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Taxonomic and nomenclatural notes on the genera *Themus* Motschulsky and *Lycocerus* Gorham (Coleoptera, Cantharidae)

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Abstract

The following taxonomic or nomenclatural changes are proposed: *Themus* (s.str.) *regalis* (Gorham, 1889) **nom. rest.**; *T.* (s.str.) *scutulatus* Wittmer, 1983 = *T.* (s.str.) *hmong* Kazantsev, 2007, **syn. n.**; *T.* (*Telephorops*) *coelestis* (Gorham, 1889) = *T. violetipennis* Wang & Yang, 1992, **syn. n.**; *T.* (*Telephorops*) *uniformis* Wittmer, 1983, **stat. n.** = *T.* (*Telephorops*) *cribripennis* Wittmer, 1983, **syn. n.**; *T.* (*Haplothemus*) *licenti* Pic, 1938, **stat. rev.**, resurrected from synonymy with *T. coriaceipennis* (Fairmaire, 1889); *Lycocerus aenescens* (Fairmaire, 1889) = *L. tcheonanus* (Pic, 1922), **syn. n.**; *L. asperipennis* (Fairmaire, 1891) = *L. wangi* (Švihla, 2004), **syn. n.**; *L. borneoensis* **nom. n.** for *Athemellus atricolor* (Wittmer, 1972); *L. bilineatus* (Wittmer, 1995) = *L. amplus* (Wittmer, 1995), **syn. n.**; *L. fairmairei* **nom. n.** et **stat. rev.** for *Athemus dimidiaticrus* (Fairmaire, 1889), originally in *Telephorus*, resurrected from synonymy with *L. orientalis* (Gorham, 1889); *L. confossicollis* (Fairmaire, 1891), **comb. n.** hereby transferred from *Cantharis* = *L. multiimpressus* (Wittmer, 1997), **syn. n.**; *L. inopaciceps* (Pic, 1926) = *Athemus (Athemellus) bimaculicollis* (Švihla, 2005), **syn. n.**; *L. nigratus* **nom. n.** for *L. nigricolor* (Wittmer, 1972), originally in *Podabrinus*; *L. plebejus* (Kiesenwetter, 1874) = *L. brunneonotaticeps* (Pic, 1922), **syn. n.** = *Cantharis rufonotaticeps* Pic, 1921, **syn. n.**; *L. swampingatus* (Pic, 1916), **comb. n.**, hereby transferred from *Cantharis*. The neotypes of *Themus violetipennis* Wang & Yang, 1992 and *Athemus* (s.str.) *maculithorax* Wang & Yang, 1992 are designated respectively.

Keywords

Coleoptera, Cantharidae, *Themus*, *Lycocerus*, synonym, homonym, new name, restoration name, new combination, new status, resurrection

Introduction

This study presents some further taxonomic and nomenclatural clarification in the cantharid genera *Themus* Motschulsky, 1857 and *Lycocerus* Gorham, 1889, based on the examination of type specimens. See Wittmer (1961, 1969, 1972, 1983a, 1995) for prior taxonomic changes. The present work primarily focuses on the Chinese species.

Material and methods

The aedeagi and the abdominal sternite VIII of female were dissected under a stereoscopic microscope, cleared in 10% KOH solution for several minutes, then placed in a droplet of glycerol and examined under a compound light microscope. Photographs of the type specimens were taken with a Canon 450D camera equipped with an EF 100mm f/2.8 USM lens. Line drawings were made with the aid of camera lucida attached to a Leica MZ12.5 stereomicroscope, and edited in the CorelDRAW 12 and Adobe Photoshop 8.0.1.

In the literature citations, the square brackets "[ ]" are used for my remarks and addenda. The type specimens are quoted verbatim, "[p]" indicated that the following data are printed and "[h]" that they are handwritten, and the quotation marks are used to separate data from different labels and a backslash "\" to separate data from different lines of the same label. The additional specimens are transliterated from Chinese labels, except those originally in English and cited in quotation marks.

The following collection codens are used in the text:

HBUM Hebei University Museum, Baoding, China;
IZAS Institute of Zoology, Chinese Academy of Sciences, Beijing, China;
MNHN Muséum national d'Histoire naturelle, Paris, France;
NHMB Naturhistorisches Museum Basel, Switzerland;
NMPC Narodni muzeum, Praha, Czech Republic.

Taxonomic account

Themus **(s.str.)** ***regalis*** **(Gorham, 1889), nom. rest.**

Telephorus regalis Gorham 1889: 103. [Synonymized with *Themus imperialis* (Gorham, 1889) by Wittmer 1983a: 215.]
Telephorus imperialis Gorham 1889: 102, t. 10, fig. 8. [Primary homonym, preoccupied by *Telephorus imperialis* Redtenbacher, 1867.]
Cantharis imperator Pic 1906: 81. [Replacement name for *Telephorus imperialis* Gorham, 1889, nec Redtenbacher 1867.]
Themus imperator: Jacobson 1911: 675.
Themus regalis: Jacobson 1911: 675.

Themus (s.str.) *imperialis*: Wittmer 1983a: 215.

Distribution. China, Vietnam.

Remarks. *Telephorus imperialis* Gorham, 1889 is a primary homonym and preoccupied by *Telephorus imperialis* Redtenbacher, 1867, so the former is permanently invalid (ICZN, 4th ed., article 57.2) and should be replaced by the next oldest available name among its synonyms (ICZN, 4th ed., article 23.3.5), that is, *Themus* (s.str.) *regalis* (Gorham, 1889) should be restated as the valid name for this species.

Themus (s.str.) *scutulatus* Wittmer, 1983

Themus rufoscutus Pic 1926a: 35. [Secondary homonym, preoccupied by *Themus rufoscutus* (Pic, 1922), originally described in *Cantharis*.]
Themus (s.str.) *scutulatus* Wittmer 1983a: 208. [Replacement name for *Themus rufoscutus* Pic, 1926, nec Pic 1922.]
Themus (s.str.) *hmong* Kazantsev 2007: 54. [Replacement name for *Themus rufoscutus* Pic, 1926, nec Pic 1921 [1922].] syn. n.

Distribution. Vietnam.

Remarks. This species was originally described as *Themus rufoscutus* Pic, 1926 (located in Vietnam), which became a junior secondary homonym of *T. rufoscutus* (Pic, 1922) (located in Yunnan, China) since the taxonomic status of the latter was changed by Wittmer (1983a), so the former was replaced by *T.* (s. str.) *scutulatus* in the latter study. However, this nomenclature change was neglected by Kazantsev (2007), so that *T. rufoscutus* Pic, 1926 was replaced again by *T.* (s. str.) *hmong*. In the same work (Kazantsev and Brancucci 2007), the distribution of this species was recorded occurring in both Vietnam and China (Yunnan). Obviously, *T.* (s. str.) *hmong* is a junior objective synonym of *T.* (s.str.) *scutulatus* (ICZN, 4th ed., article 72.7), which should be restricted to Vietnam and excluded from the Chinese fauna at the moment.

Themus (*Telephorops*) *coelestis* (Gorham, 1889)

http://species-id.net/wiki/Themus_coelestis

Telephorus coelestis Gorham 1889: 104, t. 10, fig. 7.
Themus coelestis: Jacobson 1911: 675.
Themus rugosus Pic 1929: 8. [Synonymized by Wittmer 1983a: 197.]
Themus (*Telephorops*) *coelestis*: Wittmer 1983a: 197, figs. 1, 59.
Themus violetipennis Wang and Yang 1992: 265, fig 2.
Themus (s.str.) *violetipennis*: Švihla 2008: 186. syn. n.

Type material examined. *Telephorus coelestis*: Lectotype ♂ (NHMB): without locality information, [h]“coelestis ♂”, [h]“♂”, [h]“Themus \ (Telephorops) \ coelestis \

(Gorh.) \ det. W. Wittmer", [h]"Type", [p]"LECTOTYPUS", [p]"Naturhist. \ Museum Basel \ coll. W. Wittmer", [p]"CANTHARIDAE \ CANTH00001277". Paralectotype: 1♀ (MNHN): [p]"Kiukiang \ June, 1887 \ A. E. Pratt", [h]"coelestis \ Gorh.", [h]"Themus \ (Telephorops) \ coelestis \ (Gorh.) \ det. W. Wittmer", [h]"TYPE", [p]"PARALECTOTYPUS".

Themus rugosus: Holotype ♀ (MNHN): [h]"Fokien", [h]"Themus \ rugosus \ n. sp.", [h]"Themus \ (Telephorops) \ coelestis \ (Gorh.) \ det. W. Wittmer", [h]"type", [p]"TYPE".

Neotype designation. *Themus violetipennis*: Neotype ♀ (here designated, IZAS): "湖南永顺杉木河林场 \ 600m \ 中国科学院" [Hunan, Yongshun, Shanmuhe forestry station \ 600m], "1988.VIII.4 \ 采集者：王书永" [4.VIII.1988 \ leg. Shu-Yong Wang].

Additional material examined. CHINA: Shaanxi: 2♀♀ (IZAS): Foping, 16.VIII.2007, leg. Yu-Xia Yang. Gansu: 1♂ (IZAS): Kangxian, Baiyunshan, 1250–1750m, 12.VII.1998, leg. Shu-Yong Wang; 1♀ (IZAS): Kangxian, Heimaguan, 1450–1550m, 13.VII.1998, leg. De-Cheng Yuan. Henan: 1♂ (IZAS): Jigongshan, 700m, 14.VII.2001, leg. Si-Qin Ge; 1♀ (IZAS): Tongbaishan, 500m, 16.VII.2001, leg. Si-Qin Ge; 1♀ (IZAS): Neixiang, Baoyunman, 21.VII.2001, leg. Fu-Qiang Chen. Anhui: 2♂♂ (NHMB): "Dabieshan, 65km SW Huoshan, 1400m, 21.–24. VI.1995, leg. Bolm". Zhejiang: 1♀ (IZAS): Xitianmushan, 23.VI.1998, leg. Ming-Shui Zhao. Hubei: 1♂, 1♀ (NHMB): "Hupeh, Lichuan Distr., Suisapa, 1000m, 22.VII.1948, Gressitt & Djou Collra"; 1♂ (NHMB): same data, 24.VII.1948; 1♂ (NHMB): same data, 29.VII.1948; 2♂♂, 1♀ (NHMB): same data, 31.VII.1948; 1♂, 1♀ (NHMB): same data, 4.VIII.1948; 1♂ (IZAS): Hefeng, Fenshuiling, 1400m, 1.VIII.1981, leg. Long-Long Yang; 1♀ (IZAS): Hefeng, Shayuan, 30.VII.1989, leg. Shu-Yong Wang. Jiangxi: 1♂ (IZAS): Jiulianshan, Huangniushi, 19.VI.1975, leg. You-Wei Zhang; 1♀ (IZAS): Longnan, Jiulianshan, 17.VI.1975, leg. You-Wei Zhang. Hunan: 1♂, 1♀ (NHMB): "Yon-ping, 12.VI.1917"; 1♂ (NHMB): same data, "Yon-ping, 14.VI.1917"; 1♂ (IZAS): Sangzhi, Tianpingshan, 700–1450m, 14.VIII.1988, leg. Shu-Yong Wang. Fujian: 1♂ (IZAS): Chong'an, Xingcun, Xianfengling, 1170m, 14.VII.1960, leg. Cheng-Lin Ma; 1♀ (IZAS): Dehua, Chengguan, 510–550m, 1.VI.1960, leg. Fu-Ji Pu; 11 spec. (NHMB): "Fukien, Kuatun, 15.VIII.1946, Tschung-Sen leg."; 5 spec. (NHMB): "Kuatun, 26.VII.1946"; 6 spec. (NHMB): same data, 11.VII.1946; 5 spec. (NHMB): same data, 16.VIII.1946; 4 spec. (NHMB): same data, 18.IX.1946. Hainan: 1♀ (IZAS): Wanning, 10m, 9.VI.1960, leg. Chang-Qing Li. Guangxi: 1♂ (IZAS): Longsheng, Tianpingshan, 740m, 17.VI.1963, leg. Shu-Yong Wang; 1♀ (IZAS): Maoershan, Tongmujiang, 800m, 15.VII.1985, leg. Su-Bai Liao. Sichuan: 1♂, 1♀ (IZAS): Youyang, 780m, 15.VII.1989, leg. Shu-Yong Wang. Guizhou: 1♂ (NHMB): "Kouy-Tchéou"; 1♂ (IZAS): Fanjingshan, Huguosi, 1350m, 3.VIII.2001, leg. Qiong-Zhang Song; 1♀ (IZAS): Fanjingshan, Huixiang-ping, 1600m, 2.VIII.2001, leg. Kang-Zhen Dong.

Distribution. China (Shaanxi, Gansu, Henan, Anhui, Zhejiang, Hubei, Jiangxi, Hunan, Fujian, Hainan, Guangxi, Sichuan, Guizhou).

Remarks. According to the original publication, the types of *Themus violetipennis* Wang & Yang, 1992 were deposited in the IZAS and China Agriculture University, Beijing, China (CAUB), but our search of the types in the two Chinese museums have been long, repeated and with no results. The original description of *T. violetipennis* was in accord with the standard of that time but insufficient considering the present level, and neotype allows us to satisfy a better comparision. Fortunately, a female specimen, which was collected at the same locality and date as that of one paratype designated by Wang and Yang (1992), was found in IZAS during our study. Its morphological characters are consistent with the original description, so it is designated as the neotype here, in order to clarify the taxonomic status of this species (ICZN, 4th, article 75.3). Furthermore, a careful examination of the types shows that *Themus violetipennis* Wang & Yang, 1992 is a junior synonym of *T.* (*Telephorops*) *coelestis* (Gorham, 1889), which is widely distributed in China based on the data from a large series of examined specimens.

***Themus* (*Telephorops*) *uniformis* Wittmer, 1983, stat. n.**
Figs 1–2

Themus (s.str.) *bitinctus uniformis* Wittmer 1983a: 218, fig. 30.
Themus (s.str.) *cribripennis* Wittmer 1983b: 151, figs. 46, 49.
Themus (*Telephorops*) *bitinctus uniformis*: Švihla 2008: 187.
Themus (*Telephorops*) *cribripennis*: Švihla 2008: 187. syn. n.

Type material examined. *Themus* (s.str.) *bitinctus uniformis*: Holotype ♂ (NHMB): [p]“Yen-ping, China \ VII.21. 1917 \ Ac. 5148”, [h]“bitinctus \ uniformis”, [p]“HOLOTYPUS”, [p]“Naturhist. \ Museum Basel \ coll. W. Wittmer”, [p]“CANTHARIDAE \ CANTH00000449”.

Themus (s.str.) *cribripennis*: Holotype ♂ (MNHN): [p]“Taihorinsho \ Formosa \ Sauter, VIII_ 7_09”, [h]“Cantharis \ davidis Fairm.”, [h]“Themus (s.str.) \ cribripennis \ Wittm. \ det. W. Wittmer”, [p]“HOLOTYPUS”, [h]“136”. Paratype: 1♀ (NHMB): [p]“Suisharyo \ Formosa \ H. Sauter, X.1911”, [h]“Themus s.str. \ cribripennis \ Wittm. \ det. W. Wittmer”, [p]“PARATYPUS”, [p]“CANTHARIDAE \ CANTH00002654”.

Distribution. China (Fujian, Taiwan).

Remarks. Having examined the holotypes of *Themus cribripennis* Wittmer, 1983b and *T. bitinctus uniformis* Wittmer, 1983a, we were unable to find differences justifying their separation, which has led us to consider all the examined specimens of both nominal species to be conspecific. Therefore, we synonymized *T. cribripennis* under *T. bitinctus uniformis*. Furthermore, *T. bitinctus uniformis* should be upgraded to the specific rank, because it is obviously different from *T. bitinctus* Wittmer, 1982 (located in Vietnam) in the aedeagus, except the difference in the elytra coloration from the latter.

Figures 1–9. Habitus, dorsal view **1** Holotype of *Themus* (s.str.) *bitinctus uniformis* Wittmer, 1983 **2** Holotype of *T.* (s.str.) *cribripennis* Wittmer, 1983 **3** Holotype of *T. licenti* Pic, 1938 **4** Holotype of *Telephorus coriaceipennis* Fairmaire, 1889 **5** Lectotype of *Podabrus aenescens* Fairmaire, 1889 **6** Holotype of *Cantharis tcheonana* Pic, 1922 **7** Holotype of *Athemus* (*Isathemus*) *bilineatus* Wittmer, 1995 **8** Holotype of *Athemus* (s.str.) *amplus* Wittmer, 1995 **9** Holotype of *Telephorus dimidiaticrus* Fairmaire, 1889. **1–2, 5, 7–8, 9** male **3–4, 6** female.

***Themus* (*Haplothemus*) *licenti* Pic, 1938, stat. rev.**
Fig. 3

Themus licenti Pic 1938a: 161. [Synonymized with *Themus coriaceipennis* (Fairmaire, 1889) by Wittmer 1983a: 224.]
Themus coriaceipennis (Fairmaire, 1889): Wittmer 1983a: 224, figs 43, 111. [Misidentification.]

Type material examined. *Themus licenti*: Holotype ♀ (MNHN): [p]"CHANSI. S.O. \ 22.VII.35", [p]"HO CHAN \ 2,255m", [h]"Themus \ licenti n. sp.", [h]"Themus (s.str.) \ coriaceipennis \ (Fairm.) \ det. W. Wittmer", [p]"HOLOTYPUS".

Telephorus coriaceipennis: Holotype ♀ (MNHN): [p]"Thibet \ Tàtsiénloù \ M. F. Biet", [h]"Telephorus \ coriaceipennis \ n. sp.", [h]"Themus (s.str.) \ coriaceipennis \ (Fairm.) \ det. W. Wittmer", [p]"HOLOTYPUS".

Additional material examined. CHINA: Henan: 1♂, 1♀ (IZAS): Lushi, Jihe forestry station, 1200m, 20.VII.2001, leg. Kang-Zhen Dong. Sichuan: 5♂♂, 1♀ (NHMB): "Szechuen, Yao Gi, nr Mupin, 7400ft., 15.VII.1929, D. C. Graham"; 1♂, 1♀ (NHMB): "Mu San Tsai, 10km NW Weichow, 8700ft., 26.–28.VI.1933, D. C. Graham"; 1♂, 1♀ (IZAS): Luding, Xinxing, Yanzigou, 1560m, 7.VIII.2004, leg. Ming Bai.

Distribution. China (Henan, Shaanxi, Sichuan).

Remarks. *Themus licenti* Pic, 1938a was synonymized with *T. coriaceipennis* (Fairmaire, 1889) by Wittmer (1983a). However, examination of the holotypes of both nominal species shows that they are different species. *Themus licenti* is obviously different from *T. coriaceipennis* in the following characters: head (Fig. 3) width across eyes wider than anterior margin of pronotum, pronotum reddish brown with a large black marking in middle, abdominal sternite VIII of female (see Wittmer 1983a: fig. 111) deeply concaved on both sides of the middle emargination of posterior margin; while in *T. coriaceipennis* (Fig. 4), head width across eyes narrower than anterior margin of pronotum, pronotum uniformly dark brown, without any black marking, abdominal sternite VIII of female (Fig. 22) slightly concaved on both sides of the middle emargination of posterior margin. Therefore, we suggest *Themus licenti* Pic, 1938a be resurrected from synonymy with *T. coriaceipennis* (Fairmaire, 1889).

***Lycocerus aenescens* (Fairmaire, 1889)**
http://species-id.net/wiki/Lycocerus_aenescens
Figs 5–6

Podabrus aenescens Fairmaire 1889: 40.
Cantharis tcheonana Pic 1922: 31.
Themus angusticollis Pic 1955: 16. [Secondary homonym, preoccupied by *Athemus angusticollis* (Gorham, 1882), originally described in *Telephorus*. Synonymized with *Athemus tcheonanus* (Pic, 1922) by Wittmer 1995: 211.]

Athemus angustithorax Wittmer 1975: 260. [Replacement name for *Themus angusticollis* Pic, 1955, nec Gorham 1882.]
Athemus tcheonanus: Wittmer 1975: 260; 1995: 211, figs. 42, 43, 168, 169.
Athemus aenescens: Wittmer 1982: 341.
Lycocerus aenescens: Kazantsev and Brancucci 2007: 249.
Lycocerus tcheonanus: Kazantsev and Brancucci 2007: 254. syn. n.

Type material examined. *Podabrus aenescens*: Lectotype ♂ (MNHN): without locality information, [h]"Telephorus aenescens \ Frm., n. sp.", [h]"Athemus \ aenescens \ (Fairm.) \ det. W. Wittmer", [p]"LECTOTYPUS". Paralectotype: 1♀ (MNHN): [p]"Kouy-Tchèu", [p]"PARALECTOTYPUS".

Cantharis tcheonana: Holotype ♀ (MNHN): [p]"CHINE \ Kouy-Tchèou \ Koúy Yang Foú", [h]"tcheonana \ n. sp.", [h]"Athemus \ tcheonanus \ (Pic) \ det. W. Wittmer", [p]"HOLOTYPUS".

Themus angusticollis: Holotype ♂ (MNHN): [p]"Chasseurs Indigenes \ des Missionnaires \ de Ta-tslen-Lou \ 1906", [h]"Themus \ angusticollis \ n. sp.", [h]"Athemus s.str. \ angustithorax \ Wittm. \ det. W. Wittmer", [h]"Athemus s.str. \ tcheonanus \ (Pic) \ det. W. Wittmer", [p]"HOLOTYPUS".

Additional material examined. CHINA: Guangxi: 1♂, 1♀ (NHMB): "Koung-Si-Hien, alt. 2100m". Sichuan: 1♂ (NHMB): "Moxi, Gongashan mts., 1650m, 28.VI–2.VII.1994, leg. Bolm". Guizhou: 1♂ (MNHN): "Kouy-Tchèu, Koúy Yang Foú"; 2♀♀ (MNHN): "Kouy-Tchèu"; 1♀ (MNHN): "Kouei-Tcheou"; 5♀♀ (MNHN): "Kuoy-Tcheou, Gan chouem, Min y fou et Tchen-Fong, Tchéou, 1918, P. Cavalerie"; 1♀ (MNHN): "Kouy-Tchèu, 1921, Cavaleri"; 1♀ (MNHN): "Kouy-Tchèu, Reg. De Pin-fa, 1908, Père Cavaleri". Yunnan: 1♂ (MNHN): "Tse Kou, 1895, R. P. Dubernard"; 1♂, 1♀ (IZAS): Dali, Cangshan, 30.V.1955, leg. Xing-Chi Yang; 8 spec. (NHMB): "Cangshan mts., E slope, 2000–2500m, 25°42'N, 100°08'E, 21.VI.1992, leg. Vit Kubáň"; 12 spec. (NHMB): "Dali, 19.–21.V.1993, leg. R. Cervenka"; 2♂♂, 1♀ (NHMB): "Dali, 1600–2000m, 5.–8.VII.1990, leg. L. M. Bocák"; 1♂, 2♀♀ (NHMB): "Dali, 1.–7.VI.1994, B. Šiška et T. Spevár".

Distribution. China (Guangxi, Sichaun, Guizhou, Yunnan).

Remarks. Having examined the holotypes of *Lycocerus aenescens* (Fairmaire, 1889) and *L. tcheonanus* (Pic, 1922), we could not find any difference to justify their separation, so we synonymize *L. tcheonanus* under *L. aenescens*.

***Lycocerus asperipennis* (Fairmaire, 1891)**
http://species-id.net/wiki/Lycocerus_asperipennis

Telephorus asperipennis Fairmaire 1891: ccviii.
Cantharis limbatipennis Pic 1906: 83. [Synonymized by Wittmer 1995: 256.]
Cantharis asperipennis: Jacobson 1911: 679.
Cantharis stötzneri Pic 1926b: 154. [Synonymized by Wittmer 1995: 256.]

Athemus stötzneri: Pic 1933: 4.
Athemus limbatipennis: Wittmer 1972a: 106.
Athemus (s.str.) *maculithorax* Wang and Yang 1992: 264, fig. 1. [Secondary homonym, preoccupied by *Athemus maculithorax* (Wittmer, 1972), originally described in *Athemellus*.]
Athemus (s.str.) *asperipennis*: Wittmer 1995: 256, figs. 113, 114.
Athemus (s.str.) *wangi* Švihla 2004: 183 [Replacement name for *Athemus maculithorax* Wang & Yang, 1992, nec Wittmer 1972.]
Lycocerus asperipennis: Kazantsev and Brancucci 2007: 249.
Lycocerus wangi: Kazantsev and Brancucci 2007: 254. syn. n.

Type material examined. *Telephorus asperipennis*: Lectotype ♀ (MNHN): [h]"Chang-yang", [h]"Telephorus \ asperipennis \ Fairm. \ Changyang", [h]"Athemus \ asperipennis \ (Fairm.) \ det. W. Wittmer", [p]"LECTOTYPE". Paralectotype: 1♀ (MNHN): [h]"Chang-yang", [p]"PARALECTOTYPE".

Cantharis limbatipennis: Lectotype ♀ (MNHN): [h]"Yunnan \ (China)", [h]"C. limbatipennis \ Pic", [h]"limbatipennis \ Pic", [h]"von \ asperipennis \ Frm.", [h]"Athemus \ asperipennis \ (Frm.) \ det. W. Wittmer", [h]"type", [p]"TYPE", [p]"LECTOTYPE". Paralectotype: 1♀ (MNHN): [h]"Yunnan", [p]"PARALECTOTYPE".

Cantharis stötzneri: Lectotype ♂ (MNHN): [p]"Szetschwan \ Kwanhsien \ Exp. Stötzner", [h]"stötzneri \ n. sp.", [h]"Athemus \ asperipennis \ (Frm.) \ det. W. Wittmer", [p]"LECTOTYPE". Paralectotypes: 1♂, 5♀♀ (MNHN): same data to lectotype, [p]"PARALECTOTYPE".

Neotype designation. *Athemus maculithorax*: Neotype ♂ (here designated, IZAS): [p]"湖北兴山龙门河 \ 1300m" [Hubei, Xingshan, Longmenhe \ 1300m], [p]"1993. VI.21 \ 采集者：黄润质" [21.VI.1993 \ leg. Run-Zhi Huang].

Additional material examined. CHINA: Gansu: 1♂ (IZAS): Wenxian, Qiujiaba, 2360–2650m, 29.VI.1998, leg. De-Cheng Yuan; 1♀ (IZAS): same data, 30.VI.1998. Shanxi: 1♀ (IZAS): "Shansi, Kwashan, 9.VI.1936". Shaanxi: 2♂♂ (NHMB): "Danfeng-NE env., 900–1500m, 33°45–52'N, 110°22–37'E, 28.–29.V.1995, leg. L. R. Businský"; 3♂♂, 1♀ (NHMB): "Qinling Mts.-N. slpoe, Huxian Co., 1300–1600m, 33°50'N, 108°26'E, 12.–13.VI.1995, leg. L. R. Businský". Henan: 3♀♀ (IZAS): Lushi, Jihe forestry station, 20.VII.2001, leg. Kang-Zhen Dong. Hubei: 1♂ (NHMB): "Shennongjia, Yanzi Pass, 2200m, 31°43'N, 110°28'E, 23. –26.VI.1995, leg. L. R. Businský"; 1♀ (NHMB): "Dashennongjia massif-E slpoe, 31°24–30'N, 110°21–24'E, 2000m, 28.VI–7.VII.1995, leg. L. R. Businský"; 1♂, 1♀ (IZAS): Foping, Liangfengya, 1750–2150m, 28.VI.1999, leg. YAO Jian. Sichuan: 10 spec. (NHMB): "Mt. Emei, 500–1200m, 29°30'N, 103°20'E, 4.–18.V.1989, leg. S. J. Kolibáč"; 12 spec. (NHMB): "Mt. Emei, 600–1050m, 5.–19.V.1989, leg. Lad. Bocák"; 25 spec. (NHMB): "Kwanhsien, Exp. Stötzner"; 1♂, 1♀ (NHMB): "Chengtu, 1700m, 1.–2.V.1933, D.C. Graham"; 1♂, 1♀ (NHMB): "Kuausien, 1934, D.C. Graham"; 1♂, 1♀ (NHMB): "Yaogi nr. Mupin, 8000ft, 14.–18.VI.1929, D.C. Graham"; 1♀ (NHMB): "Shikaizi, Mt. Omei, 4500ft, 1945, D.C. Graham"; 1♂ (IZAS): Mt.

Emei, Baoguosi, 550–750m, 27.IV.1957, leg. Fu-Xing Zhu; 1♀ (IZAS): Mt. Emei, Qingyinge, 800–1000m, 20.IV.1957, leg. Fu-Xing Zhu; 1♀ (IZAS): same locality, 30.IV.1957, leg. Ke-Ren Huang; 1♂ (IZAS): same locality, 24.IV.1957, leg. Zong--Yuan Wang.

Distribution. China (Gansu, Shanxi, Shaanxi, Henan, Hubei, Sichuan, Yunnan).

Remarks. The neotype is designated for *Athemus* (s.str.) *maculithorax* Wang & Yang, 1992 here, according to the loss of the type, and for allowing a comparision based on most of the criteria (ICZN, 4th, article 75.3). The latter's name was replaced by *Athemus wangi* by Švihla (2004) and now is placed in *Lycocerus* (Kazantsev and Brancucci 2007). Having examined the lectotype of *L. asperipennis* and a large series of additional specimens from China, we suggest *L. wangi* is a junior synonym of *L. asperipennis*, since that we could not find any difference to justify their separation.

Lycocerus borneoensis Y. Yang & X. Yang, nom. n.

Podabrinus atricolor Pic 1938a: 158.
Pseudoabsidia atricolor: Wittmer 1969: 128.
Athemellus atricolor: Wittmer 1972a: 126 [inc. sed.]; Delkeskamp 1977: 47. [Secondary homonym, preoccupied by *Lycocerus atricolor* (Pic, 1922), originally described in *Cantharis*.]

Distribution. Borneo.

Etymology. The new name is derived from this species' type locality "Borneo".

Remarks. This species was located in Borneo and originally described in *Athemellus* Wittmer, 1972, which was synonymized with *Lycocerus* Gorham, 1889 by Okushima (2005), so it should be placed in the latter genus for the time being. Because of this change, this species and *Lycocerus atricolor* (Pic, 1922) (originally in *Athemus*) become secondary homonyms and the junior is invalid (ICZN, 4th, article 57.3.1), so its name is replaced by *L. borneoensis* nom. n. here.

Lycocerus bilineatus (Wittmer, 1995)

http://species-id.net/wiki/Lycocerus_bilineatus
Figs 7–8

Athemus (*Isathemus*) *bilineatus* Wittmer 1995: 275, figs. 140, 141.
Athemus (s.str.) *amplus* Wittmer 1995: 278, figs. 146, 147, 203.
Lycocerus amplus: Kazantsev and Brancucci 2007: 249. syn. n.
Lycocerus bilineatus : Kazantsev and Brancucci 2007: 249.

Type material examined. *Athemus* (*Isathemus*) *bilineatus*: Holotype ♂ (NHMB): [p]"Nordwestal. China \ Chinkiang \ Col. Reitter", [h]"REM \ 95 \ 11.9", [h]"A.

(Isathemus) \ bilineatus \ Wittm., \ det. W. Wittmer", [p]"HOLOTYPUS", [p]"CANTHARIDAE \ CANTH00001927".

Athemus (s.str.) *amplus*: Holotype ♂ (MNHN): [h]"V.1917 \ China \ Shanghai \ J. Hervé-Bdzin", [h]"Athemus s.str. \ amplus \ Wittm. \ det. W. Wittmer", [p]"HOLOTYPUS". Paratypes: 3♂♂, 2♀♀ (MNHN): [h]"Shanghai", [p]"PARATYPUS"; 1♂ (NHMB): [p]"Shanghai \ V.1917 \ J. Hervé-Bdzin", [p]"PARATYPUS", "CANTHARIDAE \ CANTH00001340"; 1♀ (NHMB): [p]"Shanghai \ V \ 1917, J. Hervé-Bdzin", [p]"PARATYPUS", [p]"CANTHARIDAE \ CANTH00002072"; 1♂ (NHMB): [p]"Zi-ka-wei \ 20.IV.1924", [p]"PARATYPUS", [p]"CANTHARIDAE \ CANTH00001986".

