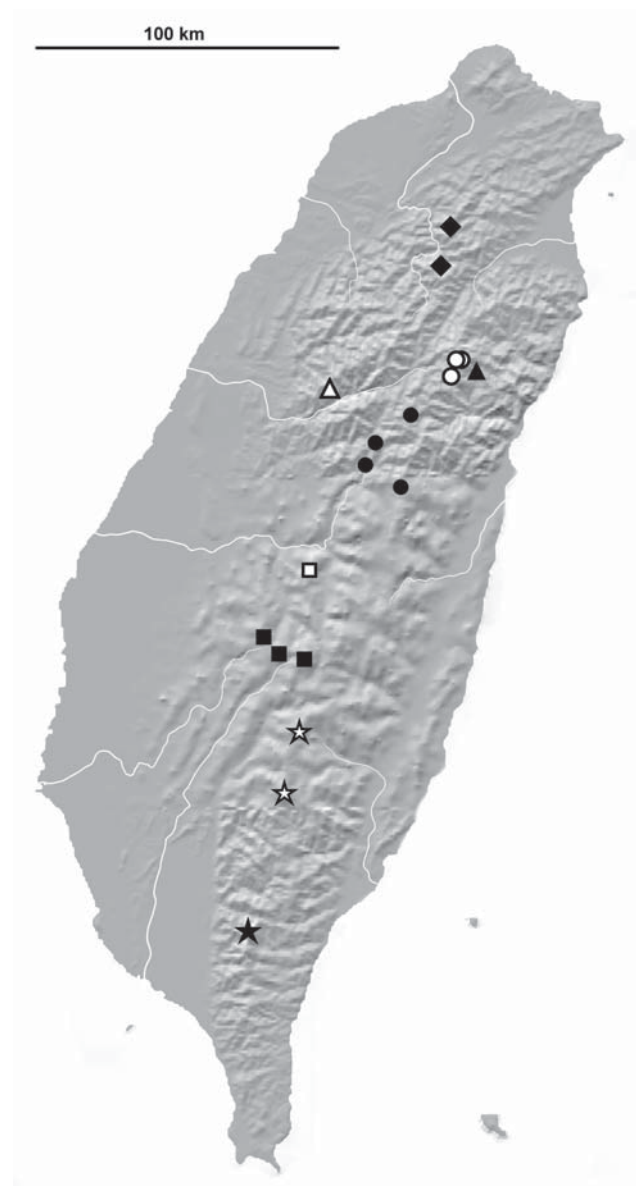
2 ♀♀: “Taiwan Kaohsiung Hsien, rd from Tengchih to Chuyushan, 1400 m, 25.IV.90, A. SMETANA [T23]” (cSme); 1 ♀: “Taiwan, Kaohsiung, Tengchih 1400 m, 29.–30.iv.2001, leg. H. SUGAYA” (MNHUB).

The above females represent a species closely allied to *P. kosempoensis*. In the key, it would key out at couplet 4, together with *P. discurrens* and *P. incisus*, from which it differs by the paler average coloration of the tibiae. In view of the restricted distributions of the *Megalopaederus* species of Taiwan, it appears unlikely that the above material is conspecific with *P. discurrens* or *P. incisus*.

##### *Paederus (Megalopaederus) sp. 2*

1 ♀: “Taiwan, Pingtung Hsien, Peitawushan trail at 1510 m, 26.IV.1992, A. SMETANA [T100]” (cSme).

This species, too, belongs to the *P. kosempoensis* group. It is distinguished from the named species of this group by the nearly completely black tibiae.



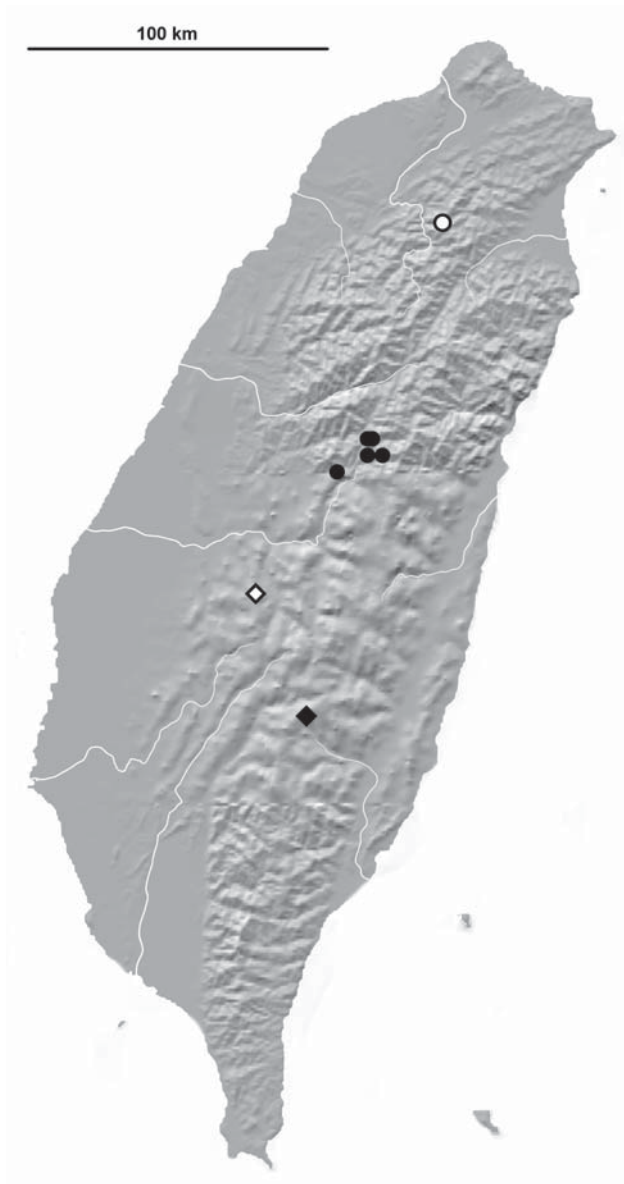
**Fig. 226.** Distributions of species of the *P. formosanus* group in Taiwan: *Paederus formosanus* (black diamonds), *P. bivirgatus* (white circles), *P. flavoterminalis* (black circles), *P. alesi* (black triangle), *P. anmamontis* (white triangle), *P. alutithorax* (white square), *P. virgifer* (black squares), *P. incurvatus* (white stars), *P. adiectus* (black star), *P. aequilobatus* (black star), *P. excisissimus* (black star).

##### *Paederus (Megalopaederus) sp. 3*

1 ♀: “Taiwan–Hsinchu Co., Wufeng Twnsh., Rd. 122, km 26, 2000 m, mountain forest litter, 28.III.2008, leg. VIT [10]” (cAss).

This species is similar to *P. alutithorax* and allied species. It would key out at couplet 16 together with *P. anmamontis*, from which it differs by the less distinct metallic hue of the elytra.





**Fig. 227.** Distributions of species of the *P. formosanus* group in Taiwan: *Paederus trihamatus* (white circle), *P. fulvocaudatus* (black circles), *P. furcispinosus* (white diamond), *P. semiflavus* (black diamond).

*Paederus (Megalopaederus) sp. 4*

3 ♀♀: “Taiwan: Tengchih, Kaohsiung Hsien, 24.IV.1990, 1565 m, Fauch. arbustes, L. LESAGE LL90-22” (cSme).

The above material would key out at couplet 7, together with *P. furcispinosus*, from which this species differs by black tibiae and very shallow microreticulation of the head and pronotum. The specimens were swept from shrubs.

*Paederus (Megalopaederus) sp. 5*

1 ♀: “Taiwan, Nantou Hsien, Nenkaoshan trail, 2050–2150 m, 8.V.1992, A. SMETANA [T120]” (cSme).

This species, too, is of similar coloration as *P. furcispinosus*, but distinguished by somewhat larger body size.

*Paederus (Megalopaederus) sp. 6*

1 ♀: “Taiwan: Shanlinhsi, 10.V.1990, Fauchage dans forêt primaire, L. LESAGE LL90-41” (cSme).