Additional material examined. CHINA: Shanghai: 1♂, 2♀♀ (IZAS): "Shanghai, 19.VI.1947, Marist Brothers"; 1♂ (IZAS): "Zi-ka-wei", 20.IV.1924. Jiangxi: 2♂♂, 1♀ (IZAS): Jiangxi. Hubei: 2♂♂ (IZAS): Xingshan, Xiakou, 140m, 2.V.1994, leg. Xing-Ke Yang; 2♀♀ (IZAS): Zigui, Jiulingtou, 110m, 1.V.1994, leg. Wen-Zhu Li.

Distribution. China (Jiangsu, Shanghai, Jiangxi, Hubei).

Remarks. Both *Lycocerus amplus* (Wittmer, 1995) and *L. bilineatus* (Wittmer, 1995) were originally described in *Athemus* and assigned to different subgenera. In the original manuscript (Wittmer 1995), *L. bilineatus* was described on a single male type, so it made no sense that it was attributed to the subgenus *Isathemus* because of no female available. Furthermore, having examined the holotypes of both nominal species and some paratypes, as well as a series of additional specimens, we could not find any difference justifying their separation, even in the tarsal claws, which is the character to distinguish the subgenera *Athemus* and *Isathemus* (Wittmer 1995). Consequently, we synonymized *L. amplus* under *L. bilineatus*.

Lycocerus fairmairei Y. Yang & X. Yang, nom. n. et stat. rev.

Figs 9, 19–21, 23

Telephorus dimidiaticrus Fairmaire 1889: 41.

Athemus dimidiaticrus: Wittmer 1972a: 106. [Synonymized with *Athemus orientalis* (Gorham, 1889) by Wittmer 1995: 255. Secondary homonym, preoccupied by *Lycocerus dimidiaticrus* (Fairmaire, 1889: 40), originally in *Podabrus*.]

Lycocerus orientalis (Gorham, 1889): Kazantsev and Brancucci 2007: 252.

Type material examined. *Telephorus dimidiaticrus*: Holotype ♂ (MNHN): [h]"Telephorus \ dimidiaticrus \ Fairm. \ Koui Tchéou", [h]"Athemus \ prattianus \ (Gorh.) \ det. W. Wittmer", [h]"Lycocerus \ dimidiaticrus (Fairm.) \ det. Y. X. Yang, 2009", [p]"HOLOTYPUS".

Additional material examined. CHINA: Fujian: 1♂ (NHMB): "Fukien. Kuatun, 22.IV.1946"; 1♂ (NHMB): same locality, 1.V.1946; 1♀ (NHMB): same locality, 2.V.1946; 1♀ (IZAS): Jianyang, Huangkeng, Aotou, 950m, 5.V.1960, leg. Yong Zuo; 1♂ (IZAS): same locality, 800–1050m, 26.IV.1960, leg. Cheng-Lin Ma.

Distribution. China (Fujian, Guizhou).

Etymology. The new name is named after L. Fairmaire, the taxonomist who described this species.

Remarks. Fairmaire described a *Podabrus dimidiaticrus* Fairmaire, 1889: 40 which became *Athemellus dimidiaticrus* by Wittmer (1972b) and now *Lycocerus dimidiaticrus* (Fairmaire, 1889), which however was neglected by Kazantsev and Brancucci (2007), and in the same original publication also a *Telephorus dimidiaticrus* Fairmaire, 1889: 41 which became *Athemus dimidiaticrus* by Wittmer (1972a) and now to be placed in *Lycocerus*, the two species become secondary homonyms and the junior is invalid (ICZN, 4th, article 57.31.), so that a new name is needed, *Lycocerus fairmairei* nom. n., to replace the name of the latter species.

At the same time, having examined the holotype of *Telephorus dimidiaticrus* and lectotype of *Lycocerus orientalis* (Gorham, 1889) (1♂ (NHMB): [p]“Foochau \ April, 1886 \ Leech.”, [h]“A. orientalis”, [p]“LECTOTYPE”, [p]“CANTHARIDAE \ CANTH00001609”.), we found that the former is distinctly different from the latter in the aedeagus (Figs 19–21; the latter’s, see Wittmer 1995: figs. 109, 110), so we suggest *Telephorus dimidiaticrus* Fairmaire, 1889: 41, with its new replacement name *Lycocerus fairmairei* nom. n., to be resurrected from synonymy with *L. orientalis*.

Lycocerus confossicollis (Fairmaire, 1891) comb. n.

http://species-id.net/wiki/Lycocerus_confossicollis

Figs 10–11

Telephorus confossicollis Fairmaire 1891: ccviii.
Cantharis confossicollis: Jacobson 1911: 679.
Athemus (s.str.) *multiimpressus* Wittmer 1997: 285, figs. 128, 129.
Lycocerus multiimpressus: Kazantsev and Brancucci 2007: 252. syn. n.

Type material examined. *Telephorus confossicollis*: Lectotype ♂ (MNHN): [h]“Changyang”, [h]“Telephorus \ confossicollis \ Fairm. \ Tchangyang”, [h]“Athemellus \ confossicollis \ (Fairm.) \ det. W. Wittmer”, [p]“LECTOTYPE”.

Athemus (s.str.) *multiimpressus*: Holotype ♂ (NHMB): [p]“Chin-ling Mts. \ Shensi. E. B. \ Apr.-May,1904”, [h]“Athemus \ multiimpressus \ Wittm. \ det. W. Wittmer”, [p]“HOLOTYPUS”, [h]“REM \ 95 \ 1314”, [p]“CANTHARIDAE \ CANTH00001208”.

Additional material examined. CHINA: Hubei: 1♂ (IZAS): Xingshan, Longmenhe, 6.V.1994, leg. Xing-Ke Yang; 1♀ (IZAS): same data, 9.V.1994; 1♀ (IZAS): same locality, 9.V.1994, leg. You-Wei Zhang; 1♂ (IZAS): same locality, 730m, 22.VI.1994, leg. Jian Yao.

Distribution. China (Shaanxi, Hubei).

Remarks. Although the type specimen of *Cantharis confossicollis* was attached with Wittmer’s manuscript label “*Athemellus confossicollis* (Fairm.)”, it has never been pub-

Figures 10–15. Habitus, dorsal view **10** Lectotype of *Telephorus confossicollis* Fairmaire, 1891 **11** Holotype of *Athemus* (s.str.) *multiimpressus* Wittmer, 1997 **12** Lectotype of *Cantharis inopaciceps* Pic, 1926 **13** Holotype of *Athemus* (*Athemellus*) *bimaculicollis* Švihla, 2005 **14** Holotype of *Cantharis rufonotaticeps* Pic, 1921 **15** Holotype of *C. brunneonotaticeps* Pic, 1922. **10–11, 13** male **12, 14–15** female.

lished formally for this taxonomic change. In our opinion, this species is definitely a member of *Lycocerus* due to the following characters: pronotum subquadrate, all tarsal claws simple and the aedeagus with dorsal plates of parameres separated. At the same time, *Lycocerus multiimpressus* (Wittmer, 1997) is considered to be a junior synonym of *L. confossicollis* (Fairmaire, 1891) comb. n., since we could not find differences between both nominal species in their morphological characters, including appearance and aedeagus. Therefore, we suggest *L. multiimpressus* is a new subjective synonym of *L. confossicollis*.

Lycocerus inopaciceps **(Pic, 1926)**
http://species-id.net/wiki/Lycocerus_inopaciceps
Figs 12–13

Cantharis inopaciceps Pic 1926b: 153.
Themus inopaciceps: Wittmer 1961: 362.
Athemellus inopaciceps: Wittmer 1983a: 190.
Athemus (*Athemellus*) *bimaculicollis* Švihla 2005: 90, figs 38–41. syn. n.
Lycocerus inopaciceps : Kazantsev and Brancucci 2007: 250.

Type material examined. *Cantharis inopaciceps*: Lectotype ♀ (MNHN): [p]“Szetschwan \ Kwanhsien \ Exp. Stözner”, [h]“Thibet”, [h]“Cantharis \ inopaciceps \ n. sp.”, [h] “Athemellus ?”, [p]“LECTOTYPUS”.

Athemus (*Athemellus*) *bimaculicollis*: Holotype ♂ (NMPC): [p]“CHINA-SHAANXI \ Lueyang \ 23.6–26.6.2004 \ leg. E. Kučera”, [p]“HOLOTYPUS \ Athemus \ (Athemellus) \ bimaculicollis sp. nov.\ V. Švihla det. 2005”. Paratype: 1♀ (NMPC): same data.

Additional material examined. CHINA: Shaanxi: 1♂, 1♀ (HBUM): Liuba, 10.–12.VI.2005, leg. Yi-Bin Ba; 1♂, 1♀ (HBUM): Liuba, Miaotaizi, 14.–15.VI.2005, leg. Yi-Bin Ba; 1♂, 4♀♀ (HBUM): Fengxian, Heigou, 13.VI.2005, leg. Yi-Bin Ba; 3♀♀ (HBUM): Liuba, Zaomulan, 11.VI.2005, leg. Yi-Bin Ba.

Distribution. China (Shaanxi, Sichuan).

Remarks. *Athemus* (*Athemellus*) *bimaculicollis* Švihla, 2005, which was omitted in the catalogue by Kazantsev and Brancucci (2007), is considered to be a junior synonym of *Lycocerus inopaciceps* (Pic, 1926), because we could not find any difference between their holotypes in the morphology including body size and coloration, tarsal claws and abdominal sternite VIII of female.

Lycocerus nigratus **Y. Yang & X. Yang, nom. n.**

Podabrinus nigricolor Wittmer 1951: 99.
Pseudoabsidia nigricolor: Wittmer 1969: 128.
Athemellus nigricolor: Wittmer 1972b: 124.
Lycocerus nigricolor: Kazantsev and Brancucci 2007: 252. [Secondary homonym, preoccupied by *Lycocerus nigricolor* (Pic, 1938).]

Distribution. China (Fujian).

Etymology. The new specific name is derived from Latin word “*niger*” = black, a reference to its black body coloration, as the same meaning as its original name.

Remarks. This species was originally described in *Podabrinus*, its original name is a junior secondary homonym of *Lycocerus nigricolor* (Pic, 1938) (originally in *Athemus*, located in Malaya), so it was replaced by *Lycocerus nigeratus* nom. n. (ICZN, 4th, article 57.3.1).

***Lycocerus plebejus* (Kiesenwetter, 1874)**
http://species-id.net/wiki/Lycocerus_plebejus
Figs 14–15

Cantharis plebeja Kiesenwetter 1874: 278.
Lycocerus plebejus : Okushima 2005: 114–116, figs 11e, 12g, 14e, 32, 90.
Cantharis rufonotaticeps Pic 1921: 29. syn. n.
Cantharis brunneonotaticeps Pic 1922: 32.
Athemus brunneonotaticeps: Wittmer 1995: 268, fig. 199.
Lycocerus brunneonotaticeps: Kazantsev and Brancucci 2007: 249. syn. n.

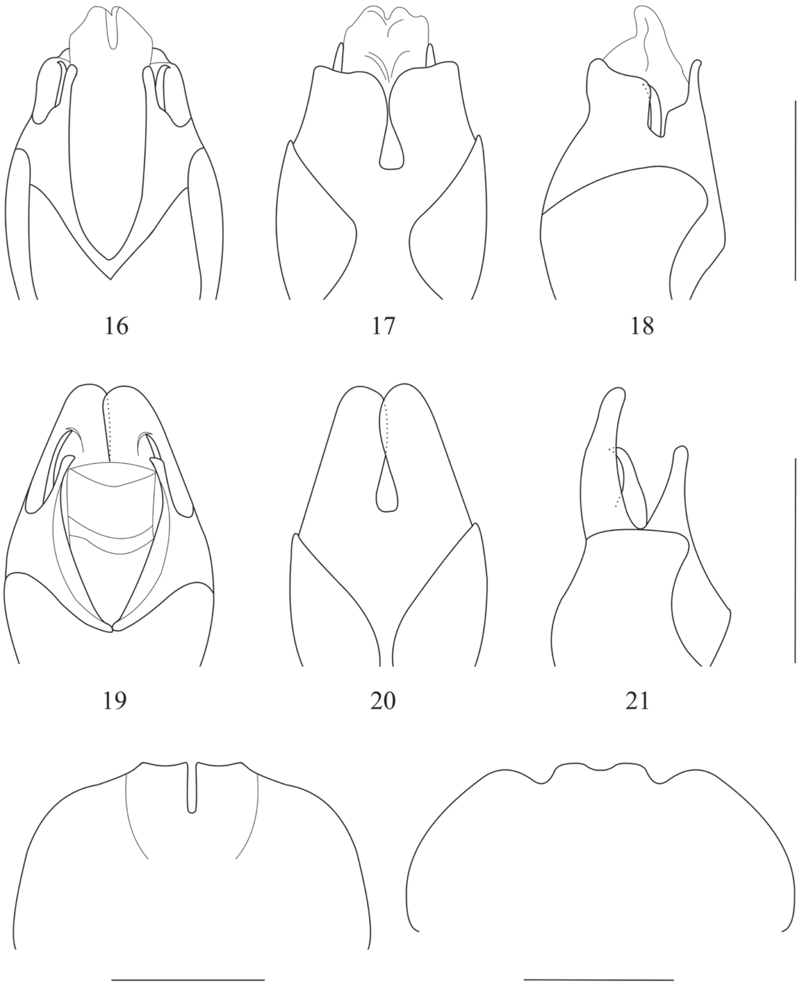
Type material examined. *Cantharis rufonotaticeps*: Holotype ♀ (MNHN): [p]“Kiautschau \ China”, [h]“rufonotaticeps \ n. sp.”, [p]“HOLOTYPUS”.

Cantharis brunneonotaticeps: Holotype ♀ (MNHN): [p]“Kiautschau \ China”, [h]“brunneonotaticeps \ n. sp.”, [h]“Athemus? \ brunneonotaticeps \ (Pic) \ det. W. Wittmer”, [p]“HOLOTYPUS”.

Additional material examined. CHINA: Shanghai: 1♂ (NHMB): “China, Kiangsu Prov., Shanghai, 15.IV.1932, A. Bavio coll.”; 1♂, 1♀ (IZAS): “China, Kiangsu Prov., Shanghai, Zi-ka-wei, 20.IV.1924”. Jiangxi: 1♀ (MNHN): “Süd-China, Pingshiang, Dr. Kreyenberg”. Fujian: 1♂ (NHMB): “Fukien, Chungan, Bohea Hill, 15.III.1940, coll. T. C. Maa”; 1♀ (NHMB): same data, 16.III.1940; 1♂, 1♀ (NHMB): same data, 29.III.1940; 1♂ (NHMB): “Fukien, Shaowu, Shuipeikai, 3.IV.1942, coll. T. C. Maa”; 1♂ (NHMB): “Fukien, Shaowu, Kuhsienkai, IV.1944, coll. T. C. Maa”; 1♀ (NHMB): “Fukien, Chungan, Kuatun, IV.1942, coll. T. C. Maa”; 1♂ (IZAS): Shaowu, Chengguan, 150–220m, 19.IV.1960, leg. Cheng-Lin Ma; 1♀ (IZAS): same locality, 160–210m, 17.III.1960, leg. Yong Zuo; 1♀ (IZAS): same locality, 150–190m, 18.III.1960, leg. Yong Zuo. Guangxi: 1♂ (IZAS): Guilin, Liangfeng, 17.III.1952; 1♀ (IZAS): same locality, 26.III.1952. Sichuan: 1♀ (IZAS): Mt. Emei, Baoguosi, 550–750m, 7.IV.1957, leg. Ke-Ren Huang; 1♂ (IZAS): same locality, 12.IV.1957, leg. You-Cai Yu; 1♀ (IZAS): same data, 19.IV.1957; 1♀ (IZAS): same data, 3.IV.1957.

Distribution. China (Shandong, Shanghai, Jiangxi, Fujian, Guangxi, Sichuan).

Remarks. Having examined the holotypes of *Cantharis rufonotaticeps* Pic, 1921 and *Lycocerus brunneonotaticeps* (Pic, 1922) (originally in *Cantharis*), as well as a large series of additional specimens including both sexes, we were unable to find differences justifying their separation, although some variation in the coloration of head and elytra, which has led us to consider all the examined specimens of both nominal species to be conspecific. Furthermore, we discovered that their characters are consistent with the redescription and illustrations of *Lycocerus plebejus* (Kiesenwetter, 1874) provided by Okushima (2005). Consequently, we synonymized *Cantharis rufonotaticeps* and *Lycocerus brunneonotaticeps* under *Lycocerus plebejus*, which confirmed Okushima’s presum that the latter occurs in China but Japan.



Figures 16–23. 16–21. Aedeagus (**16, 19** ventral view **17, 20** dorsal view **18, 21** lateral view). **22–23** female abdominal sternite VIII, ventral view **16–18** *Themus* (*Haplothemus*) *licenti* Pic, 1938 **19–21, 23** *Lycocerus dimidiaticrus* (Fairmaire, 1889) **22** *Themus* (*Haplothemus*) *coriaceipennis* (Fairmaire, 1889). Scale bars: 1 mm.

Lycocerus swampingatus **(Pic, 1916), comb. n.**

http://species-id.net/wiki/Lycocerus_swampingatus
Figs 19–21

Cantharis swampingata Pic 1916: 4.

Type material examined. *Cantharis swampingata*: Holotype ♂ (MNHN): [p]"Swamping \ China", [h]"swampingata \ Pic", [h]"n. sp.", [h]"Lycocerus \ swampingatus (Pic) \ det. Y. X. Yang, 2009", [p]"HOLOTYPUS".

Distribution. China (Sichuan).

Remarks. The type specimen of this species was damaged seriously, lacking the abdomen, thorax, all legs, one elytron and part of head, but its aedeagus has been kept well, of which dorsal plates of parameres are separated (Figs 19–21), which is a diagnostic character of *Lycocerus* (Okushima, 2005). This species is similar to *L. canthariformis* (Ishida, 1986) (located in Japan) in the pronotum, which is rounded, wider than long, lateral margins are arcuate and posterior angles rounded, but the aedeagus is differs from that of the latter. Also, it is related to *L. pubicollis* (Heyden, 1889) in the aedeagus, but obviously different from the latter in the pronotum. Consequently, we suggest the following new combination: *Lycocerus swampingatus* (Pic, 1916) comb. n.

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A taxonomic revision of Tyrini of the Oriental region. V. Revision of the genus *Lasinus* Sharp, 1874 (Coleoptera, Staphylinidae, Pselaphinae)

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Abstract

The genus *Lasinus* Sharp, 1874 of the *Pselaphodes* complex of genera (Pselaphitae: Tyrini: Tyrina) is revised. The three so far known species, *L. mandarinus* Raffray, 1890, *L. monticola* Sawada, 1961 and *L. spinosus* Sharp, 1874 are redescribed. Eight new species, *L. sinicus* **sp. n.** from China, *L. mikado* **sp. n.**, *L. yamamotoi* **sp. n.**, *L. inexpectatus* **sp. n.**, *L. yakushimanus* **sp. n.**, *L. amamianus* **sp. n.**, *L. saoriae* **sp. n.**, and *L. okinawanus* **sp. n.** from Japan, are described. And all species are illustrated. Lectotypes are designated for *L. mandarinus* and *L. spinosus*. An identification key to species of the genus *Lasinus* is provided.

Keywords

Tyrini, taxonomy, revision, new species, Russia - Kuril Islands, China, Vietnam, Japan

Introduction

The genus *Lasinus* was erected by Sharp (1874) to accommodate his new species *L. spinosus* from Japan. Another new species, *L. mandarinus* was added by Raffray (1890) from the northern Vietnam. The last known species, *L. monticola*, was described from Japan by Sawada (1961) who also provided illustrations of aedeagi of the presumed *L. spinosus*. The genus was studied by the second author (Hlaváč 2003) and was included in the *Pselaphodes* complex of genera of the subtribe Tyrina, tribe Tyrini.

The purpose of this paper is the revision of the genus, the description of eight new species, as well as to provide a key for the identification of all species of the genus.

Materials and methods

Dry-mounted specimens were relaxed in warm water. Dissections were made using standard techniques, genitalia and small parts were mounted in Euparal or Canada balsam on acetate labels which are pinned together with the specimens. Leica S8APO microscope was used for the study. All photos were done by microscope Olympus SZ 61 with camera Olympus Colorview I. The width of head is measured through eyes.

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

BMNH Natural History Museum, London, United Kingdom.
MCSN Museo Civico di Storia Naturale "G. Doria", Genova, Italy.
MNHN Muséum National d'Histoire Naturelle, Paris, France.
MHNG Muséum d'histoire naturelle de la ville de Genève, Switzerland
NMNH National Museum of Natural History, Sofia, Bulgaria
NHMW Naturhistorisches Museum, Wien, Austria
NSMT National Museum of Nature and Science, Tsukuba, Japan.
PCPH Peter Hlaváč private collection, Prague, Czech Republic
PCSK Sergei Kurbatov private collection, Moscow, Russia.

Other abbreviations and symbols used in the text: p (printed); h (hand-written); / (used to separate different labels). All paratypes bear the following red label: PARATYPE *Genus species* sp. n., Bekchiev, Hlaváč & Nomura det., 2013.

Taxonomy

Genus *Lasinus* Sharp
http://species-id.net/wiki/Lasinus

Lasinus Sharp, 1874: 106. Type species: *Lasinus spinosus* Sharp, 1874 (original designation, gender masculine).
Lasinus Sharp: Jeannel 1958: 121.
Lasinus Sharp: Hlaváč 2003: 286 (redescription).

Diagnosis. The genus *Lasinus* can be readily separated from the other genera of the *Pselaphodes* complex (Hlaváč 2003) by a combination of the following characters: 1) head with well-defined setose frontal and vertexal foveae, 2) maxillary palpi small, with palpomeres III–IV symmetrical, neither roundly expanded nor projecting laterally, 3) antennal club three-segmented, with antennomeres VIII–IX often modified in males, 4) pronotal lateral and median foveae well-defined, 5) pronotum lacking antebasal sulcus connecting foveae, 6) pronotal longitudinal sulcus present, well- to weakly-defined, 7) tarsal segments II linear, segments III inserted at the apex of the II, 8) basal carinae on the first visible tergite (IV) present, short, 9) median setose metaventral fovea absent, 10) metaventral horny processes reduced to short, stout protuberances.

Redescription. Length 2.5–3.8 mm. Head lacking dorsally visible postgenae, with well-defined setose frontal and vertexal foveae, maxillary palpi small, symmetric. Antennae with scapes distinctly longer than pedicels, club three-segmented, antennomeres VIII–IX often modified in males, species characteristic. Pronotum with well-defined median and lateral foveae, longitudinal sulcus sometimes weakly-defined but always present, antebasal transverse sulcus absent. Elytra with two basal foveae and two striae, lacking carinae, punctate, covered by short, golden pubescence. Metaventrite with two stout, short protuberances instead of long horn-like processes, metaventral apex sharp, with shallow excavation, surface punctate and pubescent, median metaventral fovea absent. Legs long and slender, roughly punctate and pubescent, protrochanters, mesotrochanters, profemora and mesofemora with spines of various shape and length, metatrochanters and metafemora lacking spines, tarsomeres II linear, tarsomeres III inserted at the apex of II.

Sexual dimorphism. Females of all species bear on mesotrochanters one or two more spines than males, females antennomeres VII–IX simple, without modification.

Relationship. Due to the simple second tarsal segments and the absence of the median metaventral foveae, *Lasinus* is most closely related to the genera *Paralasinus* Hlaváč & Nomura, 2001, *Pselaphodes* Westwood, 1870 and *Dayao* Yin, Li & Zhao, 2011. From the latter two genera *Lasinus* can be separated by the completely symmetric palpomeres II–IV. In *Pselaphodes* and *Dayao*, the maxillary palpi have at least some palpomeres II–IV asymmetric, roundly expanded, or slightly to distinctly projecting laterally. *Lasinus* differs from *Paralasinus* by the pronotum lacking an antebasal sulcus, which is present in *Paralasinus*.

Habitat. Members of the genus are usually collected by sifting leaf-litter in forested areas.

Distribution. China, Vietnam, Japan, Russia (Kuril Islands).

Key to species of *Lasinus*

1	Pronotum with prominent lateral swellings before lateral foveae (Figs 1, 4, 9). Body length 3.25–3.60 mm. Species from Vietnam or China **2**
–	Pronotum evenly rounded (Figs 5, 8) or with weak swellings (Fig. 10) before lateral foveae. Body length 2.70–3.30 mm. Species from Japan................... **3**
2	Antennomeres X elongate, about 1.6 times longer than wide (Fig. 1). (male unknown). Vietnam... ***L. mandarinus***
–	Antennomeres X short, about as long as wide in both sexes (Fig. 4). China .. .. ***L. sinicus***
3	Antennomeres IX in male simple, only slightly obliquely trucate apically ... 4
–	Antennomeres IX in male modified, with well-defined sexual character **5**
4	Antennomeres VII 1.3 times longer than wide; antennal club as in Fig. 15 ... . ***L. inexpectatus***
–	Antennomeres VII 1.15 times longer than wide; antenal club as in Fig. 14....... .... ***L. yamamotoi***
5	Antennomeres IX with well-developed preapical tubercule **6**
–	Antennomeres IX with different type of ornamentation............................. **7**
6	Antennomeres VIII 1.16 times longer than wide; antennal club as in Fig. 17 ... . ***L. amamianus***
–	Antennomeres VIII 0.9 times longer than wide; antennal club as in Fig. 18.. .... ***L. saoriae***
7	Antennomeres IX with shallow concavity, lacking apical nail-shaped protuberance **8**
–	Antennomeres IX with apical nail-shaped protuberance............................. **9**
8	Antennomeres IX almost rectangular; antennal club as in Fig. 11..... ***L. spinosus***
–	Antennomeres IX with strong, internal obliquity at apex; antennal club as in Fig. 19 .... ***L. okinawanus***
9	Antennomeres IX with deep concavity; antennal club as in Fig. 13.... ***L. mikado***
–	Antennomeres IX with shallow concavity; antennal club as in Figs 12–16... **10**
10	Genae angulate, with triangular, prominent protuberance (Fig. 6); pronotum evenly rounded before lateral fovea (Fig. 8); antennal club as in Fig. 12; aedeagus as in Fig. 21 .... ***L. monticola***
–	Genae convex, with weak protuberance (Fig. 7); pronotum with weak swellings before lateral fovea (Fig. 10); antenal club as in Fig. 16. Aedeagus as in Fig. 25 .... ***L. yakushimanus***

***Lasinus mandarinus* Raffray, 1890**
http://species-id.net/wiki/Lasinus_mandarinus
Fig. 1

Lasinus mandarinus Raffray, 1890: 212, Pl. III, fig. 16.

Type locality. Tonkin (Ha Noi, Vietnam).

Material examined (4 ♀♀). LECTOTYPE, ♀, here designated: (h) Tonkin / red label (p) TYPE / (h) *L. mandarinus* (p) A. Raffray det. / (p) MUSÉUM PARIS, 1917, COLL. A. RAFFRAY / red label (p) LECTOTYPE *Lasinus mandarinus* Raffray, Bekchiev, Hlaváč & Nomura des., 2013. (MNHN). PARALECTOTYPES, 3 ♀♀: same data as lectotype, bearing the following red label: (p) PARALECTOTYPE *Lasinus mandarinus* Raffray, Bekchiev, Hlaváč & Nomura des., 2013. (MNHN).

Lectotype designation. Redescription of this species given below is based on four females deposited in MNHN having a status of syntypes. Raffray (1890) also mentioned four females in his original description. One female is here designated as lectotype, and three remaining females paralectotypes, in order to ensure the stability of nomenclature and provide a unique name-bearing type for *Lasinus mandarinus*.

Description. Body (Fig. 1) unicoloured, dark brown, maxillary palpi yellow, length 3.30–3.60 mm.

Head elongate, about 1.15 times longer than wide, slightly longer than pronotum; median sulcus well-defined along whole length of head. Genae simple, without protuberance.

Antennae very long, about 2.3–2.4 mm; scapes about 5 times longer than pedicels, pedicels short, as long as wide; antennomeres III–VII subequal in length, slightly shorter than V; antennomeres VI–VIII about as long as pedicels; IX slender, 2.25 times longer than wide, 1.10 times as long as X; late about 1.6 times longer than wide; terminal segments 1.2 times as long as X and 1.6 times longer than wide.

Pronotum as long as wide, gibbose, with prominent lateral swellings before lateral foveae; lateral and median setose foveae well-defined; median sulcus originates in median fovea and almost reaching anterior margin of pronotum.

Legs long and slender; protrochanters with small apical spine; profemora with long spine before middle; mesotrochanters at apex with two spines, outer one fairly bigger; mesofemora with minuscule spine at basal third.

First visible abdominal tergite (IV) glabrous, slightly more than two times longer than second (V); short basal carinae well-defined, distance between carinae 0.4 of maximal tergal width.

Differential diagnosis. *Lasinus mandarinus* is close to *L. sinicus* by the pronotum with prominent lateral swellings before lateral foveae, but it differs from the latter by the proportion of antennomere X which is 1.6 times as long as wide.

Distribution. Vietnam (Tonkin, Ha Noi).

Figures 1–5. Habitus of *Lasinus* species. **1** *L. mandarinus* **2** *L. spinosus* **3** *L. monticola* **4** *L. sinicus* **5** *L. mikado*. Scale – 3.0 mm.

***Lasinus spinosus* Sharp**
http://species-id.net/wiki/Lasinus_spinosus
Figs 2, 11, 20

Lasinus spinosus Sharp, 1874: 106.
Lasinus spinosus Sharp: Waterhouse 1882, 90: pt. 21, pl. 146, fig. 3.

Type locality. Nagasaki, Suwo-sama (=Suwa shrine).

Type material examined. LECTOTYPE, ♂, here designated: (h) *Lasinus spinosus.* Type D.S. Japan. Lewis. [label where the type specimen was originaly mounted]

/ (h) *Lasinus spinosus* ♂ (p) TYPE (h) D. S. / (p) Japan. G. Lewis / round label with red margin (p) TYPE / round label with blue margin (p) SYNTYPE / (p) Sharp Coll. 1905-313. / red label (p) LECTOTYPE *Lasinus spinosus* Sharp, Bekchiev, Hlaváč & Nomura, des., 2013 (BMNH). PARALECTOTYPE, 1 ♀, here designated: (h) *Lasinus spinosus* ♀ (p) TYPE (h) D. S. / (p) Japan. G. Lewis / round label with blue margin (p) SYNTYPE / red label (p) PARALECTOTYPE *Lasinus spinosus* Sharp, Bekchiev, Hlaváč & Nomura, des., 2013 (BMNH).

Other material examined. (8 ♂♂, 9 ♀♀)**.** (1 ♂) Japan, Saga Pref., Kashima City, Mt. Kyogatake., 19.X.1986, S. Nomura leg.; (1 ♂) Japan, Fukuoka Pref., Hiko-san Mts., 3.V.1983, S. Nomura leg.; (1 ♂) Japan, Kumamoto Pref., Ueki-cho, 10.IV.1981, S. Naomi leg.; (1 ♂, 1 ♀) Japan, Kyushu, Nagasaki Pref., Isahaya-shi, Jôyama, Atagoyama, 18.III.1998, S. Nomura leg.; (1 ♂) Japan, Kyushu, Oita Pref., Shonai-machi, Nishi-Ohara, 20.VI.1998, K. Ôtsuka leg.; (1 ♂, 1 ♀) Japan, Kyushu, Miyazaki Pref., Tano-cho, Aoidake, 6.IX.1993, S. Nomura leg.; (1 ♂, 1 ♀) Japan, Fukuoka, Hikosan Mts., 27.XII.1982, S. Nomura leg.; (1 ♂, 1 ♀) Japan, Nagasaki City, Suwa Shrine, 2.V.1985, S. Nomura leg.; (1 ♀) Japan, Miyazaki Pref., Kiyotake-cho, Kaeda vall., 27.IV.1993, S. Nomura leg.; (2 ♀♀) Japan, Miyazaki Pref., Aya-Minami, 9.V.1985, S. Nomura leg.; (2 ♀♀) Japan, Kyushu, Oita Pref., Kujû Mts., Makinoto pass., 14.X.1991, S. Nomura leg. (NSMT, PCPH, NMNH, PCSK).