The above female, which was swept from vegetation in a primary forest, is similar to *P. virgifer* and *P. fulvocaudatus*, but differs from the former by the bright reddish pronotum and from the latter by the more pronounced microsculpture of the head and pronotum.

3.7 Examined *Paederus* species from China and Japan

*Paederus biacutus* Li, Zhou & Solodovnikov, 2013  
(Figs. 18, 37, 56, 73, 114–116, 217–222)

Material examined

China: Fujian: 1 ♂, Guadun [“Kuatun”], 27°40'N, 117°40'E, 2300 m, 29.IV.1938, leg. KLAPPERICH (BMNH); 1 ♀, same data, but 30.III.1938 (BMNH); 1 ♀, same data, but 10.IV.1938 (BMNH); 1 ♂, same data, but 10.V.1938 (cAss).

Comment

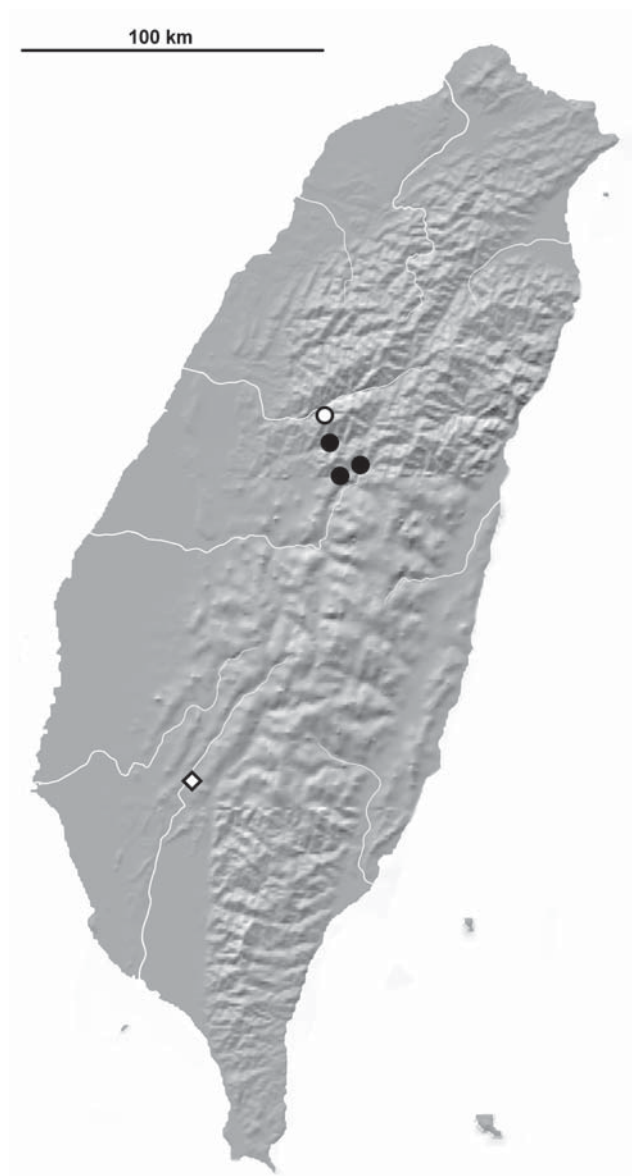
The description of this species is based on type material collected in several localities in Fujian province, China. Together with several other species, it was assigned to the *P. biacutus* species group (LI et al. 2013). Unfortunately, the description does not include some relevant structures, particularly the internal structures of the aedeagus. In order to facilitate a comparison with the *Megalopaederus* species from Taiwan, a redescription is provided below.

This species was studied to assess the significance of morphological characters and the phylogenetic affiliations of the *Megalopaederus* species from Taiwan. It is the geographically closest micropterous *Paederus* species in mainland China.

Redescription

Body length 8.7–10.3 mm; length of forebody 4.7–5.3 mm. Coloration (Figs. 18, 37, 56, 73): head black; pronotum bright reddish; elytra black with pronounced bluish-greenish hue; scutellum reddish with darker apex; abdomen black; legs with the femora blackish and the tibiae and tarsi reddish; antennae reddish.

Head (Fig. 18) distinctly transverse, but of rather variable shape, 1.10–1.20 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly to distinctly convex in dor-



**Fig. 228.** Distributions of species of the *P. kosempoensis* group in Taiwan: *Paederus discurrens* (white circle), *P. incisus* (black circles), *P. kosempoensis* (white diamond).

sal view; posterior angles obsolete or weakly marked; punctation moderately fine and sparse, sparser and finer in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation; dorsal surface glossy. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view, or nearly so. Antenna (Fig. 56) 3.2–3.8 mm long, more slender in male than in female; male: antennomeres V–VIII approximately 2.5 times as long as broad; female: antennomeres V–VIII little more than twice as long as broad.

Pronotum (Fig. 18) approximately 1.05 times as long as broad and approximately 0.95 times as broad as head; strongly convex in cross-section; punctation similar to that of head; interstices without trace of microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 18) 0.55–0.60 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III, or nearly so.

Abdomen (Fig. 37) approximately 1.1 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices distinctly broader than diameter of punctures, with shallow transverse microsculpture; surface somewhat glossy; posterior margin of tergite VII without palisade fringe; tergite VIII sexually dimorphic.

♂: tergite VIII (Fig. 37) triangularly produced posteriorly, middle of posterior margin nearly acute; sternite VII (Fig. 217) moderately strongly transverse, in postero-medial portion with rather extensive, but not very deep impression, this impression with a cluster of very dense and moderately stout setae, posterior margin weakly concave; sternite VIII (Fig. 218) weakly transverse, posterior excision U-shaped and deep, nearly 0.6 times as deep as length of sternite; hemitergites IX (Fig. 73) with the setiferous postero-lateral portions clearly delimited from the non-setiferous antero-medial portion by fine line; aedeagus (Figs. 114–116) 2.3–2.4 mm long, strongly sclerotized; parameres of subequal length, of similar shape, and apically very acute; ventral process apically weakly convex; dorsal plate strongly asymmetric and apically extending into a pronounced hook (Fig. 220), not reaching apices of parameres; internal sac (Fig. 219) with two strongly sclerotized basal structures and one dorso-apical structure of characteristic shapes.

♀: tergite VIII (Fig. 221) much longer than broad, posteriorly with a pronounced median process; sternite VIII (Fig. 222) distinctly oblong, posteriorly with a long and apically conspicuously acute median process of subtriangular shape; hemitergites IX flattened and apically extending into a small spine; tergite X strongly convex in cross-section, anteriorly even keeled.

#### Comparative notes

Though similar in general appearance (size, proportions, coloration, microsculpture) and in the shape of the female sternite VIII to *P. kosempoensis* and allied species, *P. biacutus* is distinguished from them by several characters: the more transverse head, the distinctly less slender and sexually dimorphic antennae, the sexual dimorphism of the abdominal tergite VIII, the posteriorly nearly acute male tergite VIII, the different shape and chaetotaxy of the male sternite VII, the much deeper posterior excision



of the male sternite VIII, the different general morphology of the aedeagus (ventral process apically convex; dorsal plate strongly asymmetric and much more elongated apically; dorso-apical internal structure of different shape), the posteriorly strongly elongated female tergite VIII, the flattened and apically spinose female hemitergites IX, and the strongly convex (cross-section) female tergite X.

On the other hand, aside from the external similarity, *P. biacutus* shares some character conditions with the *Megalopaederus* species from Taiwan, such as the chaetotaxy of the male sternite VII, the shape of the male sternite VIII, the apically hooked dorsal plate of the aedeagus, the general arrangement of the internal structures and the shape of the dorso-apical structure, and a female sternite VIII with a triangular median projection posteriorly. Thus, although *P. biacutus* probably represents a different lineage, assigning this species and the *Megalopaederus* species from Taiwan to different taxa at the subgeneric, or even generic level would seem unjustified.