Lectotype designation. Redescription of this species given below is based on one male and one female deposited in BMNH having a status of syntypes. Sharp (1874) mentioned three specimens in his original description. One male is here designated as lectotype, another female is paralectotype, in order to ensure the stability of nomenclature and provide a unique name-bearing type for *Lasinus spinosus*.

Description. Body (Fig. 2) unicoloured, reddish-brown, maxillary palpi yellow, length 2.90–3.10 mm.

Head elongate, about 1.15 times longer than wide, slightly longer than pronotum; median sulcus visible on rostrum and on vertex reaching level of vertexal foveae. Genae with weak protuberance, covered with erected, dense golden setae.

Antennae about 2.02 mm long (Fig. 11); scapes long, about 3.7 times longer than pedicels; pedicels about 1.18 times shorter than antennomeres III; antennomeres IV and V as long as wide; antennomeres VI 1.22 times shorter than pedicels; antennomeres VII 1.25 times shorter than VI; antennomeres VIII about 1.27 times longer than and distinctly wider than VII; IX about 1.5 times longer than wide and about same length as terminal antennomeres, IX in male with small and shallow discoidal plate on apical half bearing small pore-like structure with one long seta, in female unmodified; antennomeres X quadrate, 1.5 times shorter than IX; terminal antennomeres 1.6 times longer than X and about 1.5 times longer than wide.

Pronotum about as wide as long, wrinkly, evenly rounded before lateral foveae; lateral and median setose foveae well-defined; median longitudinal sulcus very thin, but distinct.

Legs long and slender; protrochanters with large apical spine; profemora with long spine in middle of its length; mesotrochanters at apex with one small (male) or two (female) spines, in some cases one spine is slightly stronger; mesofemora with minuscule spine at basal third.

Abdomen slightly wider than elytra, first visible abdominal tergite (IV) finely punctate with dense and short golden setae, about 4 times as long as next tergite, basal carinae very short, distance between carinae 0.4 of maximal tergal width. Aedeagus (Fig. 20) 0.64 mm long; median lobe weakly narrowed apically, with short and large apical lobe; endophallus with two spines and one lamella; dorsal spine very big, enlarged at apex, forming large plate; ventral spine long, acute at apex; lamella small finely dentate in apical part; parameres short and slender, not overlapping apical lobe.

Differential diagnosis. *Lasinus spinosus* shares with *L. monticola, L. mikado*, *L. inexpectatus*, *L. saoriae* and *L. yamamotoi* the evenly rounded pronotal lateral margins, but differs from all of these species by the shape of the antennae and aedeagus.

Distribution. Japan (Kyushu).

Lasinus monticola Sawada

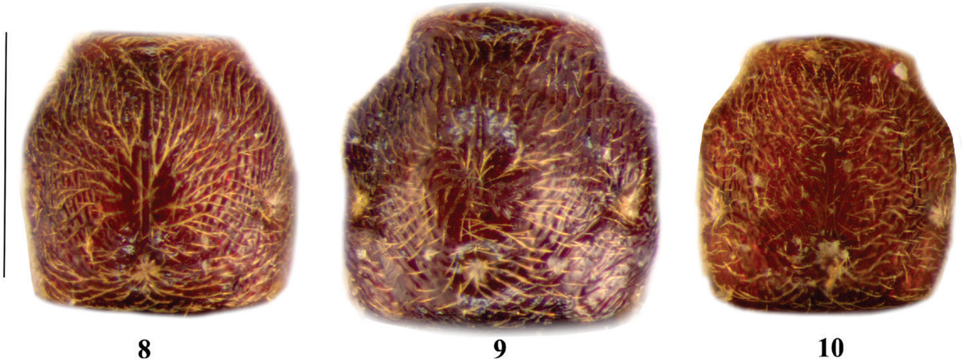
http://species-id.net/wiki/Lasinus_monticola
Figs 3, 6, 8, 12, 21

Lasinus monticola Sawada, 1961: 41; pl. 7, figs 1, 3, 4.

Type locality. Hiko (900 m), Fukuoka, Kyushu.

Material examined. (21 ♂♂, 19 ♀♀). (3 ♂♂, 1♀): Japan, Shikoku, Ehime Pref., Oda-cho, Mt. Odamiyama, Buna st., 2.IX.1993, E. Yamamoto leg.; (1 ♂) Nara, Nara Park, 8.VIII.1980, I. Löbl leg.; (1 ♀) Japan: Honshu, Kanagawa Pref., Aikawa-chô Mt., Hasuge-san, 7.I.2006, T. Lackner leg.; (1 ♂) Japan, Fukushima pref, Okutadami, Alizu, Mt. Asakusadake, 22.VII.1987, S. Nomura leg.; (5 ♂♂) Japan, Shimane Pref., Kanagimachi, Atoyama, 9.V.1991, T. Nakamura leg.; (2 ♂♂) Japan, Ehime Pref., Narukawakeikoku 600–700 m, 1.II.1997, M. Sakai leg.; (1 ♂) Japan, Ehime Pref, Komi, Yanadani, 2.X.1994, M. Sakai leg.; (1 ♂, 7 ♀♀) Japan, Kyushu, Kagoshima Pref., Kirishima, Kurinodake Spa, 8.III.1999, H. Hoshina leg.; (1 ♂) Japan, Kyushu, Miyazaki Pref., Tsuno-chô, Mt. Osuzuyama, 700 m, 8.IX.1994, S. Nomura leg.; (2 ♂♂) Japan, Kyushu, Miyazaki Pref., Takachiho-chô, Onino-iwaya, 3.XII.1994, S. Nomura leg.; (1 ♂) Japan, Kyushu, Miyazaki Pref., Wanizukayama Mts., 6.IX.1993, S. Nomura leg.; (1 ♂, 1 ♀) Japan, Kyushu, Miyazaki Pref., Aya-chô, 10.II.1994, S. Nomura leg.; (1 ♂) Japan, Kyushu, Kagoshima Pref., Aira-chô, 30.I.1985, T. Tanabe leg.; (1 ♀) Japan, Honshu, Tokyo Pref., Fussa-shi, Tamagawa Riverside, Mutsumi-bashi, 12.II.2007, S. Nomura leg.; (1 ♀) Japan, Honshu, Tokyo Pref., Okutama, Nippara, Ogawadani, 4.IV.2006, S. Nomura leg.; (4 ♀♀) Japan, Kyushu, Nagasaki Pref., Unzen Mt. Kinugasayama, 16.III.2007, S. Nomura leg.; (1 ♀) Japan, Kyushu, Kagoshima Pref., Osumi Mt., Hoyoshidake, 19.III.1994, S. Nomura leg.; (1 ♂) Japan, Kioto, 11.VI.1881, G. Lewis leg.; (2 ♀♀) Japan, Miyanoshita, 11.VI.1881, G. Lewis leg. (BMNH, NSMT, PCPH, NMNH, PCSK).

Figures 6–7. Head of *L. monticola* (**6**) and *L. yakushimanus* (**7**) lateral view. Scale – 0.4 mm.

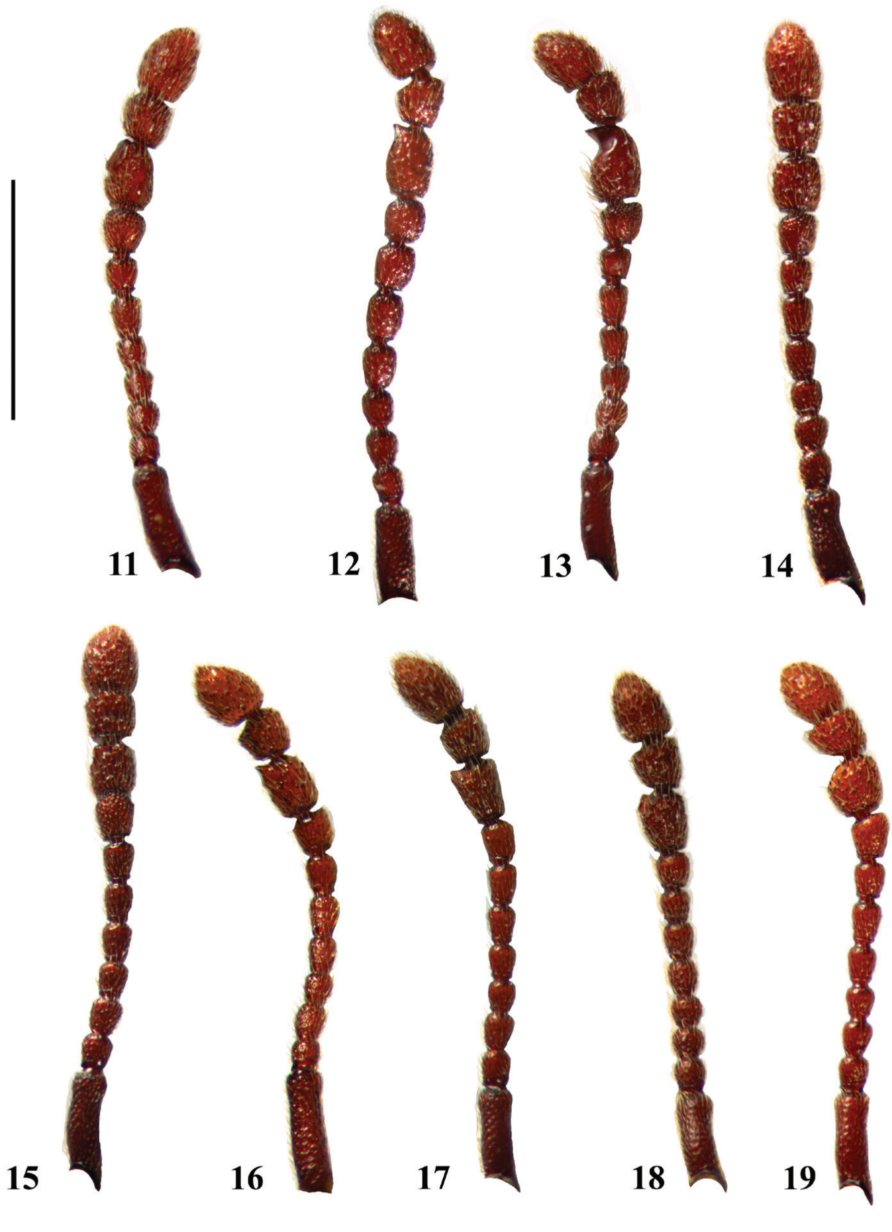


Figures 8–10. Pronotum of *L. monticola* (**8**) *L. sinicus* (**9**) and *L. yakushimanus* (**10**) dorsal view. Scale – 0.6 mm.

Description. Body bicoloured (Fig. 3), darker brown with more reddish elytra, maxillary palpi yellow, length 2.80–3.30 mm.

Head elongate, about 1.06 times longer than wide and as long as pronotum; median sulcus weakly defined along whole length of head. Genae with triangular, prominent protuberance, covered with erect, dense golden setae (Fig. 6).

Antennae about 2.23 mm long (Fig. 12); scapes long, about 4 times longer than pedicels; pedicels shortest, quadrate and as long as IV and V each; antennomeres III about 1.25 times longer than pedicels; antennomeres VI–VII subequal in length; VIII slightly shorter than VII; IX about 1.5 times longer than wide, with apical, nail-shaped protuberance on ventral side in male, in female unmodified; antennomeres X quadrate, 1.25 times shorter than IX; terminal antennomeres 1.5 times longer than X and about 1.5 times longer than wide.



Figures 11–19. Antenae of *Lasinus* species (Japan). **11** *L. spinosus* **12** *L. monticola* **13** *L. mikado* **14** *L. yamamotoi* **15** *L. inexpectatus* **16** *L. yakushimanus* **17** *L. ammamnianus* **18** *L. saoriae* **19** *L. okinawanus*. Scale – 1 mm.

Pronotum slightly longer than wide, wrinkly, evenly rounded before lateral foveae (Fig. 8); lateral and median setose foveae well-defined; median sulcus weakly-defined.

Legs long and slender; protrochanters with small apical spine; profemora with long spine before middle; mesotrochanters at apex with two (males) minuscule spines or three (females) spines, median one minuscule; mesofemora with minuscule spine at basal third.

Abdomen slightly wider than elytra, first visible tergite (IV) about 3 times as long as second (V), finely punctate with dense, very short golden setae ; basal carinae well-defined but very short, distance between carinae 0.5 of the maximal tergal width. Aedeagus (Fig. 21) 0.66 mm long; median lobe weakly narrowed apically, with short and large apical lobe, curved downwards in middle; endophallus with two spines and one large lamella; dorsal spine large, enlarged in middle to form broad plate, acutely angled at apex, with one small tooth in middle; ventral spine short, acute at apex; lamella large; parameres long, overlapping apical lobe, enlarged apically.

Differential diagnosis. *Lasinus monticola* is close to *L. mikado* and *L. yakushimanus* by the presence of nail-shaped protuberance on the antennomeres IX, but it differs from *L. yakushimanus* by the shape of the genal region of the head and the pronotum, and it differs from *L. mikado* by the absence of a deep concavity on antennomeres IX. *Lasinus monticola* can be readily separated from both species also by the shape of aedeagus.

Distribution. Japan (Honshu, Shikoku, Kyushu).

Lasinus sinicus sp. n.

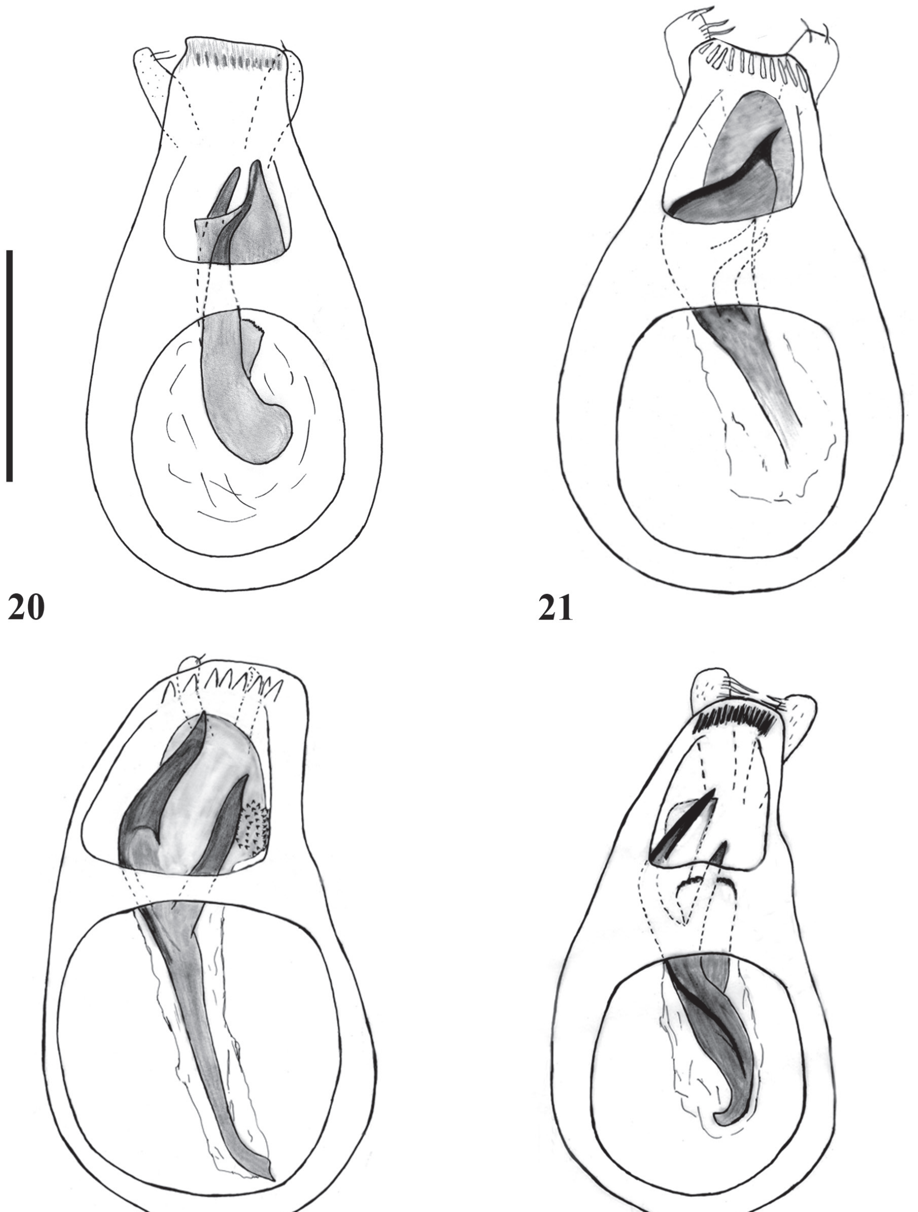
http://zoobank.org/2ADC741B-FF05-41DD-BE15-56412786449F
http://species-id.net/wiki/Lasinus_sinicus
Figs 4, 9, 22

Type material (5 ♂♂, 3 ♀♀). HOLOTYPE, ♂, labelled as follows: (p) [Guanxi,CHINA], "locality in Chinese characters", 25.V.1996, S. Uéno leg. / (p) ab. Liangshui 1710 m, Mt. Miao'ershan, Xing'an Xian. / red label (p) HOLOTYPE *Lasinus sinicus* sp. n., Bekchiev, Hlaváč & Nomura det., 2013. (NSMT). PARATYPES: 1♂: China, Vill, 86, Gansu: Mrijishan (h), 1000 m, Rougemont: 1 ♂, 2 ♀♀: same data as holotype, but specimens collected on 26.V.1996; 1 ♂, 1 ♀: China, Shaanxi, Nanwutaishan, 4.04.03, leg. Rougemont; 1 ♂: China, W Hubei, 21.VI–13.VII, Guanmenshan-1500 m, pit fall traps, 31.45 N 110.4 E, leg. Jaroslav Turna, 2003. All paratypes bear the following red label: (p) PARATYPE *Lasinus sinicus* sp. n. Bekchiev, Hlaváč & Nomura det., 2013. (NSMT, MCSN, PCPH).

Description. Body (Fig. 4) bicolored, head, pronotum and abdomen almost black, elytra reddish-brown, maxillary palpi yellow, length 3.25–3.50 mm.

Head elongate, about 1.15 times longer than wide, slightly longer than pronotum; median sulcus absent along whole length of head. Genae simple, lacking protuberances.

Antennae long about 2.10 mm; scapes long, about 4 times longer than pedicels; pedicels shortest, 1.25 times shorter than antennomeres III; antennomeres III, IV, VII and VIII subequal in length, slightly shorter than V and VI ; antennomeres XI 0.71 times longer than wide only slightly enlarged on the apex of antennomeres in male, in female unmodified; X 0.85 times longer than wide; XI 0.66 times longer than wide.



Figures 20–23. Aedeagi of *Lasinus* species (dorsal view). **20** *L. spinosus* **21** *L. monticola* **22** *L. sinicus* **23** *L. mikado*. Scale – 0.3 mm.

Pronotum about as long as wide, wrinkly, gibbose, with prominent lateral swellings before lateral foveae (Fig. 9); lateral and median setose foveae well-defined; median sulcus present only on disc, not originates from median fovea, very short and fine, largely separated from anterior margin of pronotum.

Legs long and slender; protrochanters with small apical spine; profemora with small spine in middle; mesotrochanters at apex with small median spine (male) or two (female) spines; mesofemora with small spine at basal third.

First visible abdominal tergite (IV) glabrous, very long, about 3.50 times longer than second (V); basal carinae very short, distance between carinae about 0.5 of maximal tergal width. Aedeagus (Fig. 22) 0.66 mm long; median lobe weakly narrowed apically, with short and very large apical lobe; endophallus with one large, bifid spine and one lamella; lamella large, with dentation on inner left part; parameres short and slender, not overlapping apical lobe.

Differential diagnosis. *Lasinus sinicus* is close to *L. mandarinus* by the similar shape of the pronotum with prominent lateral swellings before the lateral foveae. They can be separated from it by the proportion of antennomere X which is almost as long as wide in *L. sinicus*.

Etymology. The specific name is derived from China, where the species was discovered.

Distribution. China (Guangxi, Gansu, Shaanxi, Hubei).

Lasinus mikado sp. n.

http://zoobank.org/391BFF8A-01EF-4AE1-8AFF-22A9BDD369B3
http://species-id.net/wiki/Lasinus_mikado
Figs 5, 13, 23

Lasinus spinosus Sharp: Jeannel 1958: 121–122; figs 146, 147, 148.
Lasinus spinosus Sharp: Sawada 1961: 41; pl. 7, figs 5, 6.

Type material (14 ♂♂, 17 ♀♀). HOLOTYPE, ♂, labelled as follows: (p) [Japan, Miyanoshita, Lewis], red label (p) HOLOTYPE *Lasinus mikado* sp. n., Bekchiev, Hlaváč & Nomura det., 2013. (BMNH); PARATYPES (2 ♂♂, 1♀): Japan, Nanatsukahara, Shobara City, Hiroshima Pref., 10.X.1987, I. Okamoto leg.; (1 ♂) Japan, Honshu, Chiyoda-ku, Tokyo Pref., Fukiage Gyoen, Imperial palace, 19.I.2001, S. Nomura leg.; (1 ♂) same data, 8.V.2001; (1 ♀) 18.XII.2003; (2 ♀♀) 2.II.2004; (3 ♀♀) 12.II.2007; (1 ♂) Japan, Honshu, Fussa-shi, Tokyo Pref., Tamagawa riverside, Mutsumi-bashi, 12.II.2007, S. Nomura leg.; (1 ♂) Japan, Honshu, Akiu-machi, Miyagi Pref., Futakuchi Valley, 27.VII.1990, S. Nomura leg.; (3 ♂♂, 1 ♀) Japan, Honshu, Saitama Pref., Ranzan-machi, Kagamata, 5.IV.1996, K. Toyoda leg.; (1 ♂) Japan, Honshu, Chiba Pref., Kôzaki-jinja, Kôzaki-machi, 14.X.2001, S. Nomura leg.; (1 ♂, 2♀♀) Japan, Honshu, Niiharu-mura, Gunma Pref., Hôshi-onsen, 600 m, 20.X.2001, S. Nomura leg.; (2 ♀♀) Japan, Niigata Pref., Kuroiwa, Shibata, 22.XI.1990, H. Koike leg.; (1 ♂) Japan, Nara, 27–31.VII.1980, C. Besuchet leg.; (1 ♂) Japan, Shikoku, Ishizuchi Mts., Omogo Valley, 700 m, 18-25.VIII.1980, J. Peck leg.; (1 ♂) Japan, Ôhira, Shimamaki-mura, Hokkaido, 4-18. VI. 1994, S. Hori leg.; (1 ♂) Japan, Teshio-gawa, Teshio-chô, Hokkaido, 22. VII. 1992, S. Hori leg.; (4 ♂♂, 2 ♀♀) Russia, Kunashir Island, Tretiakovo VIII., 20.VII.1990, S. Kurbatov leg.; (1 ♀) same data, 18.VII.1990; (1 ♂) Japan, 1890, Schönfeldt leg.; (7 ♂♂, 10 ♀♀) Japan, Kanagawa, Sauter leg., (BMNH, NSMT, NHMW, NMNH, MHNG, PCPH, PCSK).

Description. Body (Fig. 5) unicoloured, reddish-brown, maxillary palpi light brown, length 2.87–3.1 mm.

Head elongate, about 1.10 times longer than wide, slightly longer than pronotum; median sulcus visible on rostrum, on vertex reaching level of vertexal foveae. Genae with weak protuberance, covered with erected, dense golden setae.

Antennae about 2.15 mm long (Fig. 13); scapes long, about 3.4 times longer than pedicels; pedicels about 1.18 times shorter than antennomeres III, antennomeres V and VI as long as pedicels; VII 1.25 times shorter than VI; antennomeres VIII about 1.27 times longer and distinctly wider than VII; antennomeres IX about 1.5 times longer than wide, about the same length as terminal antennomeres, in male with deep ventral concavity on apical half terminating with nail-shaped protuberance, in female unmodified; antennomere X quadrate, 1.5 times shorter than IX; terminal antennomeres 1.6 times as long as X and about 1.5 times longer than wide.

Pronotum about as wide as long, wrinkly, evenly rounded before lateral foveae; lateral and median setose foveae well-defined; median sulcus thin.

Legs long and slender; protrochanters with large apical spine; profemora with long spine in middle of its length; mesotrochanters at apex with two minuscule (male) or two strong (female) and one minuscule spine; mesofemora with minuscule spine at basal third.

Abdomen slightly wider than elytra; first visible abdominal tergite (IV) finely punctate, with dense and long golden setae, about 4 times longer than second visible tergite (V); basal carinae very short, distance between carinae 0.53 of maximal tergal width**.** Aedeagus (Fig. 23) 0.61 mm long; median lobe weakly narrowed apically, with long and relatively narrow apical lobe; endophallus with one bifid spine and two small lamellas; lamellas finely dentate on the apical part; parameres long, overlapping apical lobe, enlarged at apex.

Differential diagnosis. *Lasinus mikado* is close to *L. monticola* and *L. yakushimanus* by the presence of a nail-shaped protuberance on antennomeres IX, it differs from both by the presence of a deep concavity on antennomeres IX and by the shape of aedeagus.

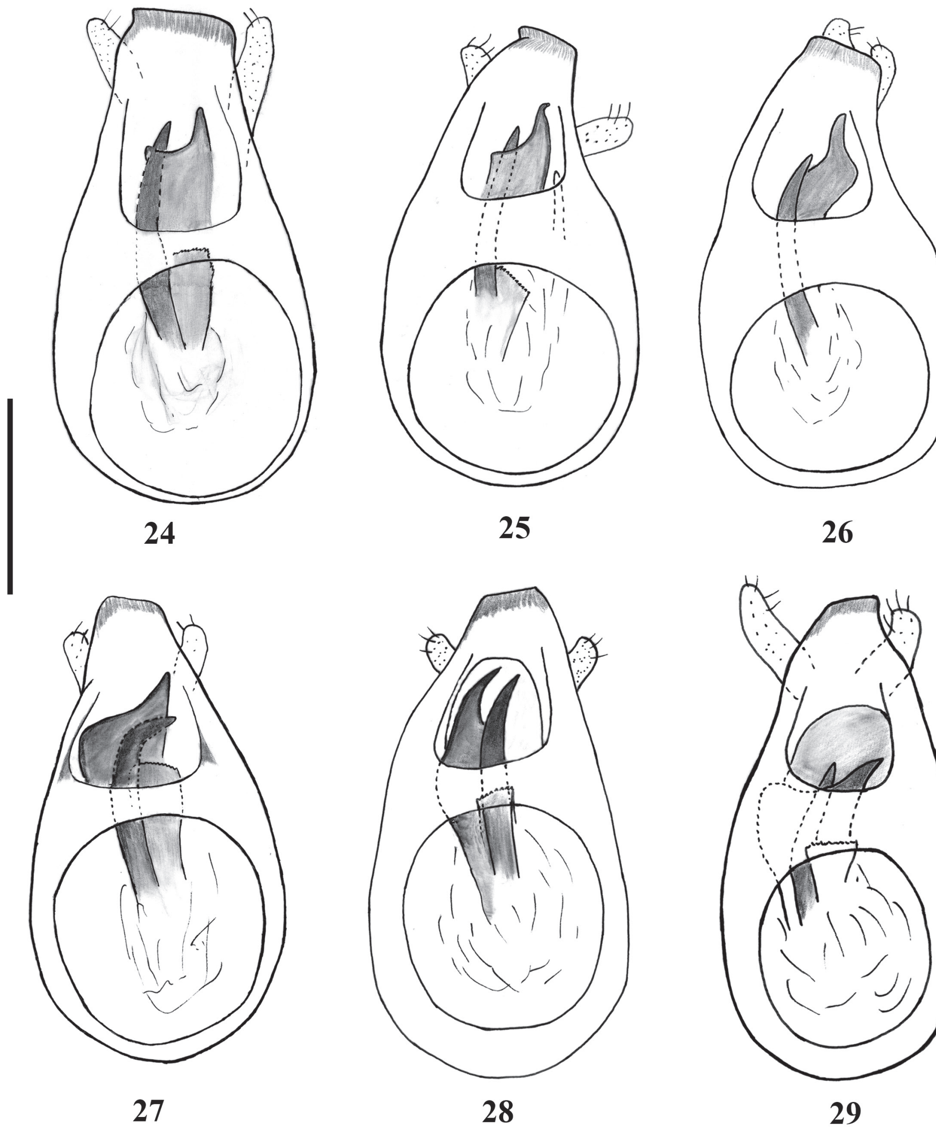
Etymology. The name is derived from the Japanese word – „mikado", meaning the Emperor of Japan.

Distribution. Japan (Hokkaido, Honshu, Shikoku), Russia (Kuril Islands).

Remarks. The original type series of *Lasinus spinosus* in the Sharp collection is in fact a mix of *L. spinosus* and *L. mikado* sp. n.

***Lasinus yamamotoi* sp. n.**
http://zoobank.org/79AC04BB-D1ED-4108-9984-DE09D9FC6B2D
http://species-id.net/wiki/Lasinus_yamamotoi
Figs 14, 24

Type material. (4 ♂♂, 1♀). HOLOTYPE, ♂, labelled as follows: (p) [Japan, Ehime, Nomura Dam, Nomura-cho, 27.V.1994, M. Sakai leg.] red label (p) HOLOTYPE *Lasinus yamamotoi* sp. n., Bekchiev, Hlaváč & Nomura det., 2013. (NSMT). PARATYPES: (2 ♂♂, 1♀); (1 ♂) same data with holotype; (1 ♀) same data with holotype



Figures 24–29. Aedeagi of *Lasinus* species (dorsal view). **24** *L. yamamotoi* **25** *L. inexpectatus* **26** *L. yakushimanus* **27** *L. amamianus* **28** *L. saoriae* **29** *L. okinawanus*. Scale – 0.3 mm.

but in 23.VII.1994; (1 ♂) Japan, Shikoku, Ehime Pref., Uchiko-chô, Shiromawari, 9.VII.1995, E. Yamamoto leg. (NSMT, PCPH, NMNH).

Description. Body unicoloured, head, pronotum and abdomen reddish-brown, elytra slightly lighter, maxillary palpi yellow, length 2.85–2.95 mm.

Head elongate, 1.08 times longer than wide and as long as pronotum; median sulcus visible on rostrum, relatively shallow at level of vertexal foveae. Genae with weak protuberance, covered with erected, dense golden setae.

Antennae (Fig. 14) about 2.02 mm long; scapes long, about 2.85 times longer than pedicels; pedicels short, 1.42 times shorter than each of antennomeres III–IV; antennomeres V and VI of same length; antennomeres VII 1.22 times longer than wide; VIII longer than wide; XI longer than wide, simple, only slightly oblique on ventral side in male, in female unmodified ; X slightly longer than wide ; XI longer than wide.

Pronotum slightly longer than wide, surface evenly wrinkly, evenly rounded before lateral foveae; lateral foveae well-defined; median setose fovea small; median sulcus very thin.

Legs long and slender; protrochanters with long apical spine; profemora with short, strong spine in middle; mesotrochanters with one small (male) or two (female) spines; mesofemora with small spine at basal third.