#### Distribution and natural history

The known distribution of this species is confined to Fujian province, but the possibility that it is present also in the adjacent parts of Jiangxi cannot be ruled out.

*Paederus (Megalopaederus) lewisi* Cameron, 1930  
(Figs. 19, 38, 74–75, 120–122, 223–225)

*Paederus lewisi* CAMERON 1930: 206.

#### Type material examined

Holotype ♀: “Japan, Chuzenji, at 4000 ft, 26.VIII.28, J. E. A. LEWIS / *P. lewisi* Cam., Type / Type / Co-Type / Holotype / M. CAMERON. Bequest. B. M. 1955-147. / Holotype *Paederus lewisi* Cameron, 1930, det. R. G. BOOTH, 2009 / *Paederus lewisi* Cameron, det. V. ASSING 2014” (BMNH).

#### Additional material examined

Japan: 1 ♀, Nagano Pref., Usui pass, 5.VIII.1950 (NHMW); 4 ♀♀, Kyoto Pref., Mt. Daihi, 22.–23.VI.1951 (NHMW, cAss); 2 ♂♂, Honshu, Yamagata-ken, Mt. Haguro, 19.IX.2010, leg. LACKNER (cAss).

#### Comment

The original description is based on a unique female from “Chuzenji” (CAMERON 1930). Unlike the additional material examined, the holotype lacks the posterior median projection of the female sternite VIII. This, however, is probably an artefact (broken off) or a teratology.

#### Redescription

Large species; body length 10.5–13.5 mm; length of forebody 5.4–6.5 mm. Coloration (Figs. 19, 38, 74–75): head, pronotum, and abdomen black; elytra with vivid blue

ish hue; legs reddish-yellow with the apices of the femora narrowly blackish; antennae reddish-yellow to reddish.

Head (Fig. 19) of variable shape, distinctly transverse in male and weakly transverse in female, 1.01–1.11 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles obsolete; punctuation rather fine to moderately coarse and moderately to very sparse, even sparser and finer in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation; dorsal surface glossy. Eyes moderately convex, somewhat less than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna 4–5 mm long and very slender; antennomeres IV–VIII approximately 3 times as long as broad.

Pronotum (Fig. 19) rather slender, 1.1–1.2 times as long as broad and approximately 0.92–0.95 times as broad as head; strongly convex in cross-section; punctuation fine and conspicuously sparse, much sparser than that of head; interstices without trace of microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 19) approximately 0.55 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctuation conspicuously fine and sparse. Hind wings completely reduced. Metatarsomere I slightly shorter than the combined length of II and III.

Abdomen (Fig. 38) conspicuously large, 1.15–1.25 times as broad as elytra at posterior margin; punctuation fine and sparse; interstices much broader than diameter of punctures, with shallow transverse microsculpture; posterior margin of tergite VII without palisade fringe; tergite VIII with moderate sexual dimorphism.

♂: tergite VIII convex posteriorly; sternite VII (Fig. 223) strongly transverse, in postero-median portion with shallow impression, pubescence not distinctly modified; sternite VIII (Fig. 224) distinctly transverse, approximately 1.2 times as broad as long, posterior excision U-shaped and conspicuously deep, at least 0.65 times as deep as length of sternite; hemitergites IX (Fig. 74) with the setiferous postero-lateral portions clearly delimited from the non-setiferous antero-median portion by fine line; aedeagus (Figs. 120–122) 3 mm long, strongly sclerotized; parameres conspicuously asymmetric and distinctly modified, right paramere curved, much longer, more slender, and apically more acute than left paramere; dorsal plate strongly asymmetric, obliquely curved to the right (ventral view); dorsal plate strongly asymmetric and apically hooked, far from reaching apex of right paramere; internal sac with dorso-apical structure, but without distinctly sclerotized basal spines.

♀: tergite VIII posteriorly more strongly convex than in male; sternite VIII (Fig. 225) oblong, posteriorly with a median process of subtriangular shape; hemitergites

IX (Fig. 75) flattened and apically extending into a stout spine; tergite X moderately convex in cross-section.

#### Comparative notes

Though similar in body size, the vivid bluish hue of the elytra, the shape of the male sternite VII, and the shape of the female sternite VIII to some *Megalopaederus* species from Taiwan, *P. lewisi* differs from them in many respects, particularly the fine and conspicuously sparse punctation of the pronotum, the broad abdomen, the sexual dimorphism of the abdominal tergite VIII, the conspicuously deep posterior excision of the male sternite VIII, the morphology and chaetotaxy of the male hemitergites IX, the extreme asymmetry of the parameres, the absence of distinct basal spines in the internal sac of the aedeagus, and the shapes of the female hemitergites IX and tergite X. In some respects, especially the shape and chaetotaxy of the

male hemitergites IX, the male tergite X, and the shape of the female hemitergites IX, *P. lewisi* is more similar to *P. biacutus*, which is currently not assigned to *Megalopaederus*.

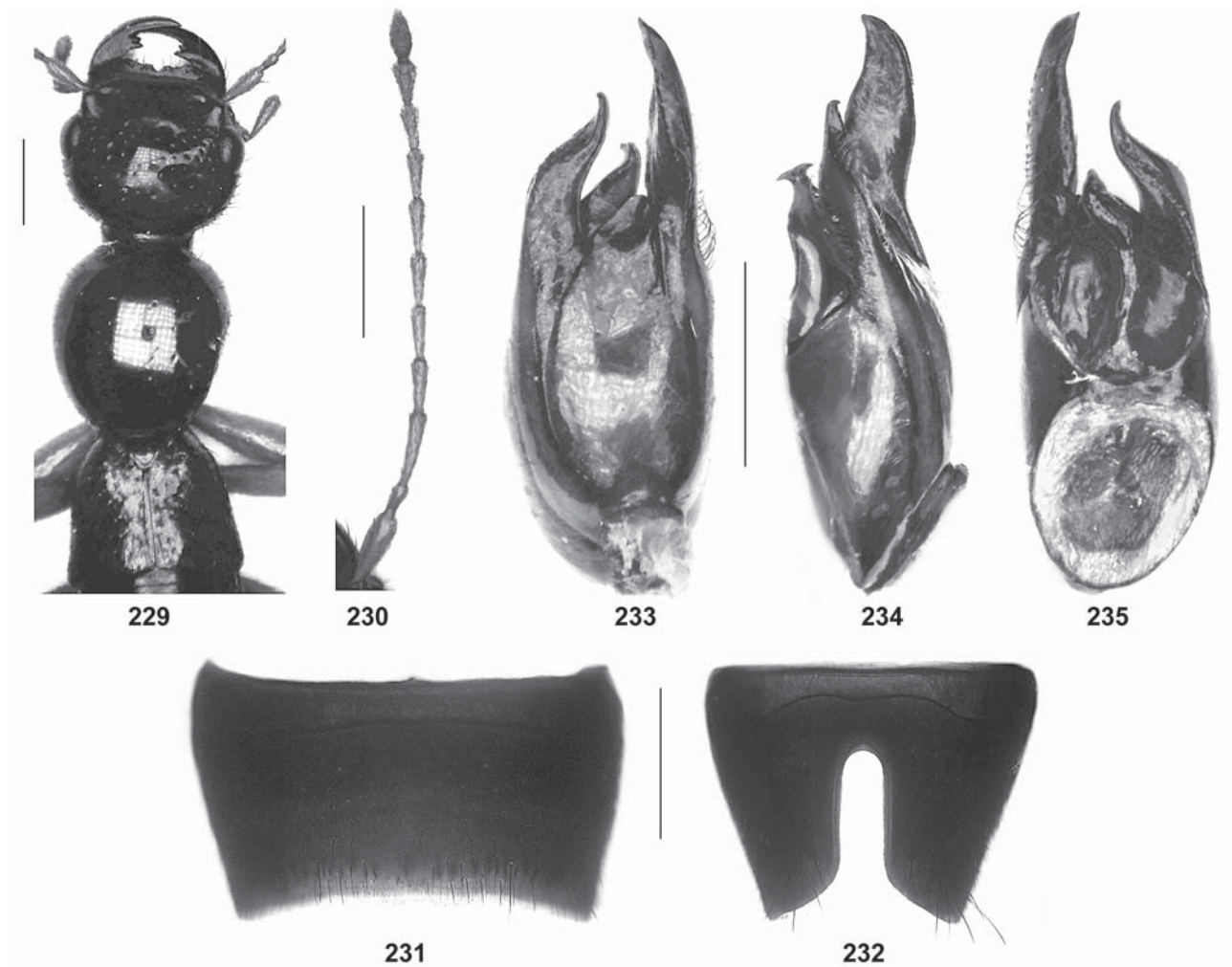
#### Distribution

*Paederus lewisi* is moderately widespread and apparently not uncommon in the central and northeastern parts of Honshu (WATANABE 1986).

#### *Paederus (Megalopaederus) bucculentus* n. sp. (Figs. 229–235)

#### Type material

H o l o t y p e ♂: “Japan: Honshu, Nagano pr., trib. to Nakatsuna Lake, ca. 36°36'31"N, 137°49'53"E, 14.VI.2012, P. ZWICK / *Paederus bucculentus* sp. n., det. V. ASSING 2014” (cAss).



**Figs. 229–235.** *Paederus bucculentus*. – 229. Forebody. 230. Antenna. 231. Male sternite VII. 232. Male sternite VIII. 233. Aedeagus in ventral view. 234. Aedeagus in lateral view. 235. Aedeagus in dorsal view. – Scale bars: 1.0 mm.



## Etymology

The specific epithet (Latin, adjective: chubby-faced) alludes to the strongly convex postero-lateral portion of the head, one of the characters distinguishing this species from the similar *P. lewisi*.

## Description

Large species; body length 15.5 mm; length of forebody 6.7 mm. Coloration (Fig. 229): head, pronotum, and abdomen black; elytra with vivid bluish hue; legs reddish-yellow with the apices of the femora narrowly blackish; antennae reddish-yellow to reddish.