First visible abdominal tergite (IV) very long, about four times longer than second visible tergite (V), with fine punctation in anterior part, disc glabrous, surrounded with short golden pubescence on sides; carinae short, distance between carinae 0.4 of maximal tergal width. Aedeagus (Fig. 24) 0.57 mm long; median lobe weakly narrowed apically, with large and relatively short apical lobe; endophallus with two spines and small lamella; ventral spine very big, forming large plate; dorsal spine big, curved, acute at apex; lamella small, finely dentate in apical part; parameres short and slender, reaching apical lobe, enlarged at apex.

Differential diagnosis. *Lasinus yamamotoi* resembles *L. inexpectatus* due to the unmodified antennal clubs in both sexes, but it can be distinguished from the latter by the proportion of the antennomeres VII and the shape of the aedeagus.

Etymology. Patronimic, dedicated to Mr. Eiji Yamamoto (Japan).

Distribution. Japan (Shikoku).

Lasinus inexpectatus sp. n.

http://zoobank.org/DD3C5D54-9348-42C5-942B-E6BAC99ACA95
http://species-id.net/wiki/Lasinus_inexpectatus
Figs 15, 25

Type material (3 ♂♂, 1♀). HOLOTYPE, ♂, labelled as follows: (p) Japan, Kyushu, Miyazaki Pref., Aya-chô, Ôtsuribashi, 25.IV.1993, leg. S. Nomura. red label (p) HOLOTYPE, Lasinus inexpectatus sp. n., Bekchiev, Hlaváč & Nomura det. 2013 (NSMT). PARATYPES, (2 ♂♂, 1♀): 1 ♂, 1 ♀, same data as holotype, 1 ♂: (p) Japan, Kyushu, Miyazaki Pref., Nangoh-choh, Ohshima (3), leg. Atsushi Nagai (NSMT, NMNH, PCPH).

Description. Body unicoloured, reddish-brown, elytra slightly lighter, maxillary palpi light brown, length 2.80–3.20 mm.

Head about 1.05 longer than wide, and as long as pronotum; median sulcus very weakly-defined, slightly visible only on rostrum, absent on vertex. Genae with weak protuberance, covered with erected, dense golden setae.

Antennae 2.20–2.24 mm long (Fig. 15); scapes long, about 3.25 times longer than pedicels; pedicels slightly shorter than antennomeres III–VII combined, which are subequal; VIII slightly longer and about 1.30 times wider than VII; antennomeres IX rectangular, simple, in male slightly shorter (0.18 mm) than in the female (0.24 mm); X about as wide as long; terminal antennomeres 1.60 times longer than X.

Pronotum 1.05 times longer than wide, wrinkly, evenly rounded before lateral foveae; lateral and median setose foveae well-defined; median sulcus thin, present only on disc.

Legs long and slender; protrochanters with large apical spine; profemora with long spine in middle of its length; mesotrochanters at apex with one minuscule (male) or two strong (female) spines; mesofemora with minuscule spine at basal third.

Abdomen slightly wider than elytra; first visible abdominal tergite (IV) finely punctate with dense and long golden setae on sides, disc glabrous, about 3 times longer than second visible tergite (V); basal carinae very short, almost invisible in males**.** Aedeagus (Fig. 25) 0.63 mm long; median lobe weakly narrowed apically, with long and narrow apical lobe; endophallus with three spines and small lamella; ventral spine large, forming large plate, acute and curved at apex; dorsal spine large, curved, acute at apex; lateral spine very slender and small, acute at the apex; lamella small, finely dentate on apical part; parameres short, unequal in length, not overlapping apical lobe, enlarged at apex.

Differential diagnosis. *Lasinus inexpectatus* is close to *L. sinicus* due to the simple antennomeres IX lacking any sexual character. The two species can be separated by the absence of swellings before lateral foveae on the pronotum in *L. inexpectatus*. From all other Japanese species, *L. inexpectatus* also differs by the shapes of the aedeagus and the antennae.

Etymology. The name is realated with the „unexpected" discovery of this species.

Distribution. Japan (Kyushu).

Lasinus yakushimanus **sp. n.**

http://zoobank.org/2845C2F2-7942-499E-8D3E-7D5948F31728
http://species-id.net/wiki/Lasinus_yakushimanus
Figs 7, 10, 16, 26

Type material. (8 ♂♂, 7 ♀♀) HOLOTYPE, ♂, labelled as follows: (p) [Japan, Kyushu, Kagoshima Pref., Yakushima, Hananoegô, 17.III.2001, H. Hoshina leg.] red label (p) HOLOTYPE *Lasinus yakushimanus* sp. n., Bekchiev, Hlaváč & Nomura det., 2013 (NSMT). PARATYPES: (6 ♂♂, 3 ♀♀) same data as holotype; (1 ♂, 3♀♀) Japan, Kagoshima Pref., Yakushima, Mt. Nonkidake , 1350 m, 4.IX.2006, S. Nomura leg.; (1♀) Japan, Kagoshima Pref., Yakushima, Mt. Aikodake, 200 m, 5.IX.2006, S. Nomura leg. (NSMT, PCPH, NMNH, PCSK).

Description. Body unicoloured, reddish-brown, maxillary palpi yellow dark, length 2.84–2.96 mm.

Head elongate, about 1.07–1.11 times longer than wide and about as long as pronotum; median sulcus visible on rostrum and on vertex reaching level of vertexal foveae. Genae with weak protuberance, covered with erected, dense golden setae (Fig. 7).

Antennae about 1.94 mm long (Fig. 16); scapes long, about 3.0 times longer than pedicels; pedicels as long as antennomeres III; antennomeres IV and V slightly longer than wide; antennomeres VI 1.62 times longer than wide; antennomeres VII as long as wide; antennomeres VIII as long as and slightly wider than VII; IX about 1.20 times longer than wide, in male with shallow ventral excavation on apical half terminating with small nail-shaped protuberance, in female unmodified; antennomeres X 1.21 longer than wide; terminal antennomeres about 1.27 times longer than wide.

Pronotum about as wide as long, wrinkly, with weak lateral swellings before lateral foveae (Fig. 10); lateral and median setose foveae well-defined; median sulcus thin.

Legs long and slender; protrochanters with large apical spine; profemora with longer spine in middle of its length; mesotrochanters at apex with two minuscule (male) or two strong and one minuscule (female) spines; mesofemora with minuscule spine at basal third.

Abdomen slightly wider than elytra; first visible abdominal tergite (IV) finely punctate, with dense, very short golden setae; carinae short, distance between carinae 0.49 of maximal tergal width. Aedeagus (Fig. 26) 0.56 mm long; median lobe weakly narrowed apically, with short and large apical lobe; endophallus with two spines; ventral spine large, forming narrow curved plate; dorsal spine slender, evenly curved, acute at apex; parameres long, overlapping apical lobe, enlarged at apex.

Differential diagnosis. *Lasinus yakushimanus* is close to *L. okinawanus* by sharing the presence of weak lateral swelling on the pronotum, and to *L. monticola* by the presence of a nail-shaped protuberance on antennomeres IX, it differs from both by the shapes of the antennae and the aedeagus.

Etymology. The name is associated with the name of the locality, Yakushima, where the speciments was found.

Distribution. Japan (Yaku-shima Island).

Lasinus amamianus sp. n.

http://zoobank.org/60DB4FAF-381E-45EC-9C69-6C3893DDE8BA
http://species-id.net/wiki/Lasinus_amamianus
Figs 17, 27

Material examined. (11 ♂♂, 9 ♀♀). HOLOTYPE, ♂, labelled as follows: (p) [Japan, Ryukyus, Kagoshima Pref., Amami-ôshima Is., Mt. Yuidake, 10.VIII.1984, S. Nomura leg.,], red label (p) HOLOTYPE *Lasinus amamianus* sp. n., Bekchiev, Hlaváč & Nomura det., 2013. (NSMT). PARATYPES: (4 ♂♂, 4 ♀♀) same data as holotype; (1 ♂, 1 ♀) Japan, Ryukyus, Kagoshima Pref., Amami-ôshima Is., Mt. Yuidake, 15.V.1983, S. Nomura leg.; (2 ♂♂, 1 ♀) Japan, Ryukyus, Kagoshima Pref., Amami-ôshima Is., Mt. Yuidake, 8.V.1987, S. Nomura leg.; (1 ♂) Japan, Kagoshima Pref., Tokunoshima Is., Mt. Inutabudake, 3.V.1988, S. Nomura leg.; (3 ♂♂, 3 ♀♀) Japan, Kagoshima Pref., Tokunoshima Is., Yonama, 4.V.1988, S. Nomura leg. (NSMT, PCPH, NMNH, PCSK).

Description. Body unicoloured, reddish-brown, elytra slightly brighter, maxillary palpi yellow dark, length 2.80–3.00 mm.

Head elongate, about 1.10 times longer than wide, as long as pronotum; median sulcus shallow, reaching level of vertexal foveae. Genae with weak protuberance, covered with erected, dense golden setae.

Antennae about 1.96 mm long (Fig. 17); scapes about 3.40 times longer than pedicels; pedicels 1.40 times shorter than antennomeres III; III slightly longer than wide; IV as long as III; antennomeres V slightly longer than wide; VI about 1.20 times longer than wide; antennomeres VII 1.2 times longer than wide; VIII 1.16 times longer than wide; IX about 1.10 times longer than wide, in male with well-developed tubercles in apical ventral part, in female unmodified; antennomeres X as wide as long; terminal antennomeres about 1.47 times longer than wide.

Pronotum about as wide as long, wrinkly, with weak lateral swellings before lateral foveae; lateral and median setose foveae well-defined; median sulcus thin and deep.

Legs long and slender; protrochanters with large apical spine; profemora with long spine in middle; mesotrochanters at apex with one (male) or two (female) spines; mesofemora with minuscule spine at basal third.

Abdomen slightly wider than elytra, first visible abdominal tergite (IV) finely punctate with dense and long, golden setae; carinae short, distance between them 0.47 of maximal tergal width. Aedeagus (Fig. 27) 0.59 mm long; median lobe weakly narrowed apically, with long and narrow apical lobe; endophallus with two spines and one small lamella; ventral spine large, enlarged, forming large plate, acute at left apex; dorsal spine very big, acute at apex; lamella large, finely dentate on apical part; parameres short and slender, reaching apical lobe.

Differential diagnosis. *Lasinus amamianus* and *L. saoriae* differ from all other species of the genus by the shape of antennae, especially by the presence of tubercles on antennomeres IX. *Lasinus amamianus* can be readily separated from *L. saoriae* by the proportion of antennomeres VII and VIII and by the shape of aedeagus.

Etymology. The species name is associated with the name of the locality, Amami-ôshima Island, where most of the specimens were found.

Distribution. Japan (Amami-ôshima, Tokunoshima Islands).

Lasinus saoriae sp. n.

http://zoobank.org/D5F88EC3-FC0E-4ACE-8EEF-805AD708DFB8
http://species-id.net/wiki/Lasinus_saoriae
Figs 18, 28

Type material (6 ♂♂, 6 ♀♀). HOLOTYPE, ♂, labelled as follows: (p) [Japan, Ryukyus, Okinawa Is., Kunigami-son, Mt. Yonahadake , 22.III.2005, S. Nomura leg.], red label (p) HOLOTYPE *Lasinus saoriae* sp. n., Bekchiev, Hlaváč & Nomura det., 2013. (NSMT). PARATYPES: (2 ♂♂, 5 ♀♀) same data as holotype; (2 ♂♂, 1 ♀) Japan, Okinawa, Yona-Kunigami, 15.III.1985, leg. S. Nomura; (1 ♂) Japan, Okinawa, Kunigami, 16.III.1985, leg. S. Nomura (NSMT, PCPH, NMNH).

Description. Body unicoloured, reddish-brown, maxillary palpi yellow dark, length 2.70–3.10 mm.

Head elongate, about 1.08 longer than wide, slightly shorter than pronotum; median sulcus shallow, reaching level of vertexal foveae. Genae with weak protuberance, covered with erected, dense golden setae.

Antennae about 1.8 mm long (Fig. 18); scapes long, about twice longer than pedicels; pedicels 1.22 times longer than antennomeres III; antennomeres IV as long as wide; antennomeres V slightly longer than wide; antennomeres VI about 1.33 times longer than wide; antennomeres VII and VIII slightly longer than wide; VII 0.88 times longer than wide; VIII 0.9 times longer than wide; IX about 1.26 times longer than wide, in male with short tubercles in apical ventral part, in female unmodified; antennomeres X about 1.33 longer than wide; terminal antennomeres about as long as wide.

Pronotum slightly longer than wide, wrinkly, evenly rounded before lateral foveae; lateral and median setose foveae well-defined; median sulcus thin and deep.

Legs long and slender; protrochanters with large apical spine; profemora with long spine in middle of its length; mesotrochanters at apex with one (male) or three (female) spines; mesofemora with minuscule spine at basal third.

Abdomen slightly wider than elytra; first visible abdominal tergite (IV) finely punctate, with sparse golden setae; carinae very small, distance between them 0.48 of maximal tergal width. Aedeagus (Fig. 28) 0.61 mm long; median lobe weakly narrowed apically; endophallus with two spines and two lamellas; ventral spine large, enlarged in middle, acute at apex; dorsal spine slender, acute at apex; dorsal lamella small, finely dentate on apical part; ventral lamella large; parameres very short and slender, not reaching apical lobe.

Differential diagnosis. *Lasinus saoriae* strongly resembles *L. amamianus* from which it differs essentially by the shapes of the antennae and the aedeagus.

Etymology. The specific epithet is dedicated to Saori Takeuchi (Japan), a family friend of the first author.

Distribution. Japan (Okinawajima Island).

Lasinus okinawanus sp. n.

http://zoobank.org/56DFA417-857B-4595-8FEB-7D875CD9C8EC
http://species-id.net/wiki/Lasinus_okinawanus
Fig. 19, 29

Type material. (4 ♂♂, 4 ♀♀). HOLOTYPE, ♂, labelled as follows: (p) [Japan, Ryukyus, Okinawa Is., Okinawajima, Mt. Oppadake, Nakijin-son, 26.VI.1998, S. Nomura leg.], red label (p) HOLOTYPE *Lasinus okinawanus* sp. n., Bekchiev, Hlaváč & Nomura det., 2013 (NSMT). PARATYPES: (2 ♂♂, 3 ♀♀) same data as holotype;

(1 ♂, 1 ♀) Japan, Ryukyus, Okinawa Pref., Nago-shi, Mt. Nagodake., 2.IX.2006, S. Nomura leg. (NSMT, PCPH, NMNH).

Description. Body unicoloured, light reddish-brown, maxillary palpi yellow, length 3.0–3.2 mm.

Head elongate, about 1.03 longer than wide, and as long as pronotum; median sulcus visible on rostrum, on vertex reaching level of vertexal foveae. Genae with weak protuberance, covered with erected, dense golden setae.

Antennae long about 1.94 mm (Fig. 19); scapes 1.16 times longer than wide, 1.40 times as long as pedicels; pedicels as long as wide and as long as antennomeres III; antennomeres IV 1.25 times shorter than III; antennomeres V 1.20 times longer than wide; antennomeres VI 1.60 times longer than wide; antennomeres VII as long as wide; antennomeres VIII about 1.40 times longer and distinctly wider than VII; antennomeres IX as long as wide and about same length as terminal antennomeres, in male with large, shallow, in apical half highly inclined discoidal plate, in female unmodified; antennomeres X quadrate; terminal antennomeres 1.60 times as long as X and about 1.37 times longer than wide.

Pronotum about as wide as long, wrinkly, with weak lateral swellings before lateral foveae; lateral and median setose foveae well-defined; median longitudinal sulcus present.

Legs long and slender; protrochanters with large apical spine; profemora with longer spine in middle of its length; mesotrochanters at apex with one (male) or three (female) spines; mesofemora with minuscule spine at basal third.

Abdomen slightly wider than elytra, first visible abdominal tergite (IV) finely punctate with sparse, short golden setae; carinae short, distance between them 0.39 of maximal tergal width. Aedeagus (Fig. 29) 0.60 mm long; median lobe weakly narrowed apically, with long and narrow apical lobe; endophallus with two spines and two lamellas; ventral spine very large, short, curved downwards in middle, acute rightward at apex; dorsal spine very strong, acute at apex; dorsal lamella small finely dentate on apical part; ventral lamella large; parameres long and slender, different in length, left one overlapping apical lobe, right one shorter,.

Differential diagnosis. *Lasinus okinawanus* is most closely related to *L. spinosus* by the antennomeres IX with a shallow cavity, and the lack of an apical nail-shaped protuberance. It differs from latter by antennomeres IX having highly inclined shallow discoidal plate in apical half, and by the shape of the aedeagus.

Etymology. The specific name is associated with the name of the type locality, Okinawa Island, where the type specimens were found.

Distribution. Japan (Okinawajima Island).

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RESEARCH ARTICLE

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Pristomyrmex tsujii sp. n. and *P. mandibularis* Mann (Hymenoptera, Formicidae) from Fiji

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Abstract

Pristomyrmex tsujii **sp. n.**, an endemic species of the Fiji islands, is described from the worker, ergatoid queen, alate queen and male castes. The alate queen and male castes of *Pristomyrmex mandibularis* Mann are also described for the first time. The ergatoid queens for both species appear to be morphologically intermediate between the worker and alate queen castes. *Pristomyrmex tsujii* is readily distinguished from *P. mandibularis* by the lack of well-developed propodeal spines. Although both species occur across the Fijian archipelago, they are rarely encountered and workers are most often collected from sifted litter. The descriptions are illustrated with specimen photographs, line drawings and a distribution map.

Keywords

Myrmicinae, *Pristomyrmex*, Fiji, taxonomy, ergatoid, islands, Pacific, new species

Introduction

Pristomyrmex Mayr is a genus composed of 59 extant valid species restricted to the Old World tropics (Bolton 2013). Its center of diversity is the Oriental region, though species are also known from the Australian rainforests, Africa, Mauritius and Reunion. Most species inhabit the rainforest, forage as predators or scavengers, and tend to nest in soil, leaf litter or rotten wood. A comprehensive and well-illustrated taxonomic revision of the genus across its range was completed by Wang (2003). Subsequent taxonomic work on the genus includes a review of the Philippine *Pristomyrmex* with three new descriptions and a key to species (Zettel 2006), and a key to the Taiwan species (Terayama 2009).

Fiji is the eastern range limit for *Pristomyrmex*, aside from *P. minusculus* Wang which is known from Tonga in addition to Papua New Guinea, Micronesia, and Queensland, Australia. *Pristomyrmex mandibularis* was first described by Mann (1921), and a second species from Fiji, described here as *Pristomyrmex tsujii,* was reported in Sarnat and Economo (2012) as *Pristomyrmex* sp. FJ02. Both species belong to the *levigatus* group. These ants are most often encountered in the leaf litter, and small colonies of *P. mandibularis* can be found nesting in rotting logs and under stones.

Both Fijian species produce a discrete ergatoid queen caste that is intermediate between a worker and an alate queen. Ergatoid queens in the genus have also been reported for *Pristomyrmex punctatus* Mayr, *P. africanus* Karavaiev, *P. brevispinosus* Emery and *P. wheeleri* Taylor. Previous studies (Heinze 1998; Peeters 1991) proposed that in truly ergatoid species the genetically winged female reproductive caste has been completely replaced by a permanently wingless female reproductive caste. By contrast, intermorph queens are a regularly produced caste that retain all reproductive functions of alate queens and can also co-occur with alate queens. Although the latter condition more accurately applies to both species of the Fijian *Pristomyrmex*, we continue to use the term ergatoid to describe the permanently wingless queen caste as it is broadly accepted across myrmecology and more easily facilitates comparative studies (Peeters 2012).

This taxonomic treatment of *P. tsujii* and *P. mandibularis* is part of an ongoing effort to characterize the systematics, ecology and evolution of the Fijian ant fauna (Economo and Sarnat 2012; Lucky and Sarnat 2008, 2010; Sarnat 2006, 2008; Sarnat and Economo 2012; Sarnat and Moreau 2011).

Sources of material

All of the material examined in this study was collected from 2002–2007, including specimens collected as part of the Fiji Terrestrial Arthropod Survey (Evenhuis and Bickel 2005; Sarnat and Economo 2012) and in other collections made by the authors. All type material designated here will be deposited in the BPBM (Bernice Pauahi Bishop Museum, Honolulu, Hawaii, USA). Non-type material will be deposited in the

ANIC (Australian National Insect Collection, CSIRO, Canberra, Australia), MCZC (Museum of Comparative Zoology Collection, Cambridge, MA, USA), and NMNH (National Museum of Natural History, Washington D.C., USA). Additional images along with additional specimen, collection and locality data for *Pristomyrmex tsujii* and *P. mandibularis* are available on Antweb.org. Geographic coordinates presented in the material examined sections are given in decimal degrees, rounded to the fourth significant digit where accuracy permits.

Methods and abbreviations

External morphological characters were quantified and are reported as lengths or indices. Measurements were made with a stereomicroscope at 40x magnification using a dual-axis stage micrometer wired to digital readouts. Digital color specimen photographs were taken using the Auto-Montage software package (Syncroscopy) in combination with a JVC KY-F7U digital camera mounted on a Leica MZ16 dissecting scope, and the software package Helicon Focus in combination with a Leica DFC450 digital camera mounted on a Leica M205C dissecting scope. Vector illustrations were made in Adobe Illustrator by tracing specimen photographs.

Morphometric measurements were recorded in thousandths of millimetres, but are reported here to the nearest hundredth as a range from minimum to maximum across all measured specimens. Specimens for measurements were chosen to reflect potential morphological variation across the full geographic range. The number of specimens from which measurements were taken for a given caste is referred to by *n*. The following measurements and indices are adapted from Wang (2003).

CI Cephalic Index: HW/HL × 100.
EL Maximum measureable eye length.
HL Maximum length of the head in full-face view measured longitudinally from the midpoint of the posterior head margin to the apex of the median tooth of the anterior clypeal margin.
HW Maximum width of the head in full-face view, excluding the eyes.
HWE Maximum width of the head in full-face view, including the eyes. This measurement is used only for the male.
ML Mesosomal length measured in lateral view from the anteriormost point of the pronotum to the apex of the propodeal lobe. Equal to 'Alitrunk Length' in Wang (2003).
PeH Maximum height of the petiole measured in lateral view as a straight line running from the most ventral to the most dorsal surface of the petiolar node, using tangential lines where required.
PeI Petiole Index: PeL/PeH × 100.
PeL Maximum length of petiole. For workers, alate queens and ergatoid queens the distance from the posterior face to the anterior face of the petiolar node

measured in lateral view. For males, the distance from the posterior face of the petiolar node to the junction with the mesosoma measured in lateral view.

PpH Maximum height of the postpetiole measured in lateral view as a straight line running from the most ventral to the most dorsal surface of the postpetiolar node.

PpI Postpetiole Index: PpL/PpH × 100.

PpL Maximum length of the postpetiole measured in lateral view from the posterior face to the anterior face of the postpetiolar node.

PW Maximum width of the pronotum in dorsal view.

SI Scape Index: SL/HW × 100.

SL Length of the antennal scape, including the lamella encircling the base of the scape but excluding the basal condyle.

TL Total length of specimen from tip of mandible to tip of gaster: TL1 + TL2 + TL3 + ML. (Note: The measurements of TL do not include those individuals whose gasters are abnormally prolonged.) TL1: A line measured in lateral view from the apex of the closed mandibles to the midpoint of a straight line across the occipital margin. TL2: A line measured in lateral view from the posteriormost point of postpetiolar dorsum to the tip of the propodeal lobes. TL3: A line measured in lateral view from the anteriormost point to the posteriormost point of gaster.

Genus diagnosis in Fiji

Pristomyrmex workers can be recognized in Fiji by the following characters. Head shape circular to ovoid. Antennal club 3-segmented. Antenna 11-segmented. Antennal sockets surrounded by a raised sharp-edged ridge. Antennal scrobe absent. Anterior clypeal margin armed with three broad and blunt teeth. Mandibles triangular with four large teeth on the masticatory margin and one on the basal margin. Mesosoma with erect hairs present. Propodeum either unarmed, armed with acute angles, or armed with triangular spines distinctly longer than diameter of propodeal spiracle. Waist 2-segmented. Petiole pedunculate; lacking a large anteroventral subpetiolar process. Postpetiole not swollen; in dorsal view not distinctly broader than long or distinctly wider than petiole.

Pristomyrmex tsujii **sp. n.**

http://zoobank.org/AC753BF0-6236-48B8-B8D0-72AEC08C9439
http://species-id.net/wiki/Pristomyrmex_tsujii
Figs 1–6, 11–22, 35

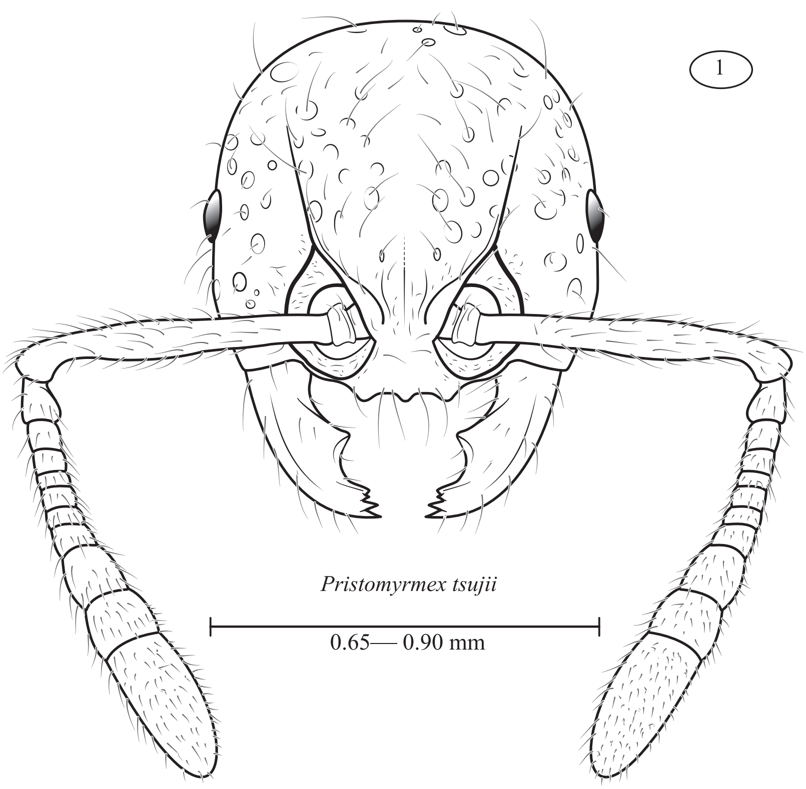
Pristomyrmex sp. FJ02. Sarnat and Economo 2012:116, pl. 113 (key, discussion, checklist).

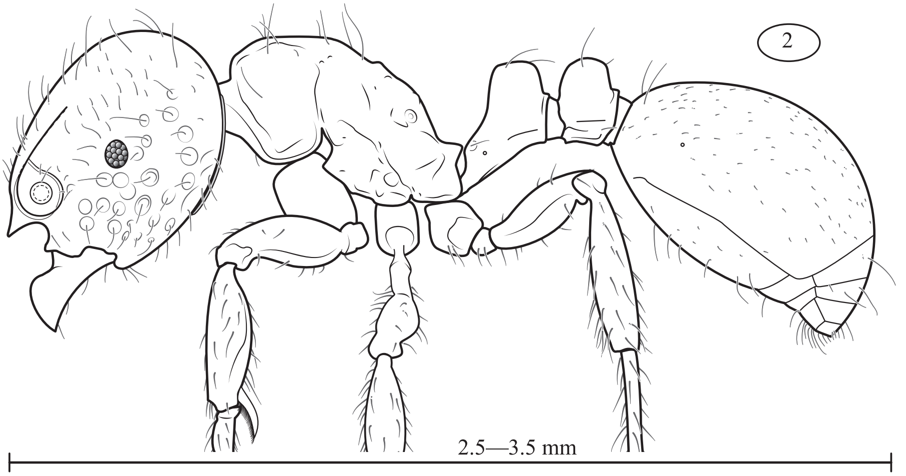
Holotype. Fiji, Lomaiviti Prov., Koro I., 2.7 km NW Nasau Village, footrack b/w Mt. Kuitarua & Nasau, 12.iii.2005, 465m, -17.2947, 179.406, primary rainforest, litter sifting, ex. soil, leaf litter, decaying wood, EMS1862.01, E.M. Sarnat (worker, dry pinned, BPBM, specimen code CASENT0171143). *Paratype*: 1 dealate queen, same data as holotype (USNM, specimen code CASENT0171144).

Diagnosis. *Pristomyrmex tsujii* workers are polished red, stoutly built and often foveolate. The propodeum is either armed with small denticles or entirely unarmed. The lack of strong propodeal spines (Figs 5–6) separates workers, ergatoid queens and alate queens of *Pristomyrmex tsujii* (Figs 12, 13, 18) from those of the sympatric *P. mandibularis* (Figs 24, 27, 30). The same character is used to diagnose the males, but the spines are reduced to denticles in *P. mandibularis* (Fig. 33) and entirely absent in *P. tsujii* (Fig. 21). Additionally, the males of *P. tsujii* tend more towards brown than black. The only congeneric species with an unarmed propodeum is *P. inermis* Wang from New Guinea which also belongs to the *levigatus* group. *Pristomyrmex tsujii* has a more nodiform petiole (Figs 3–4), a stronger median clypeal tooth (Fig. 10), and more abundant foveae between the frontal carinae (Figs 7–10).

Worker (Figs 1–6, 11–13). *Measurements* (n = 20): TL 2.63–3.35, HW 0.66–0.88, HL 0.67–0.87, CI 96–105, SL 0.59–0.77, SI 84–93, EL 0.08–0.11, PW 0.41–0.6, ML 0.61–0.79, PeH 0.24–0.29, PeL 0.14–0.18, PeI 54–71, PpH 0.25–0.31, PpL 0.14–0.19, PpI 47–67. *Holotype measurements*: TL 3.03, HW 0.79, HL 0.81, CI 99, SL 0.70, SI 89, EL 0.1, PW 0.5, ML 0.72, PeH 0.25, PeL 0.14, PeI 58, PpH 0.25, PpL 0.16, PpI 65.

Conforming to the generic *Pristomyrmex* and *levigatus* species group definitions detailed in Wang (2003) with the following specifications. Head shape circular with posterior margin flat to feebly concave medially in full-face view. Antenna 11-segmented with apical three segments forming a distinct club. Antennal insertion surrounded by a raised and unbroken lamella. Frontal carina distinct and extends just past the level of the posterior eye margin. Weak median carina, approximately same length as terminal antennal segment, extending posteriorly from between antennal insertions and transitioning into a weak median groove that terminates near eye level. Frontal lobe weakly expanded as a thin lamella. Eye moderate-sized, approximately same size as antennal socket, 3–4 facets along longest diameter. Clypeus flat and unsculptured. Median part of clypeus shield-like, projecting posteriorly between the bases of the antennae. Anterior clypeal margin tridentate with a median tooth and two lateral teeth; the median tooth similar in size or slightly smaller than the others. Ventral surface of clypeus smooth, lacking a transverse ruga. Lateral portions of clypeus anterior to antennal insertions reduced to a narrow margin. Mandibles mostly smooth with a few weak striae. Masticatory margin of mandible lacking a diastema and possessing four teeth. The third tooth, counting from the apex, is the smallest. A strongly prominent tooth present about midway on the basal margin of mandible. Anterior portion of dorsal labrum with two tooth-like prominences. Palp formula 1,3. Dorsum of mesosoma in profile view evenly arched, broken only by a weak impression separating the mesonotum from the propodeum. Pronotum unarmed; indistinct obtuse humeral angle. Propodeum armed with pair of small but distinct acute denticles to entirely unarmed. Propodeal lobes triangular, obtusely rounded. Fore tibial spur pectinate. Middle and





Figures 1–2. *Pristomyrmex tsujii*, illustrations of head (1) and profile (2). Scale bars are labelled with the approximate observed range for head width (HW) and total length (TL), respectively.

hind tibiae lacking spurs. Petiole node in profile high, taller than long, with anterior face weakly convex, dorsal face flat to weakly convex, and posterior faces weakly convex to weakly concave. Petiolar peduncle tapering broadly into petiolar node and approximately as long as petiolar node. Postpetiole in profile as tall or occasionally taller than petiole, approximately two times as tall as long; anterior face sloping evenly into dorsal face and junction of posterior face and dorsal face more angular. Dorsum of head covered with scattered to abundant weakly impressed foveae. Dorsum of mesosoma smooth and shining. Petiole and postpetiole smooth and shining, each with a weak lateral longitudinal carina on both sides. Gaster unsculptured. Dorsal surface of head with numerous erect to suberect long hairs originating from center of foveolae. Mesosoma with 4–5 pairs of long erect hairs. Petiolar peduncle with one pair of erect hairs. Petiolar and postpetiolar nodes each with one pair of posteriorly projecting erect hairs. First gastral segment with 1–3 pairs of erect hairs on anterior third. Scape and tibia with numerous erect to suberect hairs. All surfaces a shiny, polished yellowish brown to reddish brown.

Ergatoid queen (Figs 14–16). *Measurements* (*n* = 3): TL 3.25, HW 0.85–0.88, HL 0.83–0.84, CI 101–105, SL 0.68–0.73, SI 80–85, EL 0.11–0.12, PW 0.54–0.59, ML 0.75–0.79, PeH 0.26–0.28, PeL 0.16–0.18, PeI 61–66, PpH 0.27–0.30, PpL 0.16–0.19, PpI 55–63.

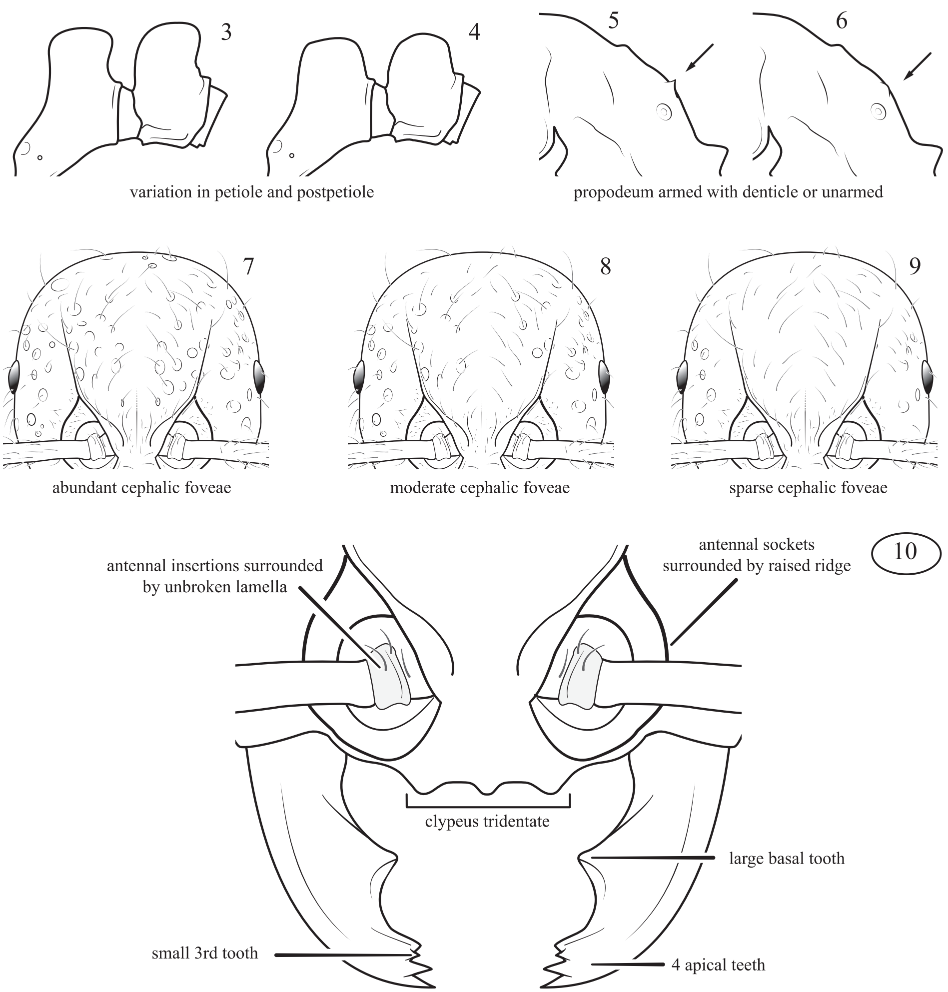
Closely resembling the worker in the structure of mandibles, clypeus, petiole, postpetiole and gaster in addition to sculpture, color and pilosity. Head with a single well-defined depression in place of the median ocellus. Mesosoma in dorsal view with a promesonotal suture but lacking sclerites associated with alate queen. Mesonotum more convex. Propodeal spines either absent or reduced to acute angles. Dorsum of head covered with scattered to abundant weakly impressed foveolae and smaller shallow punctures. Dorsum of mesosoma similar to alate queen with one or two additional pairs of erect hairs than worker.

Alate queen (Figs 20–22). *Measurements* (*n* = 2): TL 3.67–3.94, HW 0.88–0.91, HL 0.86–0.91, CI 100–103, SL 0.75–0.80, SI 85–88, EL 0.16, PW 0.66–0.69, ML 0.95–1.01, PeH 0.27–0.28, PeL 0.16, PeI 58–61, PpH 0.29–0.30, PpL 0.17, PpI 54–58.

Conforming to the generic *Pristomyrmex* definition detailed in Wang (2003) with the following specifications. Closely resembling worker in the structure of the mandibles, clypeus, petiole, postpetiole and gaster in addition to sculpture, color and pilosity with the following differences. Larger. Eyes much larger with diameter composed of ca. 12 facets. Three ocelli present. Posterior head margin weakly concave. Mesosoma marked with wing sclerites and dorsal sutures. Wing shape and venation unknown (only dealate specimens available for examination). Propodeal spines either absent or reduced to acute angles. Dorsum of head covered with scattered to abundant weakly impressed foveolae and smaller shallow punctures. Dorsum of mesosoma with more than 10 pairs of erect hairs.

Male. (Figs 23–25). *Measurements* (*n* = 11): TL 2.95–3.41, HW 0.52–0.64, HL 0.46–0.61, CI 103–112, SL 0.14–0.20, SI 24–32, HWE 0.69–0.80, EL 0.24–0.28, PW 0.50–0.73, ML 0.93–1.05, PeH 0.14–0.20, PeL 0.32–0.40, PeI 178–232, PpH 0.17–0.21, PpL 0.11–0.18, PpI 55–76.

Conforming to the generic *Pristomyrmex* definition detailed in Wang (2003) with the following specifications. Head, including the eyes, broader than long. Dorsal por-



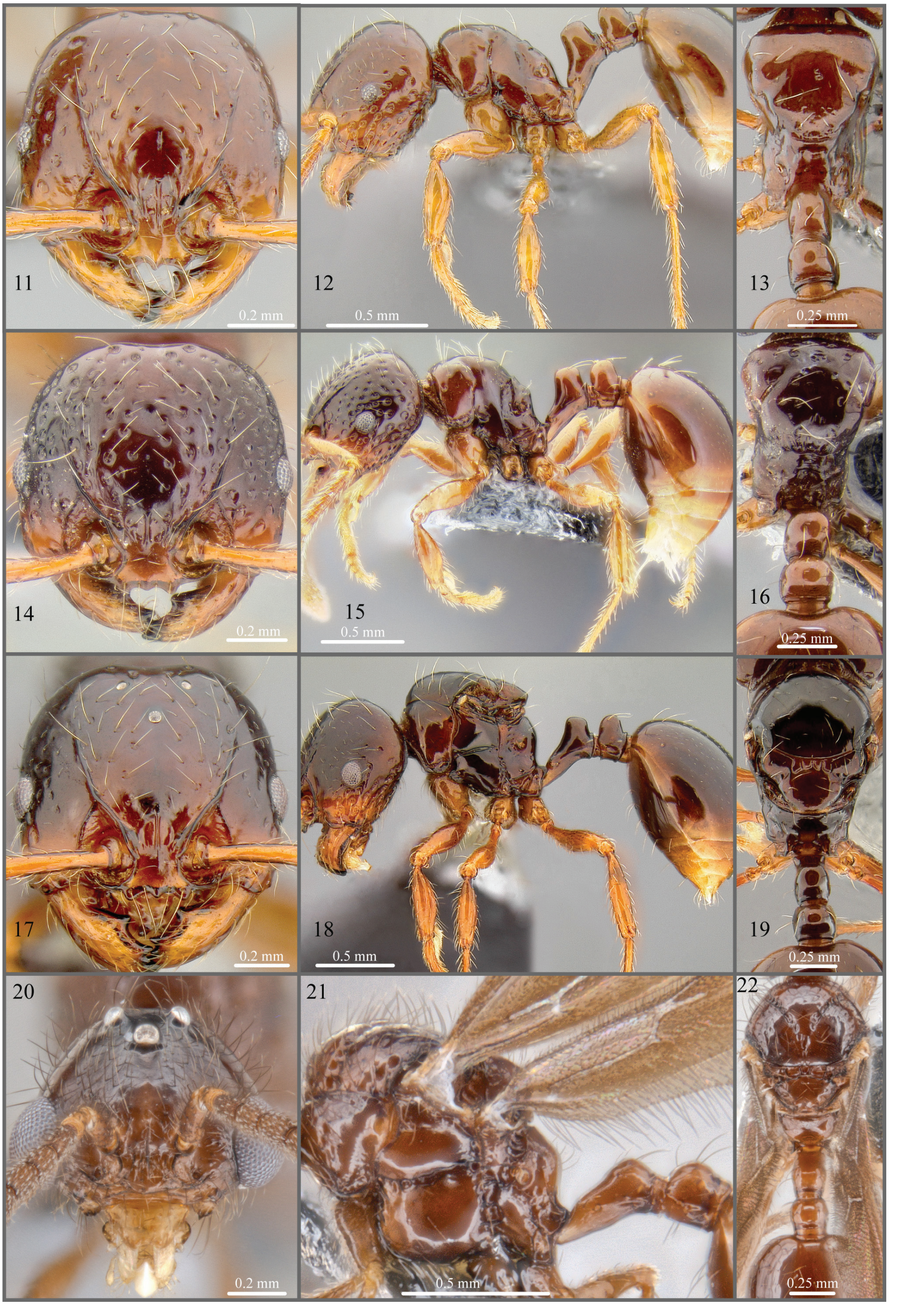
Figures 3–10. 3–4.Variation of the petiole and postpetiole observed among populations of *Pristomyrmex tsujii* (**3** Vanua Levu, **4** Koro) **5–6** Variation of the propodeum observed among populations of *Pristomyrmex tsujii* (**5** armed with denticles, **6** unarmed) **7–9** Variation of cephalic sculpture observed among populations of Fijian *Pristomyrmex*. *Pristomyrmex tsujii* tends towards abundant (**7**) to moderate (**8**) cephalic foveae, while *P. mandibularis* varies from abundant (**7**) to sparse (**9**). On Viti Levu, the cephalic sculpture of *P. mandibularis* varies along geographical gradients, whereas on Koro colonies exhibiting the two extremes of the sculpture spectrum occur sympatrically without any known intermediates **10** Taxonomic characters of the mandibles and anterior head capsule used in combination to separate *Pristomyrmex* species from all other Fijian myrmicines.

tion of occipital margin raised into a transverse carina from which short lengths of longitudinal carinae originate. Frontal carina weak, terminating before reaching the posterior level of the eye. Clypeus with a median longitudinal carina and 1–3 pair of lateral carinae extending towards the anterior margin. Anterior clypeal margin flat to weakly convex. Mesoscutum with distinct notauli forming a Y-shape. Parapsidal furrows reduced to weak impressions. Scuto-scutellar sulcus with 7–10 narrow longitudinal ridges visible in dorsal view. Propodeum unarmed to weakly tuberculate, lacking teeth or spines. Propodeal lobes obtusely triangular with a blunt or rounded apex; sometimes reduced to weak flanges. Middle and hind tibiae lacking spurs. Petiole in profile cuneiform; node with a convex posterior face but lacking a distinct anterior face. Peduncle long. Postpetiole in profile weakly nodiform with a steeply convex anterior face and shorter, more gently sloped posterior face. In dorsal view subrectangular and broader than long. Dorsum of head smooth and shining. Dorsal scutum weakly foveolate. Sides of mesosoma smooth and shining, occasionally with several short carinulae on metapleuron and propodeum. Petiole and postpetiole smooth and shining. Gaster unsculptured. All dorsal surfaces with abundant long hairs. Legs and scapes with numerous erect or suberect short hairs. Color reddish brown with lighter brown appendages. Wings infuscated.

Geographic variation. *Pristomyrmex tsujii* varies in the abundance of the cephalic foveae, propodeal armament and petiolar node shape. In Koro (the type locality) and Gau the specimens exhibit a sparse scattering of foveae and punctures usually separated from each other by a distance exceeding their diameters. None of the Koro specimens are armed even with denticles and the petiolar node is relatively broad in profile with a weakly convex posterior face. The series from Taveuni has sparse fovea and the worker from Vanua Levu has moderate foveae. Workers from both islands have an unarmed propodeum, like those from Koro, but the petiolar node is narrower in profile with a weakly concave posterior face. The postpetiolar nodes of workers from both Taveuni and Vanua Levu are taller than the petiolar node. The workers from Viti Levu are all more foveolate than those from the outlying islands. The strongest sculpture was found on a specimen from Waivudawa (CASENT0181827). The petiolar and postpetiolar shapes of Viti Levu workers are more similar to those of Koro workers than those of Taveuni and Vanua Levu. Some of the Viti Levu workers have an unarmed propodeum like those of the outlying islands, whereas others have a propodeum armed with an acute denticle equal or less than the size of the propodeal lobe.

Etymology. This new species is named for Prof. Kazuki Tsuji in honor of his extensive work on the social biology of *Pristomyrmex punctatus,* and his efforts to promote connectivity between the Japanese and international research communities. The species epithet is a noun in apposition and thus invariant.

Discussion. Despite being widely distributed across the Fijian archipelago, workers of *Pristomyrmex tsujii* were rarely encountered in the field, although males were collected in Malaise traps with some frequency. Workers were collected from Gau, Koro, Vanua Levu and Viti Levu. Of these, all were collected in leaf litter samples except for one found foraging on a fallen tree and another found foraging under a stone. Collection records suggest the species prefers primary rainforest, but several collections from secondary forests and forest fragments suggest it can tolerate some degree of disturbance. The strongly distended gasters of the ergatoid queens are presumably equipped with functional ovaries, but a more thorough examination of fresh material would be



Figures 11–22. 11–13 *Pristomyrmex tsujii* sp. n., holotype worker, specimen code CASENT0171144. **14–16** *Pristomyrmex tsujii* sp. n., ergatoid queen, specimen code CASENT0181693 **17–19** *Pristomyrmex tsujii* sp. n., paratype alate queen, specimen code CASENT0171143 **20–22** *Pristomyrmex tsujii* sp. n., male, specimen code CASENT0181883.

required to verify their reproductive potential. It is also unknown whether the ergatoid queens occur in the same nests as alate queens, or if they are capable of founding their own colonies.

Material examined. FIJI. Gau: Mt. Delaco, 3 km SE Navukailagi Village, 432m, -17.9795, 179.276 (CASENT0181697); Mt. Delaco, 3.3 km SE Navukailagi Village, 387m, -17.98, 179.275 (CASENT0181847, CASENT0181848, CASENT0181869, CASENT0181871, CASENT0181900, CASENT0181917, CASENT0181927, CASENT0181929, CASENT0181939, CASENT0181941, CASENT0181956, CASENT0181960, CASENT0181971, CASENT0181974, CASENT0181975, CASENT0181980, CASENT0181987, CASENT0181992, CASENT0182077); Mt. Delaco, 3.5 km SE Navukailagi Village, 490m, -17.9827, 179.276 (CASENT0181680); Mt. Delaco, 3.8 km SE Navukailagi Village, 496m, -17.9836, 179.277 (CASENT0181844, CASENT0181855, CASENT0181862, CASENT0181863, CASENT0181864, CASENT0181878, CASENT0181912, CASENT0181923, CASENT0181928, CASENT0181969, CASENT0181986, CASENT0181995); Mt. Delaco, 3.9 km SE Navukailagi Village, 575m, -17.9879, 179.278 (CASENT0181786); Mt. Delaco, 4.0 km SE Navukailagi Village, 564m, -17.9861, 179.277 (CASENT0181889, CASENT0181907, CASENT0181913, CASENT0181935, CASENT0181946, CASENT0181947, CASENT0181951, CASENT0181962, CASENT0181973, CASENT0181996). **Kadavu:** Mt. Washington summit, 1.6 km SW Lomaji, 800m, -19.1181, 177.988 (CASENT0182030); Mt. Washington, 1.3 km SSW Lomaji, 580m, -19.1175, 177.992 (CASENT0182000); Mt. Washington, 1.4km SSW Lomaji Village, 700m, -19.1183, 177.99 (CASENT0182060). **Koro:** 2.7 km NW Nasau Village, footrack b/w Mt. Kuitarua & Nasau, 465m, -17.2947, 179.406 (CASENT0171143, CASENT0171144); Mt. Kuitarua summit, 3.8 km NW Nasau Village, 505m, -17.2868, 179.404 (CASENT0182004, CASENT0182038); Mt. Kuitarua, 3.1 km WNW Nasau Village, 440m, -17.2905, 179.404 (CASENT0194546); Mt. Kuitarua, 3.8 km NW Nasau Village, 485m, -17.2888, 179.404 (CASENT0182037); Mt. Nabukala, 4.7 km WSW Nasau Village, 500m, -17.3122, 179.388 (CASENT0181717). **Lakeba:** 3.2 km NE Tubou Village, 100m, -18.2294, -178.779 (CASENT0182083). **Ovalau:** 1.2 km NNW Draiba Village, 300m, -17.6942, 178.825 (CASENT0181745). **Taveuni:** Devo Peak, 5.5 km SE Tavuki Village, 1188m, -16.8432, -179.966 (CASENT0181898, CASENT0181940); Devo Peak, 5.6 km SE Tavuki Village, 1187m, -16.8433, -179.96 (CASENT0181981); Mt. Devo, 5.3 km SE Tavuki Village, 1064m, -16.8409, -179.968 (CASENT0181865, CASENT0181885, CASENT0181961, CASENT0182007, CASENT0182009); Mt. Devo, Tavuki Village, 892m, -16.8372, -179.973 (CASENT0181915, CASENT0181919, CASENT0194570); Soqulu Estate, 140m, -16.8333, -180 (CASENT0182019). **Vanua Levu:** 1.5 km N Yasawa Village, 300m, -16.4681, 179.644 (CASENT0181708); Batiqere Range, 6 km NW Kilaka Village, 61m, -16.8108, 178.988 (CASENT0194551); Natewa Peninsula, Mt. Navatadoi, hilltop, 2.6 km SSE Vusasivo Village, 400m, -16.5928, 179.772 (CASENT0182031); Vatudiri, 4 km SE Lomaloma Village, 630m, -16.6296, 179.208 (CASENT0182005, CASENT0182022, CASENT0182028). **Viti Levu:** 1.8 km NW Naboutini Village, 300m, -18.2206, 177.817 (CASENT0181734); 2.3 km NW Nabukelevu Village, 300m, -18.11,

177.817 (CASENT0181655, CASENT0181747); 2.7 km NE Naikorokoro Village, 300m, -18.0872, 178.331 (CASENT0181679); 4.8 km NE Galoa Village, 300m, -18.2186, 178.014 (CASENT0181750); 7.5 km NE Vunisea Village, 300m, -17.4833, 178.143 (CASENT0181837); Mt. Evans Range, Koroyanitu Eco Park, 0.5 km N Abaca Village, 800m, -17.6667, 177.55 (CASENT0182006, CASENT0182046, CASENT0182121, CASENT0182128); Mt. Evans Range, Koroyanitu Eco Park, Kokabula Trail, 1 km E Abaca Village, 800m, -17.6667, 177.55 (CASENT0182001, CASENT0182117, CASENT0181894, CASENT0181936, CASENT0182017, CASENT0182024, CASENT0182059, CASENT0182071, CASENT0182075, CASENT0182079, CASENT0182089, CASENT0182123, CASENT0182146); Mt. Korobaba 1.0 km SW Lami Town, 200m, -18.0867, 178.379 (CASENT0181800); Mt. Korobaba near Lami Town, 300m, -18.0167, 178.35 (CASENT0181664, CASENT0181779, CASENT0194572); Mt. Korobaba, 4 km NW Lami Town, 260m, -18.1042, 178.381 (CASENT0182042); Mt. Korobaba, 4 km NW Lami Town, 400m, -18.1022, 178.383 (CASENT0181931); Mt. Nakobalevu, 4 km WSW Colo-i-Suva Village, 325m, -18.0558, 178.422 (CASENT0181950); Mt. Nakobalevu, 4 km WSW Colo-i-Suva Village, 372m, -18.0553, 178.424 (CASENT0181849, CASENT0181881, CASENT0181883, CASENT0181896, CASENT0181899, CASENT0181922, CASENT0181943, CASENT0181985, CASENT0182035, CASENT0182052, CASENT0182138); Mt. Nakobalevu, TV Tower, 5 km WSW Colo-i-Suva Village, 460m, -18.05, 178.417 (CASENT0181909, CASENT0181984, CASENT0182047, CASENT0182140); Mt. Tomanivi, 1.8 km E Navai Village, 700m, -17.6211, 177.998 (CASENT0182141); Mt. Tomanivi, 2 km E Navai Village, 700m, -17.6211, 178 (CASENT0182143); near Nabukavesi Village, 300m, -18.1167, 178.25 (CASENT0181669, CASENT0181693, CASENT0181777, CASENT0181785, CASENT0181791); Waivudawa Creek 6.0 km NNW Lami Town, 300m, -18.076, 178.363 (CASENT0181670, CASENT0181827); Waivudawa, 3.5 km N Veisari Settlement, 300m, -18.0681, 178.367 (CASENT0182013, CASENT0182074, CASENT0182139, CASENT0182002, CASENT0182020, CASENT0182036, CASENT0182126).

***Pristomyrmex mandibularis* Mann**
http://species-id.net/wiki/Pristomyrmex_mandibularis
Figs 23–35

Pristomyrmex mandibularis Mann 1921:444; worker described. Type locality: Fiji, Viti Levu, Nadarivatu, W.M. Mann [examined]. Wang 2003: 505, figs 225–228 (generic revision, ergatoid queen described). Sarnat and Economo 2012: 115, pl. 112 (key, discussion, checklist).

Diagnosis. Alate queen (Figs 29–31). *Measurements* (n = 10): TL 3.22–3.65, HW 0.80–0.86, HL 0.77–0.85, CI 99–106, SL 0.64–0.74, SI 79–88, EL 0.14–0.18, PW 0.61–0.67, ML 0.82–0.96, PeH 0.22–0.26, PeL 0.14–0.18, PeI 58–76, PpH 0.26–

0.29, PpL 0.16–0.19, PpI 59–69. *Measurements of aberrant specimen CASENT0194557*: TL 4.10, HW 1.01, HL 0.96, CI 105, SL 0.77, SI 77, EL 0.19, PW 0.76, ML 1.06, PeH 0.30, PeL 0.17, PeI 58, PpH 0.32, PpL 0.21, PpI 65.

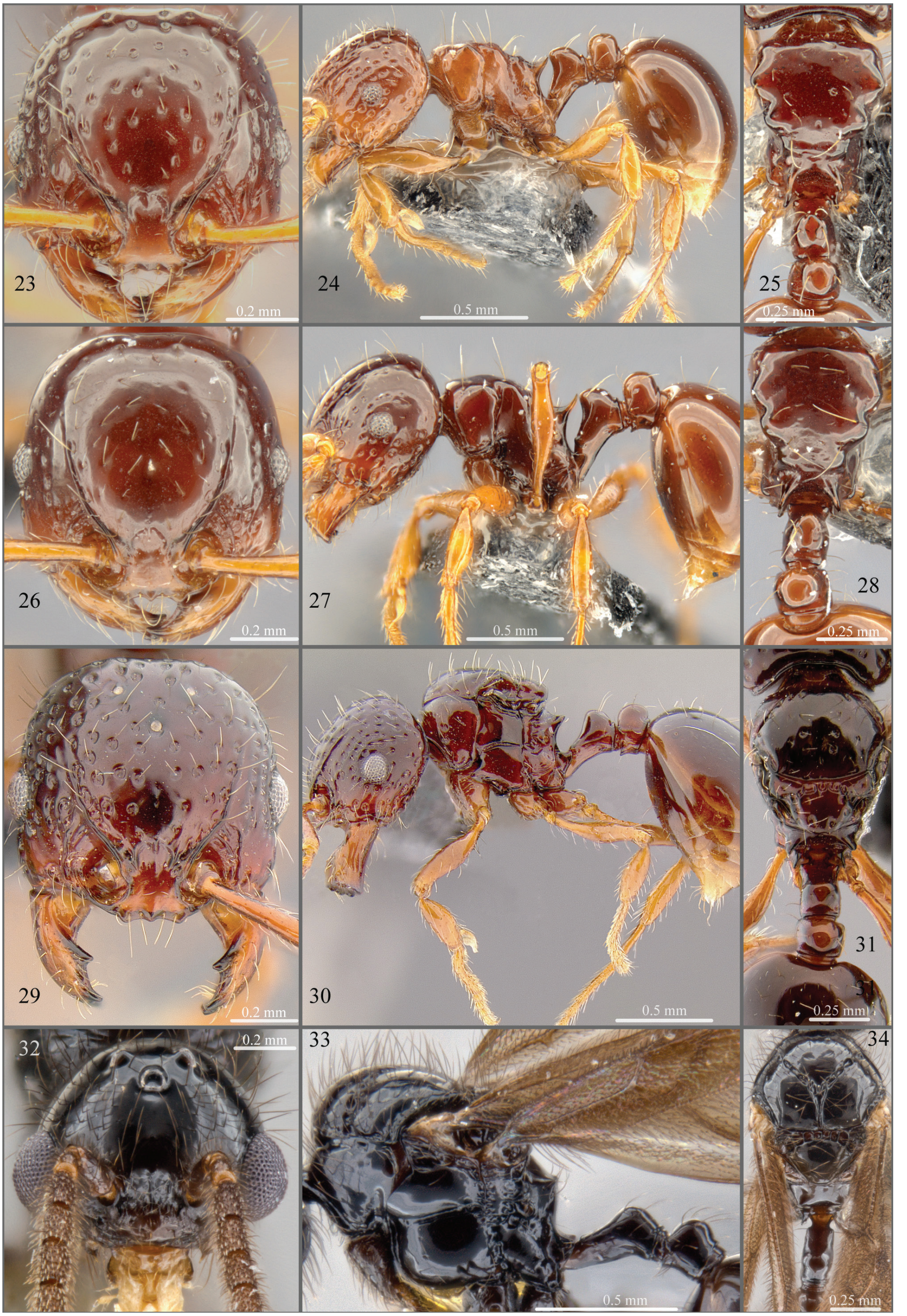
Conforming to the generic *Pristomyrmex* definition detailed in Wang (2003) with the following specifications. Closely resembling worker in the structure of the mandibles, clypeus, petiole, postpetiole and gaster in addition to sculpture, color and pilosity with the following differences. Distinctly larger. Eyes much larger with diameter composed of ca. 12 facets. Three ocelli present. Posterior head margin flat to weakly concave. Median clypeal tooth distinct to nearly absent. Mesosoma marked with wing sclerites and dorsal sutures. Propodeal spines significantly smaller than those of worker; present as large and broad distinct angles approximately equal in size to propodeal lobes. Dorsum of head entirely free of foveae to covered in abundant well-defined foveae. Dorsum of mesosoma with more than 10 pairs of erect hairs.

Male (Figs 32–34). *Measurements* (n = 21): TL 2.55–3.22, HW 0.51–0.61, HWE 0.63–0.75, HL 0.48–0.6, CI 97–113, SL 0.14–0.21, SI 26–34, EL 0.21–0.25, PW 0.53–0.73, ML 0.8–1.08, PeH 0.14–0.19, PeL 0.27–0.38, PeI 178–234, PpH 0.18–0.23, PpL 0.13–0.17, PpI 64–83.

Conforming to the generic *Pristomyrmex* definition detailed in Wang (2003) with the following specifications. Head, including the eyes, broader than long. Dorsal portion of occipital margin raised into a transverse carina from which no short lengths of longitudinal carinae originate. Frontal carina weak, terminating before reaching the posterior level of the eye. Clypeus with a median longitudinal carina and 1–3 pair of lateral carinae extending towards the anterior margin. Anterior clypeal margin flat to weakly convex. Mesoscutum with distinct notauli forming a Y-shape. Parapsidal furrows reduced to weak impressions. Scuto-scutellar sulcus with 7–10 narrow longitudinal ridges visible in dorsal view. Propodeum armed with a pair of strong tubercles or small teeth. Propodeal lobes obtusely triangular with a blunt or rounded apex; usually more developed than propodeal teeth. Middle and hind tibiae lacking spurs. Petiole in profile cuneiform with a weakly developed and broadly convex node. Peduncle long. Postpetiole in profile nodiform with a steeply convex anterior face and shorter, more gently sloped posterior face. In dorsal view subrectangular and broader than long. Entirely smooth and shiny. All dorsal surfaces with abundant long erect to suberect hairs. Legs and scapes with numerous erect or suberect short hairs. Color black to blackish brown with lighter brown appendages and gaster. Wings infuscated.

Geographic variation. Like the worker of the species, which is discussed in Wang (2003) and Sarnat and Economo (2012), the alate queens of *P. mandibularis* vary substantially in size, shape, color and sculpture across the archipelago. The Viti Levu specimens are marked by sparse foveae, a median clypeal tooth that is smaller than the lateral teeth but still distinct, and tend towards the redder end of the color spectrum. The Vanua Levu, Koro and Lakeba specimens are moderately foveolate with a smaller and more blunted median clypeal tooth.

Comments. A puzzling taxonomic situation is presented by two alate queens from Gau occupying the extreme ends of the sculpture spectrum. Specimen



Figures 23–34. 23–25 *Pristomyrmex mandibularis* Mann, worker, specimen code CASENT0181756. **26–28** *Pristomyrmex mandibularis* Mann, worker, specimen code CASENT0181648 **29–31** *Pristomyrmex mandibularis* Mann, alate queen, specimen code CASENT0171100 **32–34** *Pristomyrmex mandibularis* Mann, male, specimen code CASENT0182032.

CASENT0181910 lacks any distinct foveae on the head and mesosoma and is the least sculptured of the examined queens. Specimen CASENT0194557 is both exceptionally large (HW = 1.01 mm) and the mostly strongly sculptured of all examined Fijian *Pristomyrmex* queens, with well-defined foveae covering the head. The abundant pilosity on the head and mesosoma can be perhaps be explained by the greater number of piligerous foveae, but the length of the hairs is distinctly shorter than all other alate queens, including the aforementioned CASENT0181910 from Gau.

Specimen CASENT0194557 also has shorter antennal scapes relative to its head width than any other examined alate queens of *P. mandibularis* or *P. tsujii* (Fig. 36). The combination of gross morphological differences, morphometric disparity and sympatry of the two alate queens from Gau suggests that CASENT0194557 be assigned to a different species. We are reluctant however to describe a new species based on a single queen specimen. The aberrant measurements of CASENT0194557 are therefore reported separately from those collated from all other *P. mandibularis* alate queens.