Head (Fig. 229) strongly transverse, 1.25 times as broad as long; contours of postero-lateral portion (behind eyes) strongly convex in dorsal view. Antenna as in Fig. 230.

Pronotum weakly oblong, 1.08 times as long as broad and 0.97 times as broad as head.

Other external characters as in *P. lewisi*.

♂: tergite VIII strongly convex posteriorly; sternite VII (Fig. 231) strongly transverse, in postero-median portion with shallow impression, pubescence not distinctly modified, posterior margin broadly and weakly concave; sternite VIII (Fig. 232) distinctly transverse, approximately 1.35 times as broad as long, posterior excision narrowly U-shaped and conspicuously deep, approximately 0.65 times as deep as length of sternite; hemitergites IX with the setiferous postero-lateral portions clearly delimited from the non-setiferous antero-median portion by fine line; aedeagus (Figs. 233–235) 2.85 mm long, strongly sclerotized; parameres conspicuously asymmetric and distinctly modified, right paramere (ventral view) stout, nearly straight in ventral view, stout and somewhat dagger-shaped in lateral view, much longer than left paramere; left paramere stout and inversely S-shaped; dorsal plate strongly asymmetric, broad, and strongly sclerotized; internal sac with dorso-apical structure, but without distinctly sclerotized basal spines.

♀: unknown.

## Comparative notes

As can be inferred from the similar external and male secondary sexual characters, as well as the similarly derived morphology of the aedeagus, *P. bucculentus* is probably most closely allied to *P. lewisi*, from which it differs by slightly larger size, different head shape (*P. lewisi*: head less strongly transverse; outline of postero-lateral portion weakly convex, nearly straight), the less oblong pronotum, the more transverse male sternite VIII, and particularly by the shape of the aedeagus (right paramere much stouter and not distinctly curved; left paramere S-shaped; differently shaped dorsal plate).

## Distribution

The type locality is situated in the northwest of Nagano prefecture, northern Central Honshu. Additional data are not available.

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