Material examined. FIJI. Gau: Mt. Delaco, 3 km SE Navukailagi Village, 408m, -17.9796, 179.276 (CASENT0181652, CASENT0181752, CASENT0181761); Mt. Delaco, 3 km SE Navukailagi Village, 432m, -17.9795, 179.276 (CASENT0181751); Mt. Delaco, 3.3 km SE Navukailagi Village, 387m, -17.98, 179.275 (CASENT0182033, CASENT0182065, CASENT0182090, CASENT0182092, CASENT0182093, CASENT0182098, CASENT0194557); Mt. Delaco, 3.4 km SE Navukailagi Village, 475m, -17.9836, 179.277 (CASENT0181699); Mt. Delaco, 3.5 km SE Navukailagi Village, 490m, -17.9827, 179.276 (CASENT0181672); Mt. Delaco, 3.8 km SE Navukailagi Village, 496m, -17.9836, 179.277 (CASENT0181910, CASENT0182016, CASENT0182021, CASENT0182032, CASENT0182051, CASENT0182054, CASENT0182062, CASENT0182078, CASENT0182091); Mt. Delaco, 4.0 km SE Navukailagi Village, 564m, -17.9861, 179.277 (CASENT0182034); Mt. Delaco, 4.4 km SE Navukailagi Village, 625m, -17.9879, 179.278 (CASENT0181644); 2.5 km SE Navukailagi Village, 300m, -17.9714, 179.272 (CASENT0181816). **Kadavu:** Moanakaka Bird Sanctuary, 0.25km SW Soladamu Village, 60m, -19.0775, 178.121 (CASENT0181597);, CASENT0182044, CASENT0182049, CASENT0182053, CASENT0182055, CASENT0182085, CASENT0182087, CASENT0182094, CASENT0182096, CASENT0182097); Mt. Washington summit, 1.6 km SW Lomaji, 800m, -19.1181, 177.988 (CASENT0182025); Mt. Washington, 1.3 km SSW Lomaji, 580m, -19.1175, 177.992 (CASENT0182069); Mt. Washington, 1.4km SSW Lomaji Village, 700m, -19.1183, 177.99 (CASENT0181796); Mt. Washington, 1.4km SSW Lomaji Village, 760m, -19.1181, 177.988 (CASENT0181712). **Koro:** 1.6 km E Tavua Village, 220m, -17.2753, 179.374 (CASENT0181645, CASENT0181782, CASENT0181808, CASENT0181831); 2.1 km SW Nabuna Village, nr. Wailolo Creek, 115m, -17.2658, 179.37 (CASENT0171044, CASENT0171100, CASENT0181765, CASENT0194552, CASENT0194559, CASENT0194575); 2.7 km NW Nasau Village, footrack b/w Mt. Kuitarua & Nasau, 465m, -17.2947, 179.406 (CASENT0181654); 3.0 km WNW Nasau Village, footrack b/w Mt. Kuitarua & Nasau, 420m, -17.2903, 179.405 (CASENT0171142); Mt. Kuitarua summit, 3.8 km NW

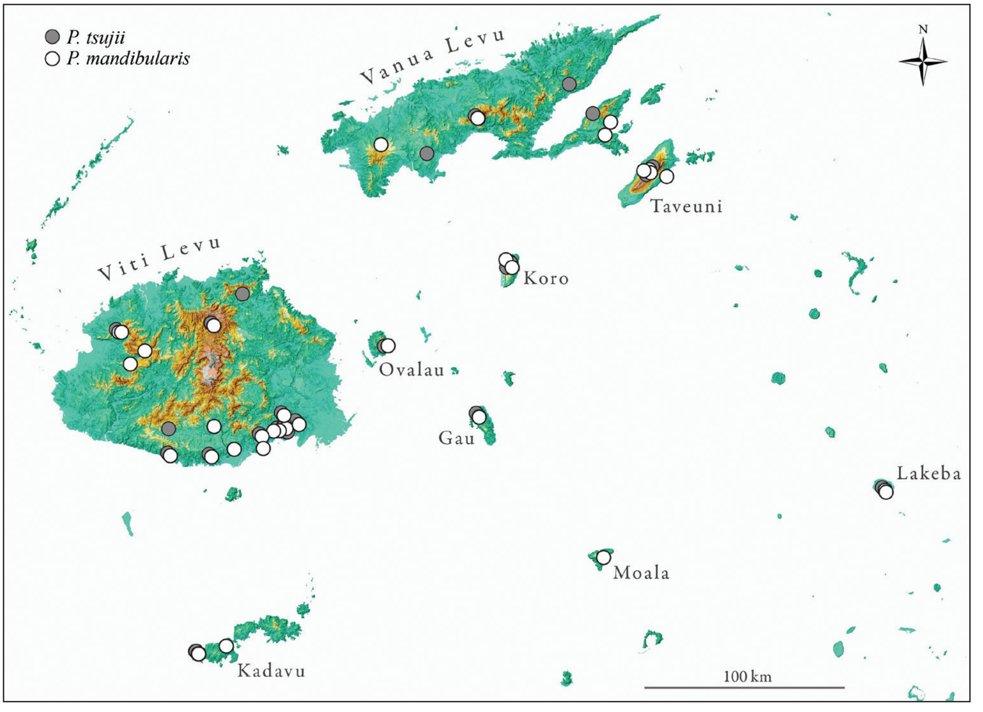


Figure 35. Known distribution of *P. tsujii* (white) *Pristomyrmex mandibularis* (gray) across the Fijian archipelago. Names are given for all islands on which specimens were collected. Symbols have been minimally offset from each other so as not to obscure localities where both species have been recorded.

Nasau Village, 500m, -17.2875, 179.402 (CASENT0182026, CASENT0182058, CASENT0182061, CASENT0182072, CASENT0182080); Mt. Kuitarua summit, 3.8 km NW Nasau Village, 505m, -17.2868, 179.404 (CASENT0182084, CASENT0182095); 2.0 km N Nasoqloa Village, 300m, -17.2722, 179.389 (CASENT0181716, CASENT0181718, CASENT0181769, CASENT0194562); Mt. Kuitarua, 4 km WNW Nasau Village, 380m, -17.3, 179.4 (CASENT0181688). **Lakeba:** 3.2 km NE Tubou Village, 100m, -18.2208, -178.784 (CASENT0182063, CASENT0194549, CASENT0182039, CASENT0182068, CASENT0182088). , CASENT0194569). **Moala:** Mt. Korolevu, 5.5 km SW of Naroi Village, 300m, -18.5948, 179.9 (CASENT0182307). **Ovalau:** (coordinates for Levuka), m, -17.68, 178.83 (CASENT0233996). **Taveuni:** Mt. Devo, 3.6 km SE Tavuki Village, 734m, -16.8306, -179.974 (CASENT0181668); Mt. Devo, 3.9 km SE Tavuki Village, 775m, -16.8328, -179.973 (CASENT0181813); Mt. Devo, 5.3 km SE Tavuki Village, 1064m, -16.8409, -179.968 (CASENT0182043); Mt. Koronibuabua, 3.2 km NW Lavena Village, 234m, -16.8547, -179.891 (CASENT0182023, CASENT0182086). Soqulu Estate, 140m, -16.8333, -180 (CASENT0182018). **Vanua Levu:** 2.0 km NW Nakanakana Village, 300m, -16.62, 179.833 (CASENT0181756); Lasema, m, -16.68, 179.81 (CASENT0233997); Mt. Vatudiri, 3 km NW Waisali Village, 570m,

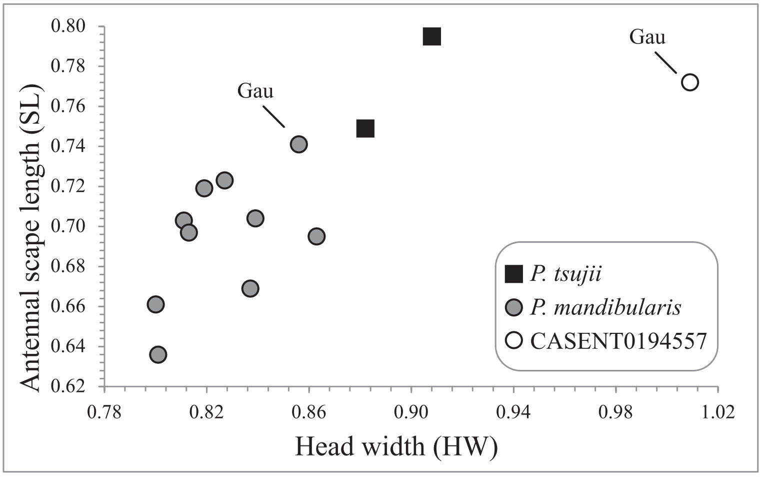


Figure 36. Antennal scape length (SL) *versus* head width (HW) for alate queens of *Pristomyrmex mandibularis* and *P. tsujii.* Circles represent *P. mandibularis*, squares represent *P. tsujii.* The white circles represent the aberrant specimen CASENT0194557 from Gau.

-16.629, 179.211 (CASENT0194550); Mt. Vatudiri, 3 km NW Waisali Village, 641m, -16.6285, 179.208 (CASENT0181637); Navotuvotu Range, Mt. Koroimari, logging road nr. Banikea Village, 398m, -16.7675, 178.757 (CASENT0182082); Vatudiri, 4 km SE Lomaloma Village, 630m, -16.6296, 179.208 (CASENT0182040, CASENT0182056, CASENT0182067, CASENT0182070, CASENT0182081). **Viti Levu:** 1.3 km SW Vaturu Dam, 530m, -17.7478, 177.677 (CASENT0182012); 1.5 km NE Colo-i-Suva Village, 340m, -18.0506, 178.417 (CASENT0181724, CASENT0181729, CASENT0194548); 1.8 km NW Naboutini Village, 300m, -18.2206, 177.817 (CASENT0181702); 2.7 km NE Naikorokoro Village, 300m, -18.0872, 178.331 (CASENT0181687, CASENT0181836, CASENT0194934); 4.8 km NE Galoa Village, 300m, -18.2186, 178.014 (CASENT0181659); Koroyanitu Eco Park 5.0 km NE Abaca Village, 700m, -17.6667, 177.553 (CASENT0181662, CASENT0181673, CASENT0181789, CASENT0181790); Mt. Evans Range, Koroyanitu Eco Park, 0.5 km N Abaca Village, 800m, -17.6667, 177.55 (CASENT0182014); Mt. Evans Range, Koroyanitu Eco Park, 1.8 km NE Abaca Village, 700m, -17.6667, 177.563 (CASENT0181773); Mt. Evans Range, Koroyanitu Eco Park, Kokabula Trail, 1 km E Abaca Village, 800m, -17.6667, 177.55 (CASENT0182011, CASENT0182045, CASENT0182147, CASENT0181870, CASENT0181989); Mt. Korobaba near Lami Town, 300m, -18.0167, 178.35 (CASENT0181648, CASENT0181740, CASENT0181807, CASENT0181811, CASENT0181829); Mt. Nakobalevu, 4 km WSW Colo-i-Suva Village, 372m, -18.0553, 178.424 (CASENT0181861); Mt. Rama 1.8 km NW Naikorokoro Settlement, 300m, -18.09, 178.304 (CASENT0181663, CASENT0181759); Mt. Tomanivi, 2 km E Navai Village, 700m, -17.6211, 178 (CASENT0182066); Nasoqo, m, -18.08, 178.02 (CASENT0233995); Nausori Highlands, 400m, -17.81, 177.61 (CASENT0234108); near Nabukavesi Village, 300m, -18.1167, 178.25 (CASENT0181397, CASENT0181778, CASENT0181801); Ocean Pacific Resort, 2 km SE Nabukavesi Village, 40m, -18.1708, 178.258 (CASENT0182064); Waivudawa Creek 6.0 km NNW Lami Town, 300m, -18.076, 178.363 (CASENT0181555); Waiyanitu, m, -18.18, 178.12 (CASENT0233994).

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A reclassification of the millipede superfamily Trichopolydesmoidea, with descriptions of two new species from the Aegean region (Diplopoda, Polydesmida)

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Abstract

Two new species are described from caves in several Greek islands in the Aegean Sea: *Galliocookia gracilis* **sp. n.**, a presumed troglobite from Rhodes, Dodecanese Islands, and *Sphaeroparia simplex* **sp. n.**, likely a troglophile from Kithnos, Cyclades, and Chios, Eastern Sporades. These genera are assigned to the family Trichopolydesmidae Verhoeff, 1910. Because *Sphaeroparia* Attems, 1909, an Afrotropical genus, nicely bridges the gap, both morphologically and geographically, between the Euro-Mediterranean Trichopolydesmidae and the much more diverse, pantropical Fuhrmannodesmidae Brölemann, 1916, the latter family is considered as a new junior subjective synonym of the former, **syn. n.** Thus expanded, the family Trichopolydesmidae is rediagnosed and its position within the superfamily Trichopolydesmoidea refined. Because the families Mastigonodesmidae Attems, 1914, Macrosternodesmidae Brölemann, 1916 and Nearctodesmidae Chamberlin & Hoffman, 1950 are also formally synonymized with Trichopolydesmidae, **syn. n.**, the Trichopolydesmoidea currently contains only two families, Trichopolydesmidae and Opisotretidae Hoffman, 1980.

Keywords

Diplopoda, Trichopolydesmidae, Fuhrmannodesmidae, taxonomy, new species, cave, Greece

Introduction

According to Shear (2011), the millipede superfamily Trichopolydesmoidea includes only three families: Fuhrmannodesmidae Brölemann, 1916, Macrosternodesmidae Brölemann, 1916 and Nearctodesmidae Chamberlin & Hoffman, 1958. Strangely enough, the nominotypical family Trichopolydesmidae Verhoeff, 1910 was omitted. More recently, Golovatch et al. (2013) have added therein not only the Trichopolydesmidae, but also the Opisotretidae Hoffman, 1980, the latter family previously (Simonsen 1990, Shear 2011) considered as representing a superfamily of its own, Opisotretoidea.

Prompted by the discovery of two new species of trichopolydesmoids in caves on three Aegean islands of Greece, this superfamily is reclassified. One of the genera appears to so nicely bridge the gap between the Euro-Mediterranean Trichopolydesmidae and the much more diverse, pantropical Fuhrmannodesmidae, that the latter family is formally synonymized here with the former.

Material and methods

The material treated below had been taken in 1987 by Petar Beron, of the National Museum of Natural History, Sofia, Bulgaria (NMNHS), in caves on a few Aegean islands of Greece and was offered to me for treatment in August 2013, when I visited the NMNHS in the framework of the Russian-Bulgarian interacademician exchange programme. Most of the type material will be returned to the NMNHS, with only two paratypes retained for the collection of the Zoological Museum, State University of Moscow, Russia (ZMUM).

Descriptions

Galliocookia gracilis **sp. n.**
http://zoobank.org/97419B2E-E237-4A96-A507-2A9FBF4ACFC0
http://species-id.net/wiki/Galliocookia_gracilis
Figs 1–6

Type material. Holotype ♂ (NMNHS), Greece, Rhodes Island, village Archangelos, Cave Coumellos, 02.05.1987, leg. P. Beron.

Paratypes: 1 ♂, 1 ♀, 1 ♂ subadult (NMNHS), same locality, together with holotype.

Diagnosis. Differs from the other species of *Galliocookia* Ribaut, 1955, all three from caves in southern France (Mauriès 1983), by the somewhat larger size (8-9 mm versus maximum 6.7 mm in ♀ *G. balazuci* Mauriès, 1983, 7.5 mm in ♀ *G. fagei* Ribaut, 1955 or 7.7 mm in ♀ *G. leclerci* Mauriès, 1983), the presence of a distodorsal field of sensilla also in antennomere 5, of porosteles, the peculiarly upturned pre-apical

Figures 1, 2. Habitus of *Galliocookia gracilis* sp. n., holotype, lateral and dorsal views, respectively. Photos by K. Makarov, not taken to scale.

teeth flanking the epiproct, as well as a trifid, not bifid, tip of the gonopod (with a small stump proximal to the solenomere).

Name. To emphasize the highly gracile looks of this species.

Description. Length of adults ca 8.0 (♂) or 9.0 mm (♀), width of midbody pro- and metazona 0.8 and 0.9 mm (♂, ♀), respectively. Coloration in alcohol uniformly pallid to, in front body quarter, light yellowish (Figs 1, 2).

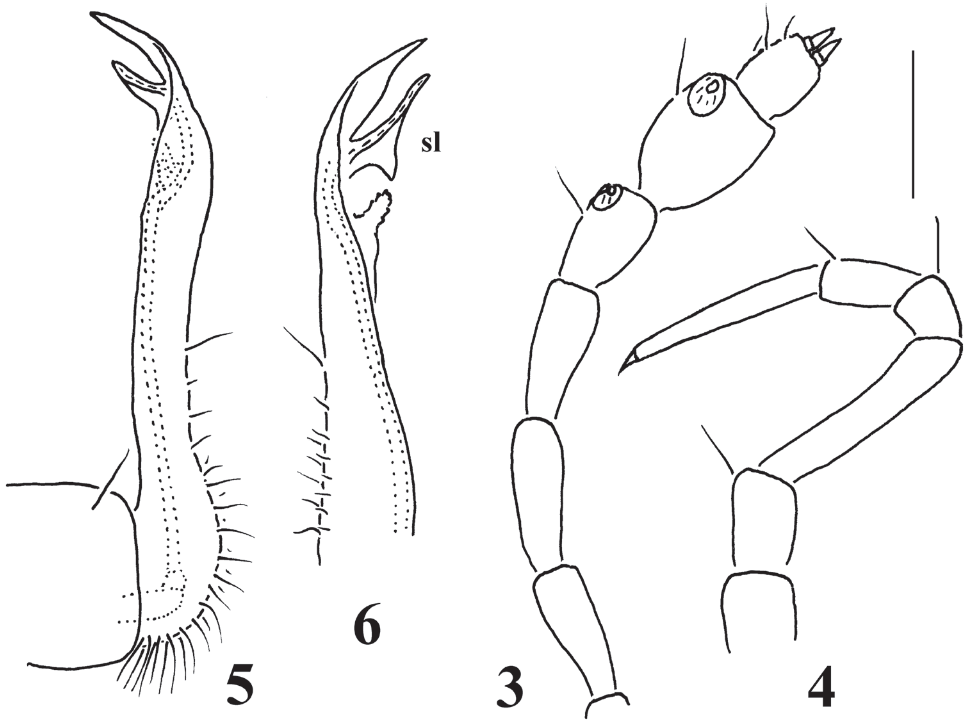
Body with 19 (♂) or 20 (♀) segments, strongly moniliform. Tegument smooth, mainly slightly shining, texture very delicately alveolate. Head densely pilose throughout; ♂ epicranial modifications absent, frons being regularly convex in both sexes. Antennae long and slender, reaching behind segment 2 when stretched dorsally (♂, ♀); antennomeres 2-4 and 6 subequal in length, but 6th clearly the highest (height being measured from ventral to dorsal margin) (Figs 1, 3); antennomeres 5 and 6 each with a distinct, round, distodorsal, compact field of sensilla.

In width, head = segments 6-18(19) > 5 > 4 > 2 = 3 > collum; body suddenly tapering on telson. Collum ellipsoid, acutangular caudolaterally, like most of following metaterga with three transverse, rather regular rows of setae until segment 15 or 16, following metaterga with 3-4 less regular rows in front of a 4th or 5th regular row at caudal margin. Tergal setae very short, simple, sharp, only about 1/5-1/6 the length of a metatergum, a little longer only on collum and penultimate segment, mostly 3+3 in each row, but gradually growing to about 4+4 or 5+5 per row towards telson. A very faint transverse sulcus in caudal 1/3 of metaterga in front of caudal row of setae. Dorsum invariably convex. Paraterga poorly developed, especially so in ♀, visible starting from collum, invariably slightly declivous, set rather high (mainly at about upper quarter or third of midbody height in ♂ and ♀, respectively), slightly, but regularly rounded laterally; lateral margin of postcollum paraterga clearly serrate, with 6-7 subequal, often setigerous indentations in front of a somewhat (♀) or much (♂) larger, isolated, sometimes nearly pointed tubercle, this in pore-bearing segments turning into a conspicuous porostele (Figs 1, 2). This caudal tubercle or porostele of paraterga drawn caudolaterad, but never extending behind rear tergal margin. Pore formula normal: 5, 7, 9, 10, 12, 13, 15-18(19), ozopores round, dorsal, quite evident due to their porosteles. Stricture between pro- and metazona wide, shallow and smooth. Limbus very finely microspiculate. Epiproct conical, rather long, but barely extending behind 2+2 conspicuous, pre-apical teeth, caudalmost of which unusually strong and upturned (Figs 1, 2). Hypoproct trapeziform.

Sterna clearly separated, unmodified. Legs rather long and slender, without modified setae, ca 1.3–1.4 (♂) or 1.1–1.2 (♀) times as long as midbody height, femora and tarsi longest, claw short (Fig. 4). Epigynal ridge very low, inconspicuous.

Gonopod aperture transversely oblong-oval, taking up most of ventral part of metazonite 7. Gonopods (Figs 5, 6) with small, subglobose, evidently exposed, medially fused coxae, each carrying only 1 long seta distolaterally and a long, curved cannula distomesally; a scaly texture on lateral face absent. Telopodite suberect, slender and long, up to about its half being taken up by an elongate, setose prefemoral part; acropodite slightly helicoid, its apical lobe subacuminate, with a pre-apical, lobe-shaped, subtriangular solenomere (**sl**) and a short, papillate, rounded stump a little proximally. Both prefemoral part and acropodite strictly coaxial, in situ directed forward and parallel to each other. No traces of accessory seminal chamber or hairy pulvillus.

Remarks. Among the Euro-Mediterranean genera of Trichopolydesmoidea, only some show a deeply bipartite and strongly curved gonopod telopodite, the prefemoral part of which is quite elongate, but lies more or less transversely to strongly angular, largely (sub)parallel telopodites and extends across the nearly entire ventral width of segment 7. Such are *Trichopolydesmus* Verhoeff, 1898 (together with *Banatodesmus* Tabacaru, 1980), *Bacillidesmus* Attems, 1898, *Napocodesmus* Ceuca, 1974 and *Caucasodesmus* Golovatch, 1985. In contrast, the gonotelopodites in *Verhoeffodesmus* Strasser, 1959, *Cottodesmus* Verhoeff, 1936 and *Occitanocookia* Mauriès, 1980 have increasingly shortened prefemoral parts, being enlarged and laterally flattened distad, unipartite and mostly less strongly curved, in *Cottodesmus* and *Occitanocookia* also devoid of a solenomere, but sometimes supplied instead with what can be seen as a primordial accessory seminal chamber. In *Trichopolydesmus, Heterocookia* Silvestri, 1898, *Ingurtidorgius* Strasser, 1974 and, especially,



Figures 3–6. *Galliocookia gracilis* sp. n., holotype **3** antenna, lateral view **4** leg 9, **5, 6** right and left gonopods, lateral and sublateral views, respectively. Scale bars: **3, 4** 0.2 mm; **5, 6** 0.4 mm.

Mastigonodesmus Silvestri, 1898, the solenomere is flagelliform, branching off near the base of the femorite. In all these genera, the gonotelopodites are strongly exposed, not sunken inside an obvious central coxal cavity (= gonocoel). A modest gonocoel seems to only be observed in *Ingurtidorgius* and *Haplocookia* Brölemann, 1915. This latter genus does resemble *Galliocookia*, but its gonopod telopodite is clearly curved, there is a small gonocoel and both sexes have 20 body segments (see also review by Mauriès 1983).

The new species definitely belongs to *Galliocookia*, sharing with the other three congeners (see Diagnosis above) a small coxa and a slender, simple and suberect telopodite, the latter showing an extended prefemoral part strictly coaxial with the acropodite. Moreover, the solenomere is likewise modest, lobe-shaped and located distally. Even the presence of 19 or 20 body segments in the male and female, respectively, as well as of a normal ozopore formula, setose metaterga and laterally serrate/indentate paraterga coincide.

Biogeographically, the discovery of a *Galliocookia* in the Aegean region, so far away from France, is remarkable, emphasizing a pan-Mediterranean distribution pattern of this currently purely cavernicolous, likely troglobitic genus.

***Sphaeroparia simplex* sp. n.**
http://zoobank.org/795A5831-ADEA-49EC-977F-AAE9878037B2
http://species-id.net/wiki/Sphaeroparia_simplex
Figs 7–17

Type material. Holotype ♂ (NMNHS), Greece, Kithnos Island, village Dryopis near Phirès, Cave Katafyki, 08.05.1987, leg. P. Beron.

Paratypes: 1 ♂, 4 ♀♀, 1 ♂ subadult (19 body segments), 2 fragments (NMNHS) + 1 ♂, 1 ♀ (ZMUM), same locality, together with holotype; 1 ♂, 1 ♀, 1 ♀ fragment (head and first 12 body segments) (NMNHS), Greece, Chios Island, village Haghios Galos (Agiongalas, Haghia Gala), 65 km from town of Chios, Cave Hagiogalousaina, 12.05.1987, leg. P. Beron.

Diagnosis. Differs from the other 30+ species of *Sphaeroparia* Attems, 1909, many of which have been reviewed by Mauriès and Heymer (1996), by 20 body segments in both sexes and the presence of an axial sternal process on the especially simple gonopods, including a nearly fully suppressed solenomere.

Name. To emphasize the highly simple gonopods in this species.

Description. Length of adults ca 5.0–5.5 (♂) or 6.0–7.0 mm (♀), width of midbody pro- and metazona 0.55 and 0.7 mm (♂, ♀), respectively. Coloration in alcohol uniformly pallid to light yellowish (Figs 7–10).

Body with 20 segments in both sexes. Tegument generally smooth, dull, texture very delicately alveolate. Head densely pilose throughout; ♂ epicranial modifications absent, frons being regularly convex in both sexes. Antennae rather short and clavate, nearly reaching end of segment 2 (♂) or collum (♀) when stretched dorsally; antennomeres 2, 3, 5 and 6 subequal in length, but both 5th and 6th clearly the highest (height being measured from ventral to dorsal side) (Figs 11, 15); antennomeres 4-6 each with a loose, indistinct, distodorsal group of increasingly long and numerous sensilla.

In width, head = segments 6-16(17) > 5 > 4 > 2 = 3 > collum; starting from segment 17, body gradually tapering towards telson. Collum ellipsoid, lobuliform caudolaterally, like most of following metaterga with 3 transverse, rather regular rows of 3+3 setae on minute knobs until segment 16, of 4+4 setae in segments 17(18)-19. Tergal setae medium-sized, slender, bacilliform, mostly about 1/4 the length of a metatergum, a little longer only on collum and penultimate segment. Usually a very faint transverse sulcus between first 2 rows of setae. Dorsum invariably convex. Paraterga poorly developed, especially so in ♀, visible starting from collum, invariably slightly declivous, set rather high (mainly at about upper third of midbody height in both sexes), slightly, but regularly rounded laterally; lateral margin of postcollum paraterga very poorly indentate, on each side usually with 3 subequal setigerous indentations in front of a rounded caudolateral lobule, the latter increasingly well drawn caudad, but never extending behind rear tergal margin (Figs 7–10). Pore formula normal: 5, 7, 9, 10, 12, 13, 15-18(19), ozopores round, dorsal, rather indistinct, lying at base of caudolateral lobule near lateral margin. Stricture between pro- and metazona wide, shallow and smooth. Limbus very finely microspiculate. Epiproct conical, rather long. Hypoproct trapeziform.

Figures 7–8. Habitus of *Sphaeroparia simplex* sp. n., holotype, dorsal and lateral views, respectively. Photos by K. Makarov, not taken to scale.

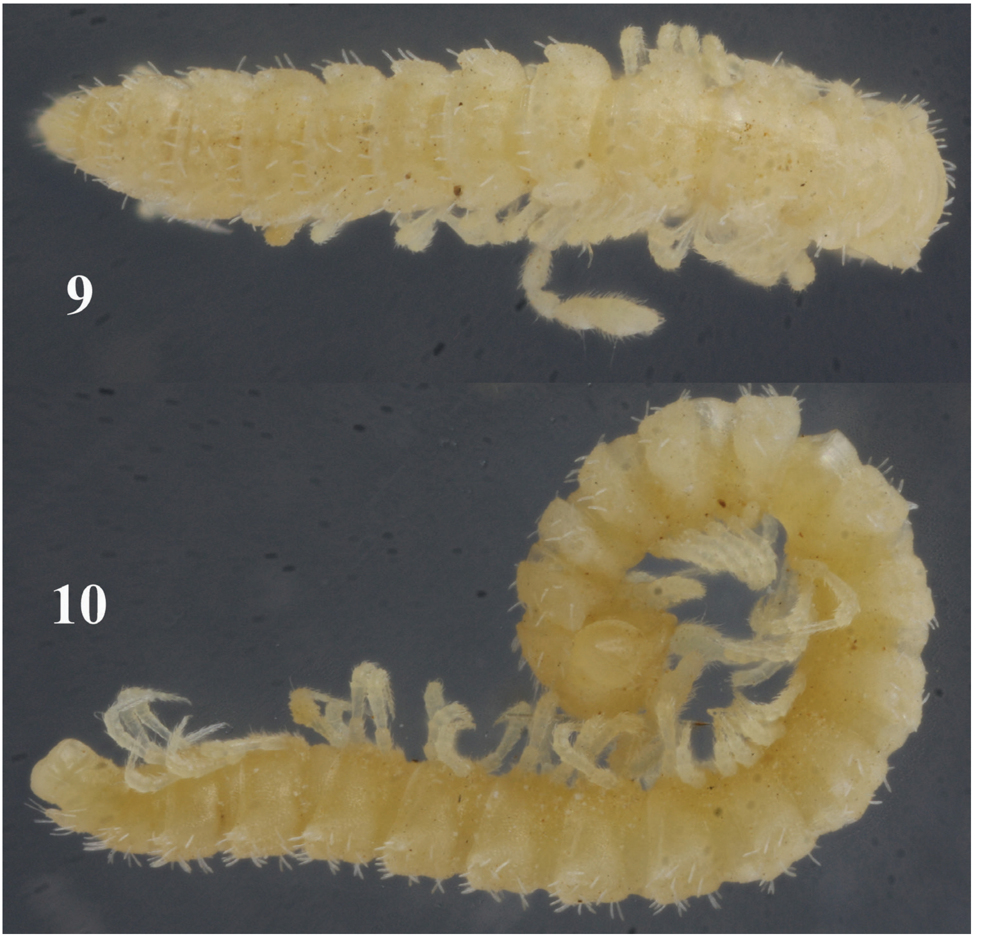
Sterna clearly separated, unmodified. Legs rather long and slender (Figs 8, 10, 12, 16), without modified setae, ca 1.2–1.3 (♂) or 1.0–1.1 (♀) times as long as midbody height, tarsi longest, claw short. Epigynal ridge very low, inconspicuous.

Gonopod aperture evident, transversely oblong-oval, taking up most of ventral part of metazonite 7. Gonopods (Figs 12–14, 17) with large, transversely subglobose, evidently exposed, medially fused, medially clearly excavate coxites, each microgranular/scaly and micropilose laterally, carrying only 1 long seta distofrontally and a long, curved cannula distomesally; sternum plate-like, with a slender, central, not too strongly chitinized process (**k**) between coxites. Telopodites short, stout, subglobose, sac-shaped, very simple, only moderately exposed below coxites, deeply sunken inside a prominent gonocoel; prefemoral part as usual, setose, quite elongate, about as long as, but clearly set at an angle to, acropodite, the latter with a distinct seminal groove running entirely on mesal side and terminating on a vestigial lobuliform solenomere (**sl**) at base of a rather strong, only faintly curved, apical spine (**d**). Neither an accessory seminal chamber nor a hairy pulvillus.

Remarks. This species seems to be only a troglophile, which occurs in caves on two remote islands in the Aegean Sea. On the other hand, Cave Katafyki is known to support at least two presumed troglobites, i.e. the woodlouse *Cordioniscus kithnosi* Andreev, 1986 (Isopoda, Oniscidea, Styloniscidae) (Schmalfuss 2003) and the millipede *Syrioiulus andreevi* Mauriès, 1984 (Diplopoda, Julida, Julidae) (Mauriès 1984), while Cave Hagiogalousaina hosts the presumed troglobitic false-scorpion *Chthonius chius* Schawaller, 1990 (Pseudoscorpiones, Chthoniidae) (Harvey 2008) and the millipede *Hyleoglomeris subreducta* Golovatch, 2013 (Diplopoda, Glomerida, Glomeridae) (Golovatch in press).

The discovery of a *Sphaeroparia* in the Aegean region is even more remarkable than that of a *Galliocookia*. Indeed, *Sphaeroparia* is a rather large genus hitherto believed to be strictly Afrotropical, ranging from Liberia and Benin in western Africa, through Gabon and Zaire, to Kenya and Tanzania in eastern Africa (see review by Mauriès and Heymer 1996). Furthermore, it has been assigned to the large pantropical family Fuhrmannodesmidae (Hoffman 1980, Mauriès and Heymer 1996), as opposed to the Holarctic Macrosternodesmidae, the Nearctic Nearctodesmidae (often referred to as only a subfamily of Macrosternodesmidae), and the Euro-Mediterranean Trichopolydesmidae. The Fuhrmannodesmidae has long been considered as an artificial, composite group (e.g. Hoffman 1980, Mauriès and Heymer 1996, Golovatch et al. 2013), being distinguished from the above allies solely by its being tropical.

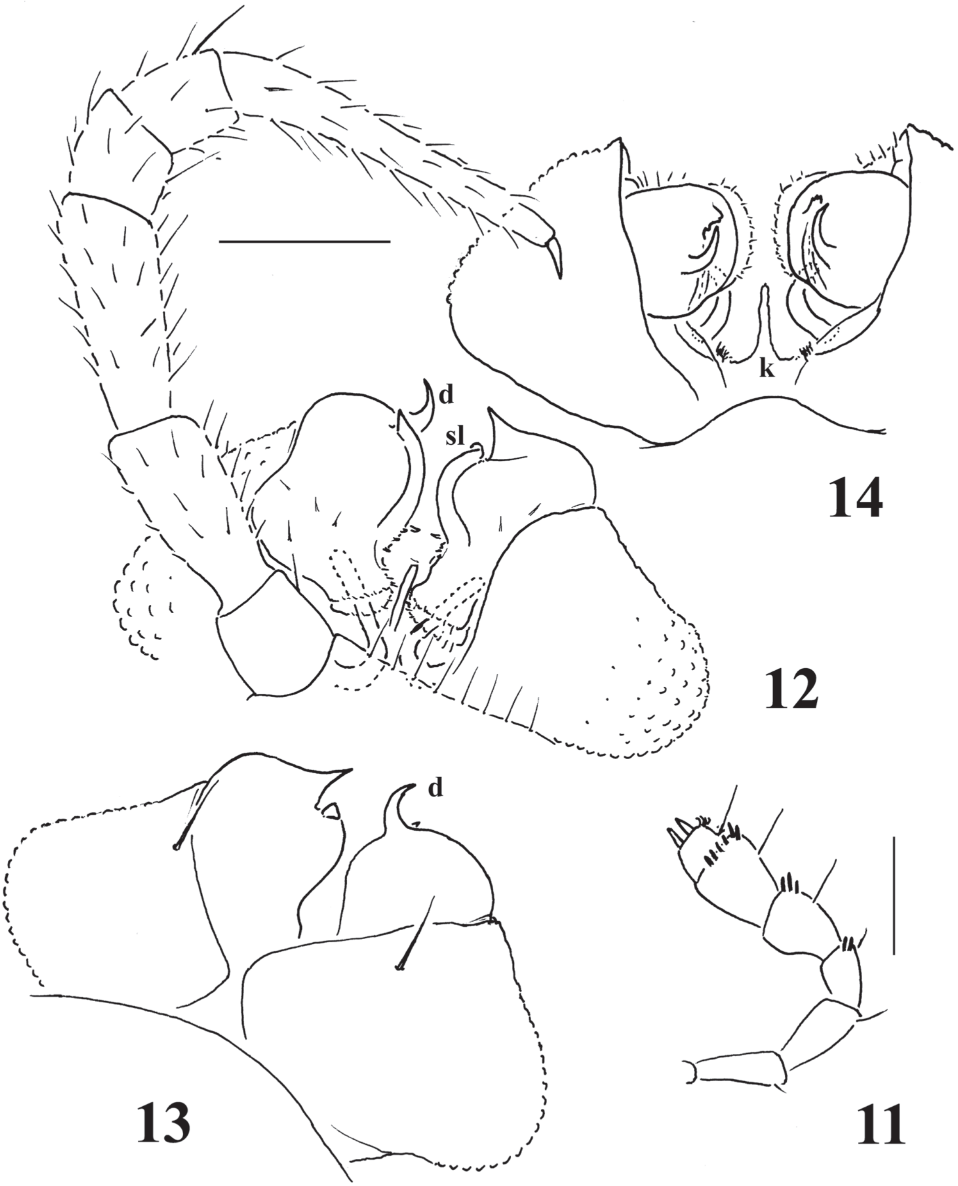
Golovatch (1994) provided an evolutionary scenario for the genera of Fuhrmannodesmidae known from South America, accepting as the basalmost those genera showing rather small, subglobose gonopod coxae that form no significant gonocoel in which to hinge the largely exposed, usually rather simple and elongate telopodites. Moreover, as in some true Trichopolydesmidae (see above), the prefemoral (= setose) part of the gonopod is mostly orientated transversely to the body axis, extending mesally across the entire width of the coxae. Following a series of transitional states, such forms ultimately culminate in having the gonopod coxae strongly enlarged, forming a large gonocoel in which to conceal the clearly shortened, usually highly complex



Figures 9, 10. Habitus of *Sphaeroparia simplex* sp. n., ♂ paratype from Kithnos, dorsal and lateral views, respectively. Photos by K. Makarov, not taken to scale.

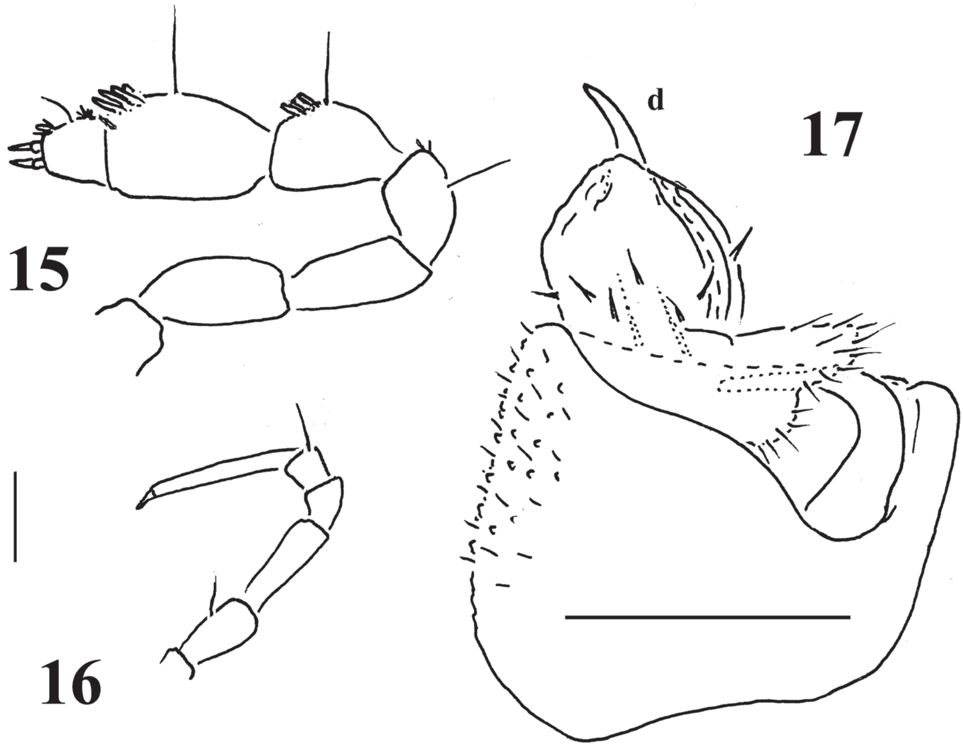
and deeply sunken telopodites. Their prefemoral parts already tend to be positioned increasingly parallel to the body's main axis, thus providing a transition between the usually small-sized Trichopolydesmoidea (= so-called "micropolydesmoids") to the normally medium- to large-sized Polydesmoidea (= so-called "macropolydesmoids").

Naturally, similar general trends can be surmised to have occurred in the fuhrmannodesmids of Central America and the Afrotropical and Oriental realms, which also support fairly diverse faunas of this family. Remarkably, none of the genera of Trichopolydesmidae (see above), all confined to Europe and the Mediterranean, though demonstrating a certain degree of variation in the length and orientation of the gonopod prefemoral part, has a deep gonocoel. Furthermore, *Galliocookia* as one of the few genera where the gonocoxae are particularly small while the prefemoral part is still elongate, but already strictly coaxial with a very strongly exposed acropodite represents an evolutionary extreme, apparently the basalmost situation.



Figures 11–14. *Sphaeroparia simplex* sp. n., holotype (**12, 13**) and ♂ paratype (**11, 14**) from Kithnos **11** antenna, lateral view **12** leg 9 and both gonopods, caudal view **13, 14** both gonopods, oral and ventral views, respectively. Scale bars: **11** 0.2 mm; **12–14** 0.1 mm.

The discovery of a *Sphaeroparia* in the eastern Mediterranean, of an Afrotropical genus demonstrating a very large and deep gonocoel for the small and only poorly exposed telopodites to be hinged into, clearly represents the opposite, evolution-



Figures 15–17. *Sphaeroparia simplex* sp. n., ♂ paratype from Chios **15** antenna, lateral view **16** midbody leg **17** left gonopod, mesal view. Scale bars: 0.1 mm.

arily obviously the most advanced extreme. Therefore, the Euro-Mediterranean Trichopolydesmoidea appear to show basically the same full range of evolutionary trends in the development of gonopod structures as do at least the properly assessed South American representatives now assigned to Fuhrmannodesmidae! Among the Afrotropical Trichopolydesmoidea, *Sphaeroparia* is certainly the most speciose genus and Mauriès and Heymer (1996) divide it into as many as six subgenera, most of which they themselves admit to be ill-grounded. A *Sphaeroparia* species is likely to be present also in the Seychelles (Golovatch and Gerlach 2010). In contrast to the Euro-Mediterranean region, the Afrotropical realm is thus dominated by trichopolydesmoids showing a deep gonocoel between strongly hypertrophied gonopod coxae. Only *Peronorchus parvicollis* Attems, 1907, the type and still sole species of *Peronorchus* Attems, 1907, shows a far more basal gonopod structure quite comparable to that of *Trichopolydesmus*. That species was originally described from near Buitenzorg (= Bogor), Java, Indonesia, and it has since been redescribed from material from Mauritius, Indian Ocean and formally assigned to the family Trichopolydesmidae (Mauriès and Geoffroy 1999). However, *Peronorchus* has recently been transferred to Fuhrmannodesmidae (Golovatch et al. 2013).

Considering the above new evidence, I no longer hesitate to formally synonymize the family Fuhrmannodesmidae Brölemann, 1916 under Trichopolydesmidae Verhoeff, 1910, **syn. n.**

A reclassification

The following refined classification and diagnosis of the superfamily Trichopolydesmoidea, as well as of its two constituent families can be proposed (see also Golovatch 2011, Golovatch et al. 2013).

Superfamily Trichopolydesmoidea Verhoeff, 1910

Diagnosis. Body largely polydesmoid, only 2–16 mm long, exceptionally up to 30 mm, usually ≤ 10 mm long, with 18–20 segments. Antennomeres 2-6 usually subequal in length, but 6th normally highest; 5th often, 6th only exceptionally, devoid of an apicodorsal field of sensilla. ♂ head sometimes with vertigial modifications (humps, fossae etc.). Paraterga at most with only thin calluses, often devoid of these, lateral margin entire, only exceptionally lobulate (*Trilobodesmus* Golovatch & Mauriès, 2007), typically at least faintly incised and setigerous; metaterga devoid of a cerategument, more often with 3-4, more or less regular, transverse rows of low, polygonal or rounded, setigerous bosses, but rather usually these latter either obliterated or pronounced and more numerous. Ozopores flush, opening on dorsal surface of paraterga to be located at their lateral margin, pore formula normal. Sphaerotrichomes rather often present, usually affecting both tibiae and tarsi.

Gonopod aperture large, transversely ovoid, not extending onto prozonite, but sometimes spreading caudad between coxae 9; gonocoxae subglobose, sometimes with a distolateral projection; prefemoral parts usually lying transversely to main body axis and, together with coxae, taking up most of ventral extent of ♂ ring 7, quite often with an obvious gonocoel formed by enlarged coxae; cannula and seminal groove nearly always present, both absent only exceptionally; entire telopodites or, more usually, acropodites distal to prefemoral parts usually complex, parallel to main body axis and directed forward, but often either crossing each other or, more rarely, directed more or less laterad, dorsolaterad or, exceptionally, even caudad, also exceptionally perforating lateral walls of coxites. A solenomere, an exomere and/or an endomere often present, sometimes these being prominent. An accessory seminal chamber and/or a hairy pulvillus at its orifice only seldom developed, mostly tend to be absent.

Distribution. All continents except Australia, mostly a Northern Hemisphere group only marginally represented in the Southern Hemisphere (Indonesia + New Guinea and Melanesia, Afrotropical realm north of Malawi and Madagascar, Neotropical realm north of Bolivia, Paraguay and southern Brazil), apparently fully allopatric with the superfamily Dalodesmoidea.

Family Trichopolydesmidae Verhoeff, 1910
http://species-id.net/wiki/Trichopolydesmidae

Diagnosis. Body polydesmoid, only exceptionally paraterga deeply lobulate laterally. Sphaerotrichomes only rarely present. Antennomere 5 sometimes devoid of sensilla distodorsally. Sphaerotrichomes only sometimes present.

Gonopod aperture large, transversely oval, with exposed to deeply sunken gonocoxae. Gonocoxae subglobose, usually with normal, tube-shaped cannulae, from small to rather large while telopodites from strongly exposed to concealed inside a considerable central gonocoel; prefemoral portion tends to be orientated transversely to main body axis, only occasionally somewhat to clearly shortened and thus resembling the condition observed in Polydesmoidea; acropodite tri-, bi- or uniramous, usually directed cephalad or cephalomesad; solenomere mostly evident, simple, only seldom a short tooth, more often long, distal in location, either stout or slender/flagelliform. Normally neither an accessory seminal chamber nor a hairy pulvillus, only exceptionally with a primordial accessory seminal chamber. *Caucasodesmus* Golovatch, 1985 (Caucasus and Crimea) is aberrant in having no sensilla on antennomeres 5 and no cannulae or seminal grooves.

Type genus: *Trichopolydesmus* Verhoeff, 1898.

Remarks. The family Mastigonodesmidae Attems, 1914, based on *Mastigonodesmus* Silvestri, 1898 (ca 8 eight species in the western Mediterranean), is sometimes regarded as a synonym of Polydesmidae Leach, 1815 (Hoffman 1980, Simonsen 1990), apparently because the gonopod prefemoral part is shortened, but, due to globose gonocoxae and a peculiar, parabasal, long and coiled solenomere, it seems to be far more similar to that in trichopolydesmoids. The Mastigonodesmidae seems to also contain the monobasic genus *Ingurtidorgius*, which is sometimes treated as a subfamily of its own, because its male shows a peculiar hook on the mentum and totally suppressed lamellae linguales, coupled with a non-coiled, but flagelliform solenomere. Since the latter character is shared with *Trichopolydesmus*, contrary to some recent opinions (Mauriès 1983, Golovatch 2011), it seems best to also merge Mastigonodesmidae with Trichopolydesmidae, syn. n.

The same applies to the family Macrosternodesmidae, which basically fails to differ from Trichopolydesmidae, but simply tends to encompass quite a few genera with small to medium-sized, invariably globose gonocoxae and strongly exposed, often complex telopodites. Since the purely Nearctic nominate family Nearctodesmidae shares the gonopod conformation with Macrosternodesmidae, and it has sometimes been treated as only a subfamily or even a possible synonym of the latter family, I am inclined to treat these two latter families as synonyms of Trichopolydesmidae as well, syn. n.

Shelley (1994) gave a detailed morphological description of nearctodesmids and revived their family status, contrary to Hoffman (1982) who had synonymized the Nearctodesmidae with Macrosternodesmidae. Later, however, apparently following Shelley (1994), Hoffman (1999) also considered the Nearctodesmidae as a distinct family.

The diversity of gonopod structural plans in nearctodesmids+macrosternodesmids (Shelley 1994, Shear and Shelley 2007) appears to be quite modest and uniform, since all of their constituent genera such as *Nearctodesmus* Silvestri, 1910, *Kepolydesmus* Chamberlin, 1910, *Bistolodesmus* Shelley, 1994, *Tidesmus* Chamberlin, 1943 etc. show clearly transverse and elongated prefemoral portions which are set subrectangular to the subparallel, usually bi- or triramous, elaborate, normally clearly curved and well exposed acropodites. The gonocoel if any is moderate at most. According to Shear and Shelley (2007), the differences between these "families" lie only in the number and location of branches on the acropodite, a distinction that by far fails to exceed the diversity of gonopod plans observed among the South American fuhrmannodesmids alone (Golovatch 1994).

Contents and distribution. Thus refined, the Trichopolydesmidae currently contains ca 20 genera and about 60 species in the Holarctic, as well as ca 55 genera and about 80 species in the tropics.

Family Opisotretidae Hoffman, 1980

http://species-id.net/wiki/Opisotretidae

Diagnosis. Sphaerotrichomes absent. Gonopod aperture large, transversely oval, with small and largely exposed coxites. Telopodites elongate, directed strongly dorsolaterad; seminal groove running along most of telopodite extent on caudal face to terminate distally either on a special branch or tooth (= solenomere), flush on caudal surface, or debauch inside an accessory seminal chamber which normally is supplied with a hairy pulvillus.

Type genus. *Opisotretus* Attems, 1907

Contents and distribution. Only seven genera and 29 described species ranging from the Ryukyu Islands, Japan, Taiwan, southern mainland China and the Himalayas in the North and Northwest, through Indochina and across Indonesia, to Papua New Guinea in the Southeast (Golovatch et al. 2013).

Acknowledgements

I am greatly obliged to Petar Beron and Pavel Stoev (both NMNHS) for allowing me to study the above interesting material. In addition, Petar Beron most helpfully provided information on some other potential troglobites of Greece. Kirill Makarov (Moscow, Russia) skilfully took all pictures. Robert Mesibov and again Pavel Stoev very kindly reviewed the manuscript. My visit to the NMNHS in August 2013 was partly supported through the Russian-Bulgarian interacademician exchange programme, partly also by a grant issued by the Ministry of Education and Science of Russia.

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RESEARCH ARTICLE

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Genus *Microsternus* Lewis (1887) from China, with description of a new genus *Neosternus* from Asia (Coleoptera, Erotylidae, Dacnini)

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Abstract

This work treats species of the genus *Microsternus* Lewis, 1887 from Asia and North America. A new genus is described: *Neosternus* (type species *Microsternus higonius* Lewis, 1887). A new species is described: *Microsternus pengzhongi*. A new synonym is provided: *Microsternus tricolor taiwanicus* Nakane (=*Microsternus tricolor* Lewis). Three species previously placed in *Microsternus* Lewis, 1887 are transferred to *Neosternus* resulting in the following three new combinations: *Neosternus higonius* (Lewis, 1887), *Neosternus taiwanus* (Chûjô, 1976), and *Neosternus hisamatsui* (Nakane, 1981).

Keywords

Coleoptera, Erotylidae, Dacnini, *Microsternus*, *Neosternus*, identification key, new Genus, new species, new synonym, Asia, China

Introduction

General introduction

The family Erotylidae is composed of fungus feeding beetles which vary greatly in body size and color; many are elaborately patterned. Crotch's (1876) world revision of the Erotylidae was the last study to cover the entire Old World fauna at the species level, but it provided no keys nor illustrations, and only a few short descriptions. In the time between Chûjô and Chûjô 's (1988) catalog of the Old World erotylids and Wegrzynowicz's (2006) catalog of the Palaearctic erotylids, the China erotylid fauna had been studied intermittently, with scattered regional studies, checklists, and species descriptions. Most Chinese erotylid genera have no modern revisions.

Taxonomic arrangement

Wegrzynowicz (2002) formally synonymized the tribes Megalodacnini and Encaustini. More recent phylogenetic work by Leschen (2003), Robertson et al. (2004), and Leschen and Buckley (2007) were either inconclusive or resulted in different tree topologies that indicate more work is needed to better establish relationships of all tribes before making further taxonomic changes.

Herein, tribal placement of included taxa follows a five-tribe system: Dacnini, Megalodacnini, Encaustini, Erotylini, Tritomini (Lawrence and Newton 1995). China has three genera arranged under tribe the Dacnini: *Dacne*, *Microsternus* and *Neosternus* gen. n.

History

The first described member of the genus *Microsternus* Lewis is *Megalodacne ulkei* Crotch (1873). In studying the Japanese erotylid specimens, Lewis (1883) described *Episcapha perforata*, but on further study of these group, Lewis (1887a) found three similar Japanese species required a genus to be formed for their reception. Together with *Episcapha perforata*, Lewis thought these four species were congeneric with American species *Megalodacne ulkei* and established the genus *Microsternus*. Lewis (1887b) transferred *Episcapha perforata* into *Microsternus* becoming *Microsternus perforatus* (Lewis, 1883) and described three other species as *Microsternus higonius* Lewis (1887b), *Microsternus crotchi* Lewis (1887b) and *Microsternus tricolor* Lewis (1887b).

Before our study, there were 17 valid species and 1 subspecies placed in the genus *Microsternus* Lewis: *Microsternus ulkei* Crotch (1873), *Microsternus perforatus* (Lewis, 1883), *Microsternus crotchi* Lewis (1887b), *Microsternus higonius* Lewis (1887b), *Microsternus tricolor* Lewis (1887b), *Microsternus cribricollis* Gorham (1895), *Microsternus puncticollis* Heller (1918), *Microsternus queenslandicus* Heller (1918), *Microsternus javanus* Deelder

(1942), *Microsternus sumatranus* Deelder (1942), *Microsternus tokioensis* Nakane (1961), *Microsternus yamadai* Chûjô & Shibata (1963), *Microsternus tricolor taiwanicus* Nakane (1966), *Microsternus quatei* Chûjô (1968), *Microsternus bhutanensis* Chûjô (1975), *Microsternus taiwanus* Chûjô (1976), *Microsternus hisamatsui* Nakane (1982), *Microsternus nakanoi* Narukawa (2004). Only one species and one subspecies have been reported from China (Taiwan), *Microsternus taiwanus* and *Microsternus tricolor taiwanicus*. No record has been reported from the Chinese mainland.

In this work, while examining the specimens of *Microsternus* from China, we described a new species *Microsternus pengzhongi* sp. n. from Hainan Prov. and reduce *Microsternus tricolor taiwanicus* Nakane to a synonym of *Microsternus tricolor* Lewis. After genitalic dissections and comparisons of head and pronotum structures, we recognized that the genus *Microsternus* can be divided in two species-groups. *Microsternus higonius* Lewis (1887b), *Microsternus taiwanus* Chûjô (1976) and *Microsternus hisamatsui* Nakane (1982) are not congeneric with the type species of *Microsternus* Lewis, *Microsternus ulkei* Crotch (1873). Unlike typical *Microsternus*, the species, *M. higonius*, *M. taiwanus* and *M. hisamatsui* do not have the pit posterior to the postmandibular lobes; pronotum has a deep sulcus along each side, which is broadly margined and formed thicken lines in lateral view; male genitalia with flagellum curved, bearing a dorsal, arched, cartilaginous mass on apical quarter, along with prosternum and mesosternum characters not present in other members of Dacnini. Here we describe a new genus *Neosternus* for these three species.

Characters and terminology

Male genitalia

The internal sac of the male genitalia is held invaginated within the median lobe. During copulation, the internal sac is everted; exposing any microstructure and extending the flagellum. The median lobe, internal sac, and flagellum are the true copulatory organs and show the majority of species specific characters. For additional insight into the genitalia of Erotylidae see Skelley (1998) and Skelley and Leschen (2007).

In this work, after dissection of the internal sac, we found the dorsal lobe of *Microsternus* has obvious differences that are important characters in species recognition.

Female genitalia

Female genitalia seemed to vary little from species to species. Structures varied in proportions, but species recognition based on female genitalia was not possible with any degree of confidence. The sclerotized spermatheca showed some variation in shape which could be useful to determine relationships within the genus. See Skelley (1998).

Material and methods

In addition to extensive collecting by the authors and their colleagues, Chinese specimens of the tribe Dacnini were borrowed from Wen-xuan Bi's private collections. North America specimens of the genus *Microsternus* were provided for study from Florida State Collection of Arthropods, USA [Paul E. Skelley]. The photos of type specimens were taken from The Natural History Museum, London, England.

Erotylids were collected in a wide variety of woodland fungi, in crevices under bark or in other retreats by splitting and sifting, and in light traps. For an examination of the male genitalia, the abdominal segments were detached from the body after softening in hot water. The genitalia, together with other dissected parts, were mounted in Euparal (Chroma Gesellschaft Schmidt, Koengen, Germany) on plastic slides. Photos of sexual characters were taken with a FUJIFILM X10 camera attached to an Olympus SZX 16 stereoscope; habitus photos were taken with a Canon macro photo lens MP-E 65 mm attached to a Canon EOS7D camera.

The specimens treated in this study are deposited in the following public and private collections:

SNUC Department of Biology, Shanghai Normal University, P. R. China
FSCA Florida State Collection of Arthropods, USA [Paul E. Skelley]
NHM The Natural History Museum, London, England
CBWX Collection of Wen-xuan, Bi, Shanghai, China

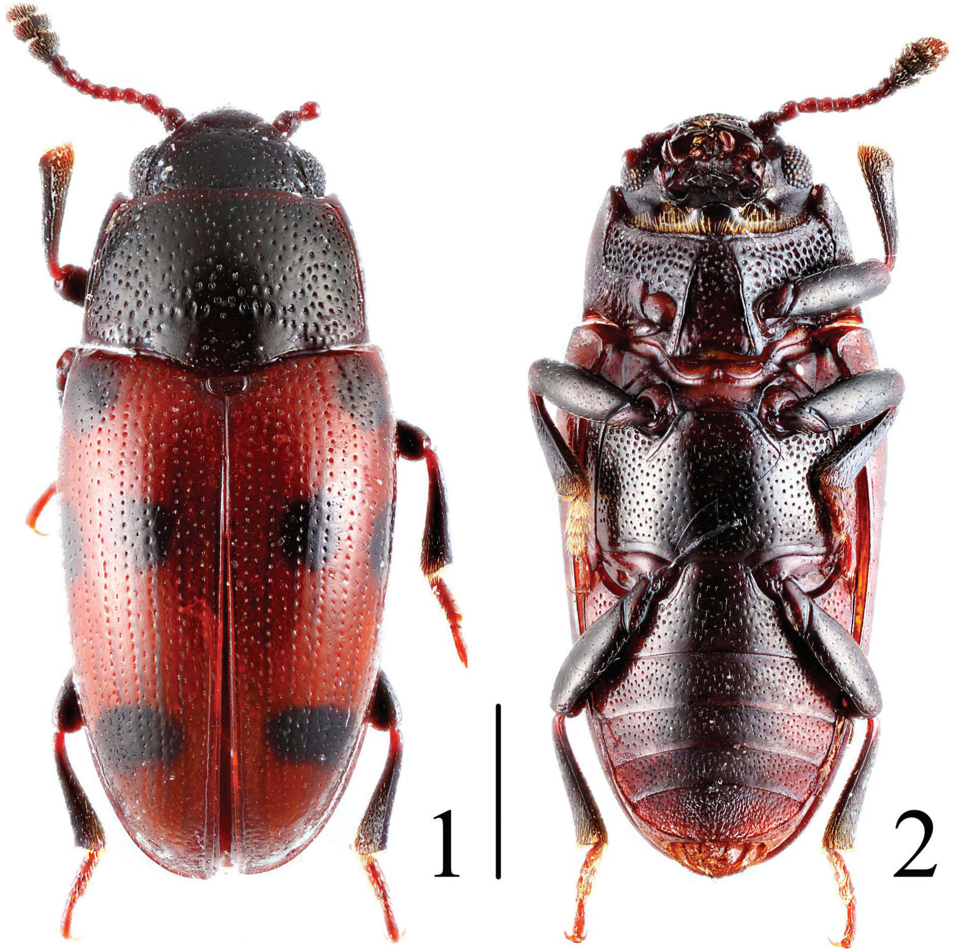
Taxonomy

Key to genus of Dacnini from China

1	Mesosternum exposed; eyes not very coarsely facetted	***Dacne* Latreille**
–	Prosternal process covering the mesosternum; eyes very coarsely facetted	**2**
2	Head with the pit posterior to the postmandibular lobes, pronotum without a deep sulcus along each side and narrowly margined in lateral view	***Microsternus* Lewis**
–	Head without the pit posterior to the postmandibular lobes, pronotum with a deep sulcus along each side, which is broadly margined in lateral view	***Neosternus* Dai & Zhao, gen. n.**

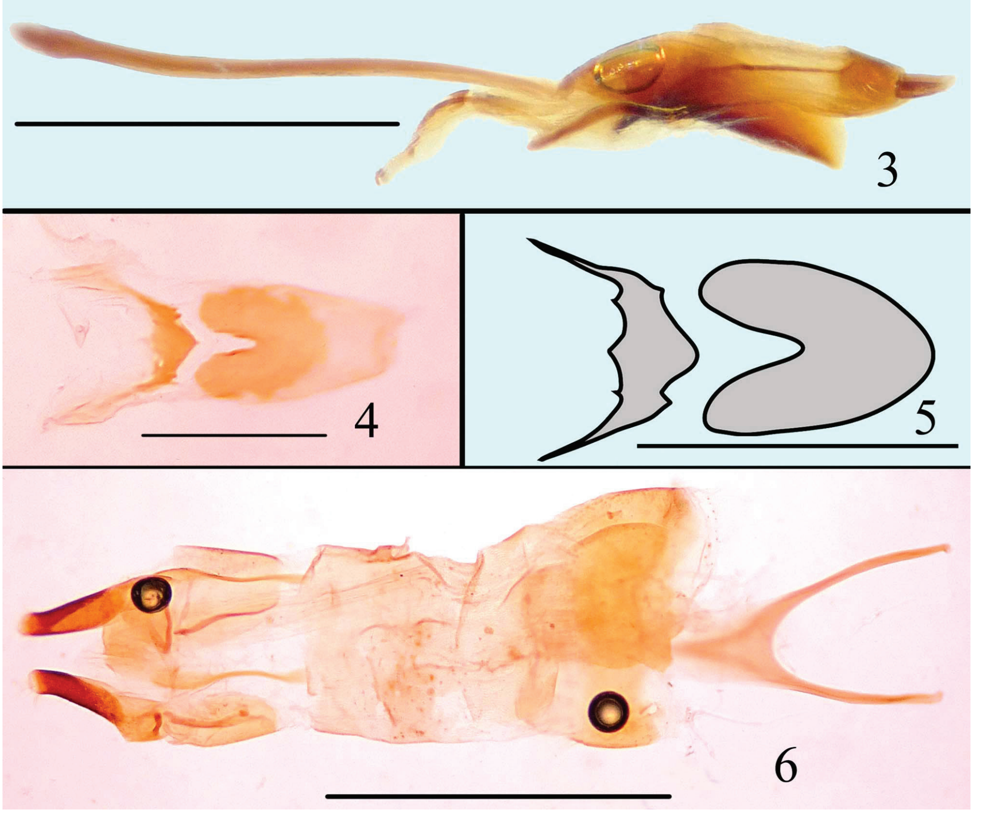
Genus *Microsternus* Lewis, 1887
http://species-id.net/wiki/Microsternus
Figs 1–2, 3–6, 7–8, 9–12, 13–14, 15–21, 22–23, 24–29, 30–33, 40–42, 45–47, 50–52, 59–64, 73–74, 77–78

Type species. *Megalodacne ulkei* Crotch, 1873



Figures 1–2. Habitus of *Microsternus ulkei* in dorsal and ventral view. Scale = 1 mm.

Description. Body (Figs 1–2, 7–8, 13–14, 22–23, 73–74, 77–78) small, elongate, with legs short and robust, the tarsi cylindrical, 5-jointed, the four basal joints short, nearly equal in size and not at all dilated, the last joint long. Antennae not very long, the latter with a broad 3-jointed club. Eyes coarsely facetted. Head with the pit posterior to the postmandibular lobes (Figs 40–42). Maxillary and labial terminal palpomeres acuminate, sensory area restricted to apex. Pronotum (Figs 45–47) arched, widest at base; narrowed from base to apex, with formed thinned lines in lateral view (Figs 50–52); disk punctured, except the impunctate medio-basal area, which is limited by an arched transverse row of coarse punctures. Prosternum with median area including its process elevated in an elongate triangular plane, which is distinctly bordered by a ridge on both sides and shortly rounded-subtruncate in front. Mesosternum almost concealed by prosternal process. Metasternum with a pair of mesocoxal lines



Figures 3–6. Male genitalia of *Microsternus ulkei* in lateral view **3** Dorsal lobe of *Microsternus ulkei* in dorsal view **4–5** Female genitalia of *Microsternus ulkei* in dorsal view **6**. Scale = 1mm (**3, 6**), Scale = 0.2mm (**4**, **5**).

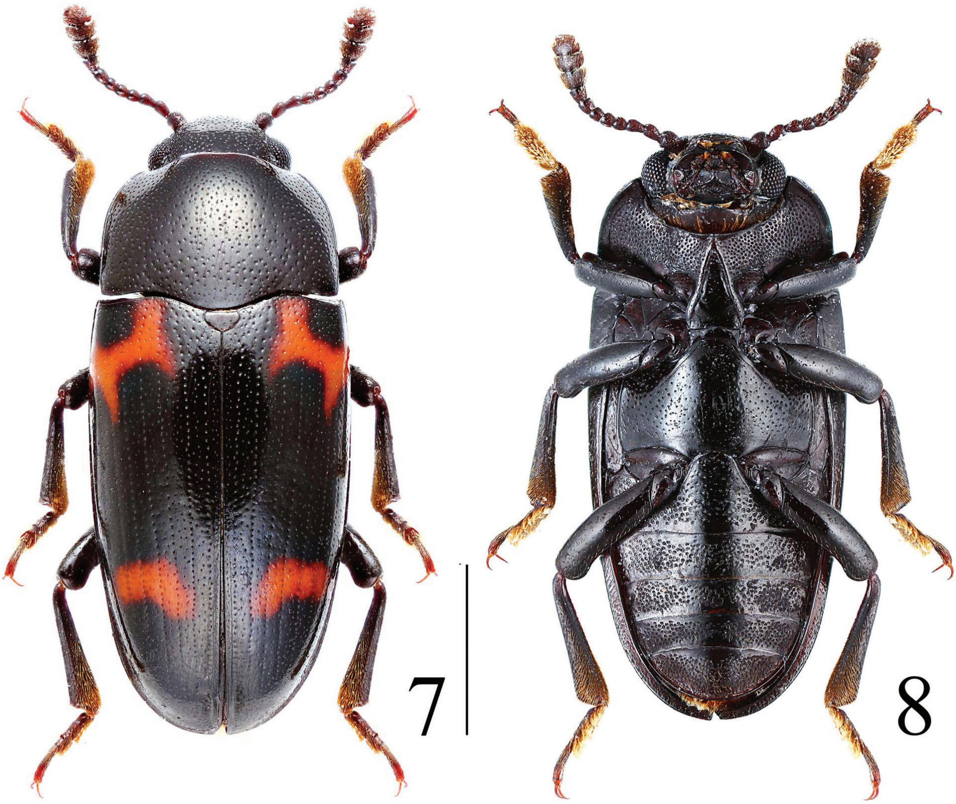
strongly divergent posteriorly. Abdomen without metacoxal lines on basal visible sternite. Elytra convex.

Distribution. *Microsternus* is widespread in Asia, with one species in Australia and one species in America.

Diagnosis. Defining characters for *Microsternus* are body elongate, head with the pit posterior to the postmandibular lobes, pronotum without a deep sulcus along each side and narrowed margin in lateral view, mesosternum almost concealed by prosternal process, male genitalia with flagellum (Figs 59–64) bearing a straight mass on apical quarter.

Key to Chinese species of genus *Microsternus*

1	Body black to reddish-brown, each elytra black with two narrow orange bands	**2**
–	Body red, elytra with orange and black spots or bands (Figs 22–23)	***Microsternus tricolor* (Lewis)**



Figures 7–8. Habitus of *Microsternus pengzhongi* in dorsal and ventral view. Scale = 2 mm.

2 Body shining, punctation of pronotum fine and sparse (Figs 7–8) ....*Microsternus pengzhongi* **Dai & Zhao, sp. n.**

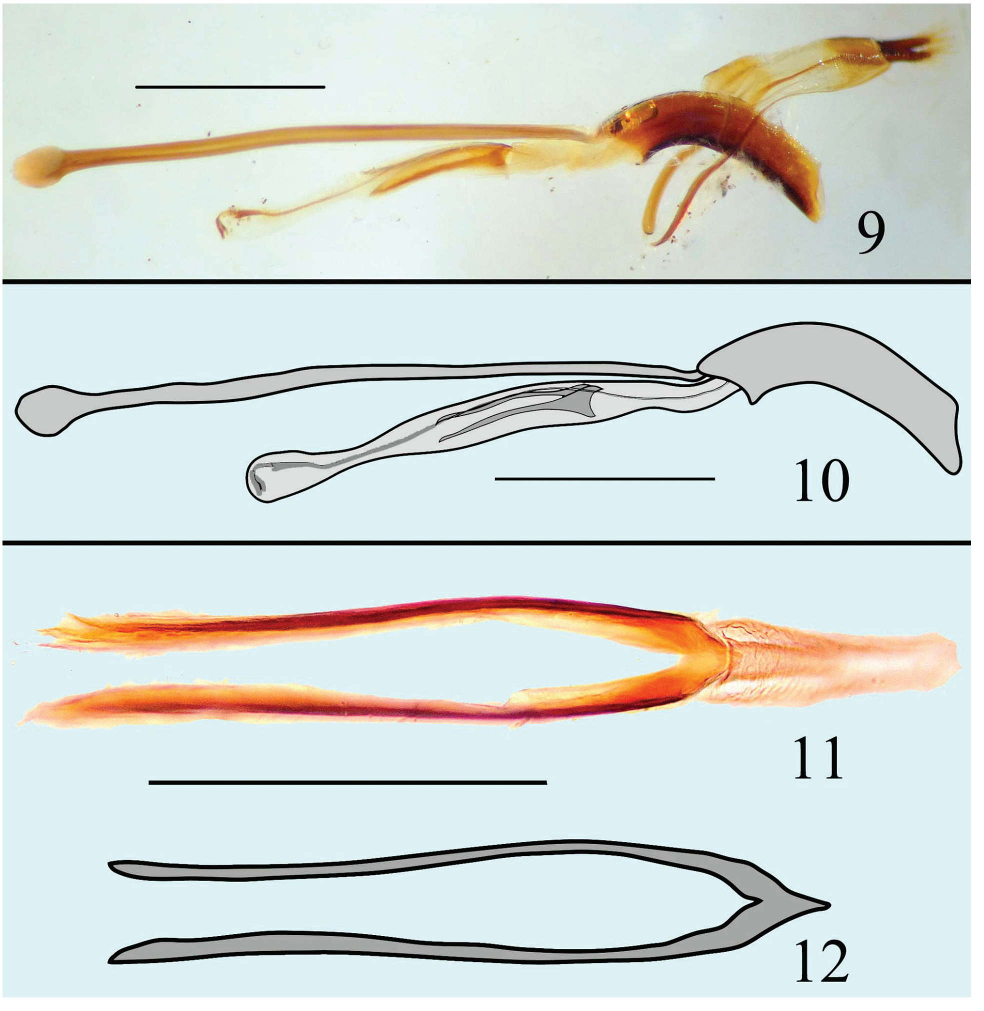
– Body not shining, punctation of pronotum coarse and close (Figs 13–14) .... ***Microsternus perforatus* (Lewis)**

***Microsternus pengzhongi* Dai & Zhao, sp. n.**
http://zoobank.org/87B144AA-4704-4A78-8A8E-0ACABC75B973
http://species-id.net/wiki/Microsternus_pengzhongi
Figs 7–8, 9–12

Material examined. Holotype: CHINA: Hainan Prov.: ♂, Jianfengling N.R., Mingfenggu Valley, 18°44'N, 108°50'E, alt. 950 m, 30.IV.2012, Peng & Dai leg. (SNUC).

Description. Body (Fig. 7, 8) elongate, length: 7.5 mm; width: 3.2 mm. Body black, shining. Each elytron with two narrow orange bands.

Head width between eyes = 4 times eye diameter in dorsal view; punctation fine, spare, separated by two to four puncture diameters; epistome truncate, lacking marginal line on



Figures 9–12. Male genitalia of *Microsternus pengzhongi* in lateral view **9–10** Dorsal lobe of *Microsternus pengzhongi* in dorsal view **11–12**. Scale=1mm (**9**, **10**), Scale=0.5mm (**11**, **12**).

anterior margin; stridulatory files not evident. Eyes coarsely facetted. Antennomere III about 1.2 times as long as IV; antennomere VIII slightly wider than VII, about 1.3 times as wide as long; antennomere IX trapezoidal; antennomere X transverse; antennomere XI almost elliptic. Gular area with pit posterior to the postmandibular lobes. Maxillary and labial terminal palpomeres acuminate, sensory area restricted to apex. Mentum broad with anterior projection, almost triangular, slightly more than 2.3 times wider than long.

Pronotum arched, widest at base (pl/pw = 0.65); narrowed from base to apex, with formed thinned lines in lateral view; disk finely and spare punctured, except the impunctate medio-basal area, which is limited by an arched transverse row of fine punctures.

Prosternum with median area including its process elevated in an elongate triangular plane, which is distinctly bordered by a ridge on both sides and shortly rounded-subtruncate in front, bearing a few fine punctures; sides rugose, coarsely and densely punctured. Mesosternum almost conceled by prosternal process, impunctate as the mesepisterna, which is somewhat concave. Metasternum rather sparsely and strongly punctured on lateral areas, some finer punctures on median area, with a pair of mesocoxal lines strongly divergent posteriorly. Abdomen rather strongly and closely punctured, but median areas of four basal visible sternites and medio-basal area of last visible sternite with few punctures respectively; without metacoxal lines on basal visible sternite. Legs rather robust.

Scutellum pentagonal, finely and sparely punctured.

Elytra convex, with eight striae of distinct punctures on each elytron and each interstice with a row of extremely fine punctures.

Male genitalia (Figs 9–10) with flagellum bearing a straight mass on apical; flagellar apex acute with a well-separated ventral process; dorsal lobe of internal sac with long and tweezer-like structure in dorsal view (Figs 11–12).

Distribution. China (Hainan Province).

Diagnosis. Characterized by its shining body, spare punctured pronotum and dorsal lobe's unique structure of internal sac.

Etymology. This species is named in honor of Mr. Zhong Peng, one of the collectors of this new species.

Microsternus perforatus Lewis, 1883

http://species-id.net/wiki/Microsternus_perforatus

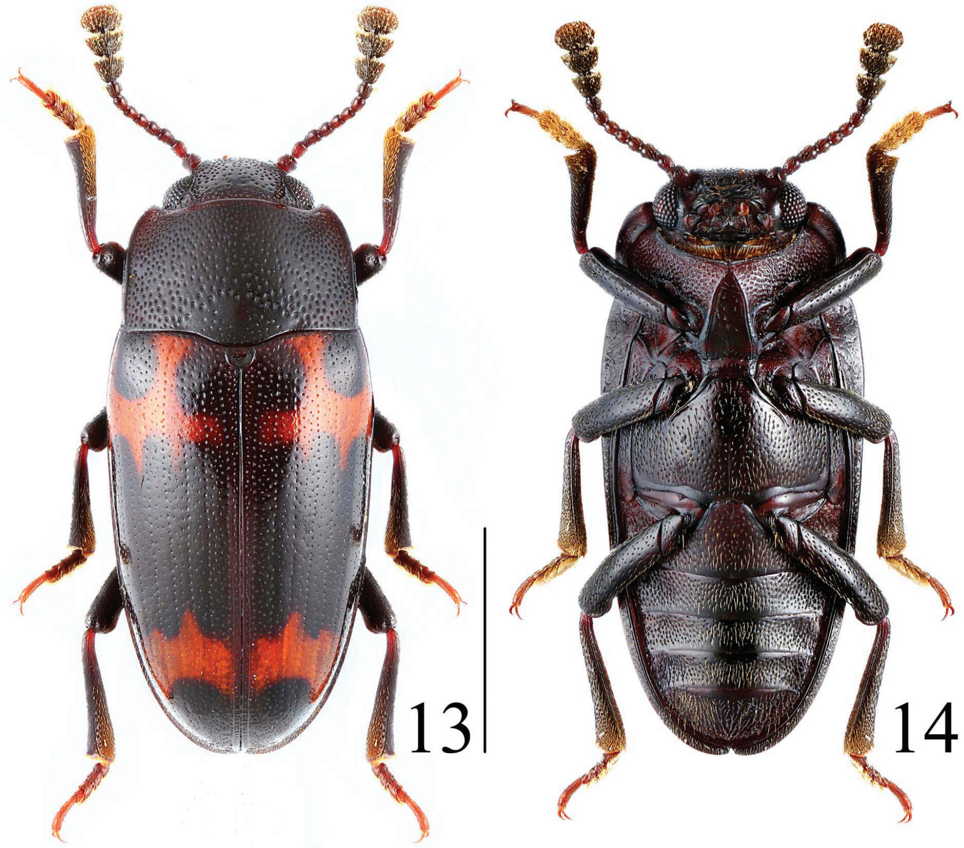
Figs 13–14, 15–21, 42, 47, 52, 63–64, 74–75, 78

Material examined. CHINA: Hainan Prov.: 4♂♂, 3♀♀, Shuiman County, Mt. Wuzhishan, 18°54'N, 109°41'E, alt. 500–800 m, 24.IV.2011, Bi Wenxuan leg. (CBWX); **Zhejiang Prov.:** 1♂♂, 2♀♀, Linan County, Mt. Tianmushan, 18°54'N, 109°41'E, alt. 300 m, 27.IV.2008, He & Tang leg. (SNUC)

Description. Body (Figs 13–14, 74–75, 78) elongate, length: 4.9–7.0 mm; width: 2.2–3.0 mm. Body black to blackish-brown. Each elytron with two narrow orange bands.

Head width between eyes = 7 times eye diameter in dorsal view; punctation coarse, close, separated by half to two puncture diameters; epistome truncate, lacking marginal line on anterior margin; stridulatory files not evident. Eyes coarsely facetted. Antennomere III about 1.4 times as long as IV; antennomere VIII slightly wider than VII, about 1.2 times as wide as long; antennomere IX trapezoidal; antennomere X transverse; antennomere XI almost elliptic. Gular area with pit posterior to the postmandibular lobes (Fig. 42). Maxillary and labial terminal palpomeres acuminate, sensory area restricted to apex. Mentum broad with anterior projection, almost triangular, slightly more than 3.7 times wider than long.

Pronotum (Fig. 47) arched, widest at base (pl/pw = 0.63); narrowed from base to apex, with formed thinned lines in lateral view (Fig. 52); disk coarsely and close punctured, except the impunctate medio-basal area, which is limited by an arched transverse row of coarse punctures.



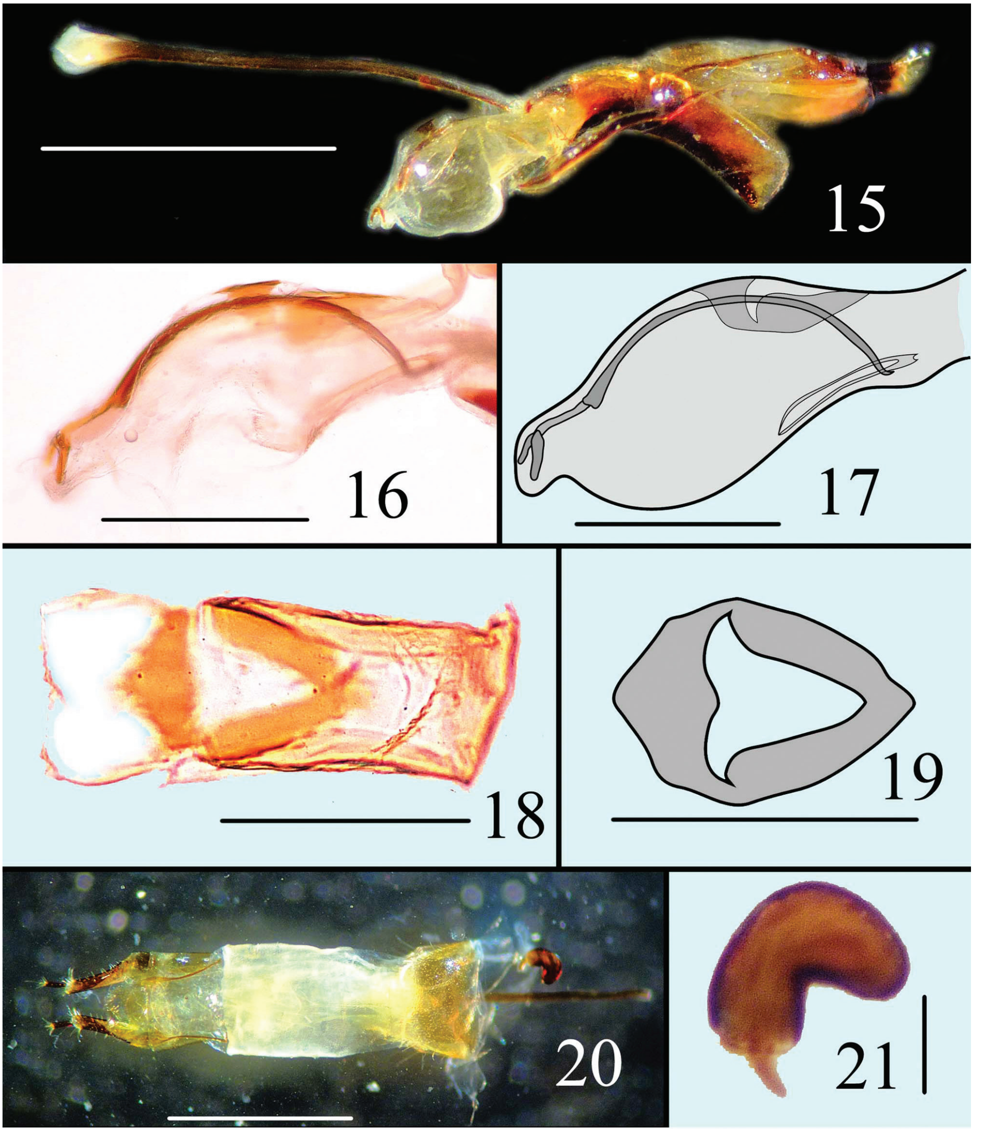
Figures 13–14. Habitus of *Microsternus perforatus* in dorsal and ventral view. Scale = 2 mm.

Prosternum with median area including its process elevated in an elongate triangular plane, which is distinctly bordered by a ridge on both sides and shortly rounded-subtruncate in front, bearing a few fine punctures; sides rugose, coarsely and densely punctured. Mesosternum almost conceled by prosternal process, impunctate as the mesepisterna, which is somewhat concave. Metasternum rather sparsely and strongly punctured on lateral areas, some finer punctures on median area, with a pair of mesocoxal lines strongly divergent posteriorly. Abdomen rather strongly and closely punctured, but median areas of four basal visible sternites and medio-basal area of last visible sternite with few punctures respectively; without metacoxal lines on basal visible sternite. Legs rather robust.

Scutellum pentagonal, with each corner rounded, flattish and almost impunctate on surface.

Elytra convex, with eight striae of distinct punctures on each elytron and each interstice with a row of extremely fine punctures.

Male genitalia (Fig. 15–17) with flagellum bearing a straight mass on apical quarter; flagellar (Fig. 63–64) apex acute with a well-separated ventral process; dorsal lobe of internal sac with subhexagon edge and propeller -like hollow in dorsal view (Figs 18–19).



Figures 15–21. Male genitalia of *Microsternus perforatus* in lateral view **15** Internal sac of *Microsternus perforatus* in lateral view **16–17** Dorsal lobe of *Microsternus perforatus* in dorsal view **18–19** Female genitalia of *Microsternus perforatus* in dorsal view **20** Female spermatheca of *Microsternus perforatus* **21**. Scale=1mm (**15**, **20**), Scale=0.3mm (**16**, **17**), Scale=0.2mm (**18**, **19**), Scale=0.1mm (**21**).

Female genitalia (Fig. 20) and spermatheca (Fig. 21) simple.

Distribution. China, Japan.

Diagnosis. Characterized by its close punctured pronotum, orange bands of elytra and dorsal lobe's unique structure of internal sac.

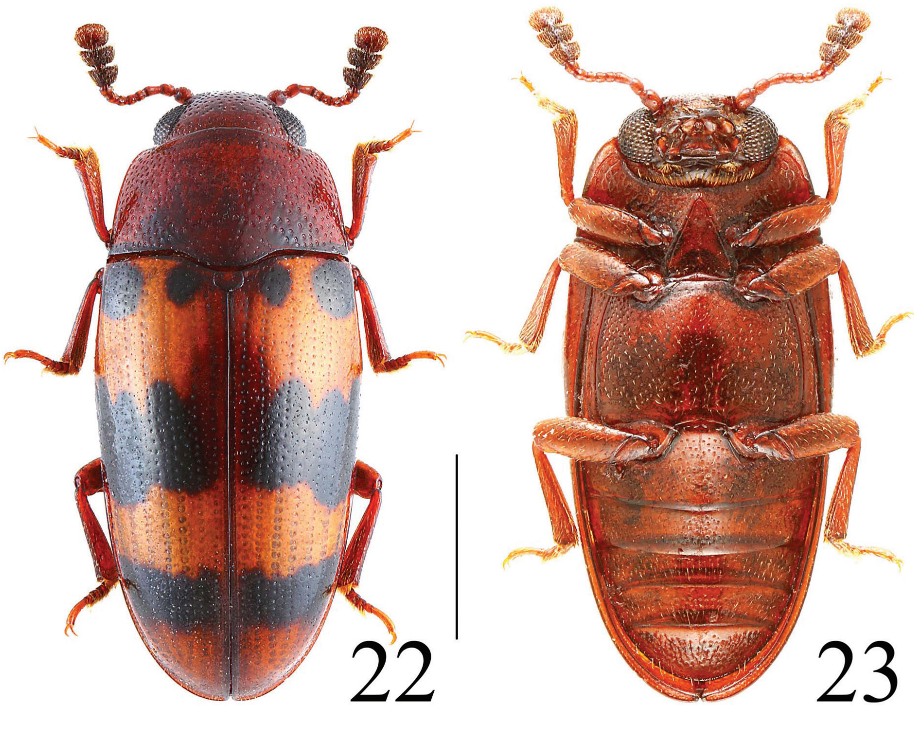
Microsternus tricolor **Lewis, 1887**
http://species-id.net/wiki/Microsternus_tricolor
Figs 22–23, 24–29, 30–33, 41, 46, 51, 61–62, 73, 77

Microsternus tricolor taiwanicus Nakane, 1966, syn. n.

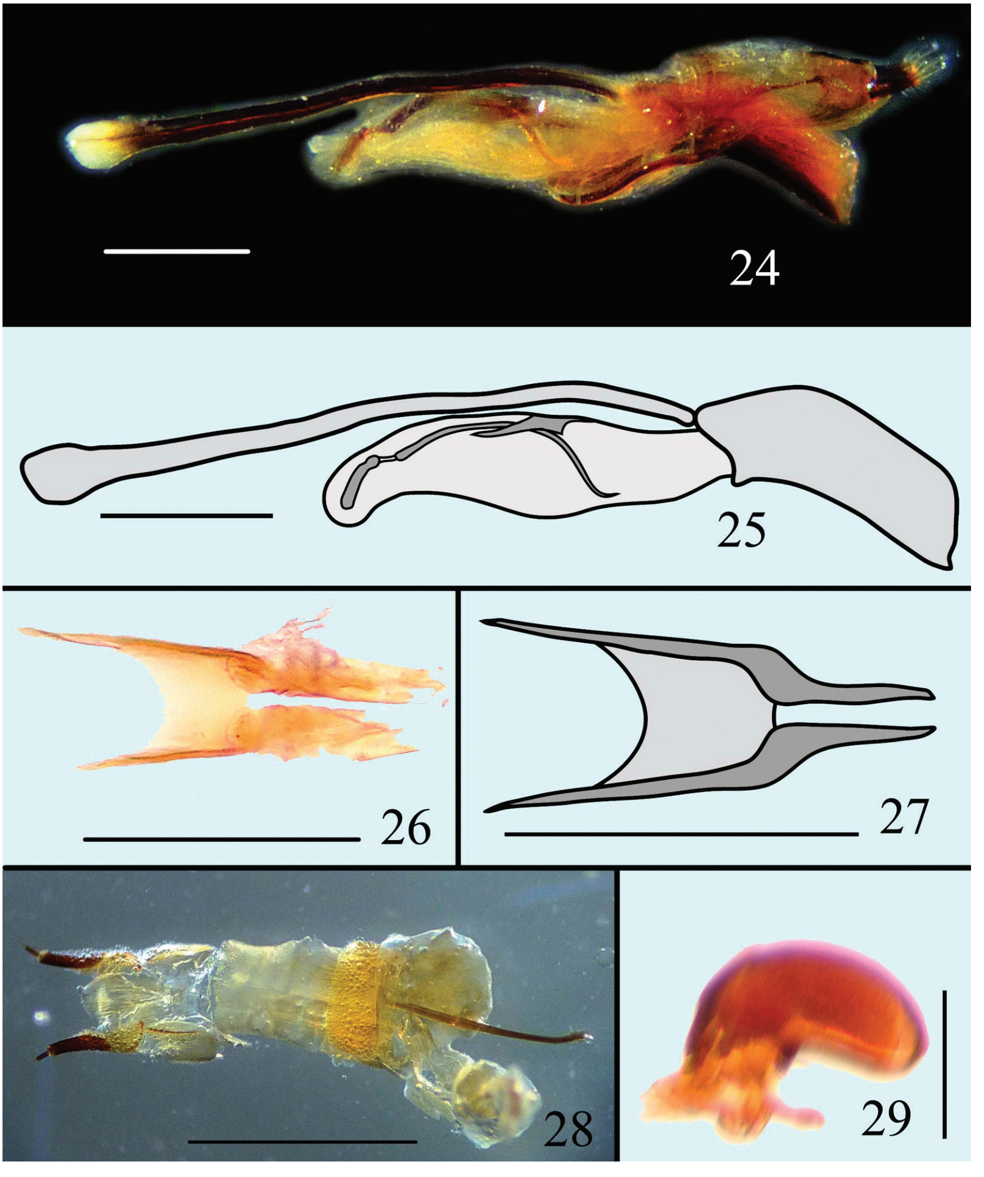
Material examined. CHINA: Hainan Prov.: 1♂♂, 1♀, Shangsi County, Mt. Wuzhishan, 18°54'N, 109°41'E, alt. 800–1000 m, 22.IV.2011, Bi Wenxuan leg. (CBWX); 1♂, Jianfenglin N R. Mingfenggu Valley, 18°44'N, 108°50'E, alt. 1000 m, 22. V.2011, Bi Wenxuan leg. (CBWX)

Description. Body (Figs 22–23, 73, 77) elongate, length: 3.0–5.0 mm; width: 1.4–2.4 mm. Body red to reddish-brown. Each elytron orange and black spots or bands.

Head width between eyes = 8 times eye diameter in dorsal view; punctation coarse, close, separated by half to two puncture diameters; epistome truncate, lacking marginal line on anterior margin; stridulatory files not evident. Eyes coarsely facetted. Antennomere III about 1.7 times as long as IV; antennomere VIII slightly wider than VII, about 1.2 times as wide as long; antennomere IX trapezoidal; antennomere X transverse; antennomere XI almost elliptic. Gular area with pit posterior to the postmandibular lobes (Fig. 41). Maxillary and labial terminal palpomeres acuminate, sensory area restricted to apex. Mentum broad with anterior projection, almost triangular, slightly more than 4.0 times wider than long.



Figures 22–23. Habitus of *Microsternus tricolor* in dorsal and ventral view. Scale = 1 mm.



Figures 24–29. Male genitalia of *Microsternus tricolor* in lateral view **24–25** Dorsal lobe of *Microsternus tricolor* in dorsal view **26–27** Female genitalia of *Microsternus tricolor* in dorsal view **28** Female spermatheca of *Microsternus tricolor* **29**. Scale=1mm (**28**), Scale=0.3mm (**24**, **25**), Scale=0.2mm (**26**, **27**), Scale=0.1mm (**29**).

Pronotum (Fig. 46) arched, widest at base (pl/pw = 0.58); narrowed from base to apex, with formed thinned lines in lateral view (Fig. 51); disk coarsely and close punctured, except the impunctate medio-basal area, which is limited by an arched transverse row of coarse punctures.

30 31 32 33

Figures 30–33. Elytra of *Microsternus tricolor* in dorsal view.

Prosternum with median area including its process elevated in an elongate triangular plane, which is distinctly bordered by a ridge on both sides and shortly rounded-subtruncate in front, bearing a few fine punctures; sides rugose, coarsely and densely punctured. Mesosternum almost conceled by prosternal process, impunctate as the mesepisterna, which is somewhat concave. Metasternum rather sparsely and strongly punctured on lateral areas, some finer punctures on median area, with a pair of mesocoxal lines strongly divergent posteriorly. Abdomen rather strongly and closely punctured, but median areas of four basal visible sternites and medio-basal area of last visible sternite with few punctures respectively; without metacoxal lines on basal visible sternite. Legs rather robust.

Scutellum pentagonal, with each corner rounded, flattish and almost impunctate on surface.

Elytra convex, with eight striae of distinct punctures on each elytron and each interstice with a row of extremely fine punctures.

Male genitalia (Figs 24–25) with flagellum bearing a straight mass on apical quarter; flagellar (Figs 61–62) apex acute with a well-separated ventral process; dorsal lobe of internal sac with spade -like structure in dorsal view (Figs 26–27).

Female genitalia (Fig. 28) and spermatheca (Fig. 29) simple.

Distribution. China, Japan, Russia (Far East), Oriental region.

Diagnosis. *Microsternus tricolor* is characterized by its close punctured pronotum, orange and black interphased bands of elytra (Figs 30–33) and dorsal lobe's unique structure of internal sac.

Comment. Nakane described '*taiwanicus'* for a single female specimen, according his description, *Microsternus tricolor taiwanicus* can be distinguished from *Microsternus tricolor* by a difference in the elytral bands: *Microsternus tricolor taiwanicus* has the median black patch on each side is nearly quadrate, not triangular and more extended inwards, with the inner margin more longitudinal and the front angle nearly rectangular; the posterior yellow fascia is much broader and nearly as wide as the black band before the apex. On studying the specimens of *Microsternus tricolor*, we find the bands of elytra are variable in different specimens (Figs 30–33), after compare the photos about *Microsternus tricolor* from Taiwan and Japan, we think the differences Nakane mentioned in his paper are not unique to Taiwan.

Based on the information outlined above, we considered *Microsternus tricolor taiwanicus* is a new synonym of *Microsternus tricolor*.

Genus *Neosternus* Dai & Zhao, gen. n.

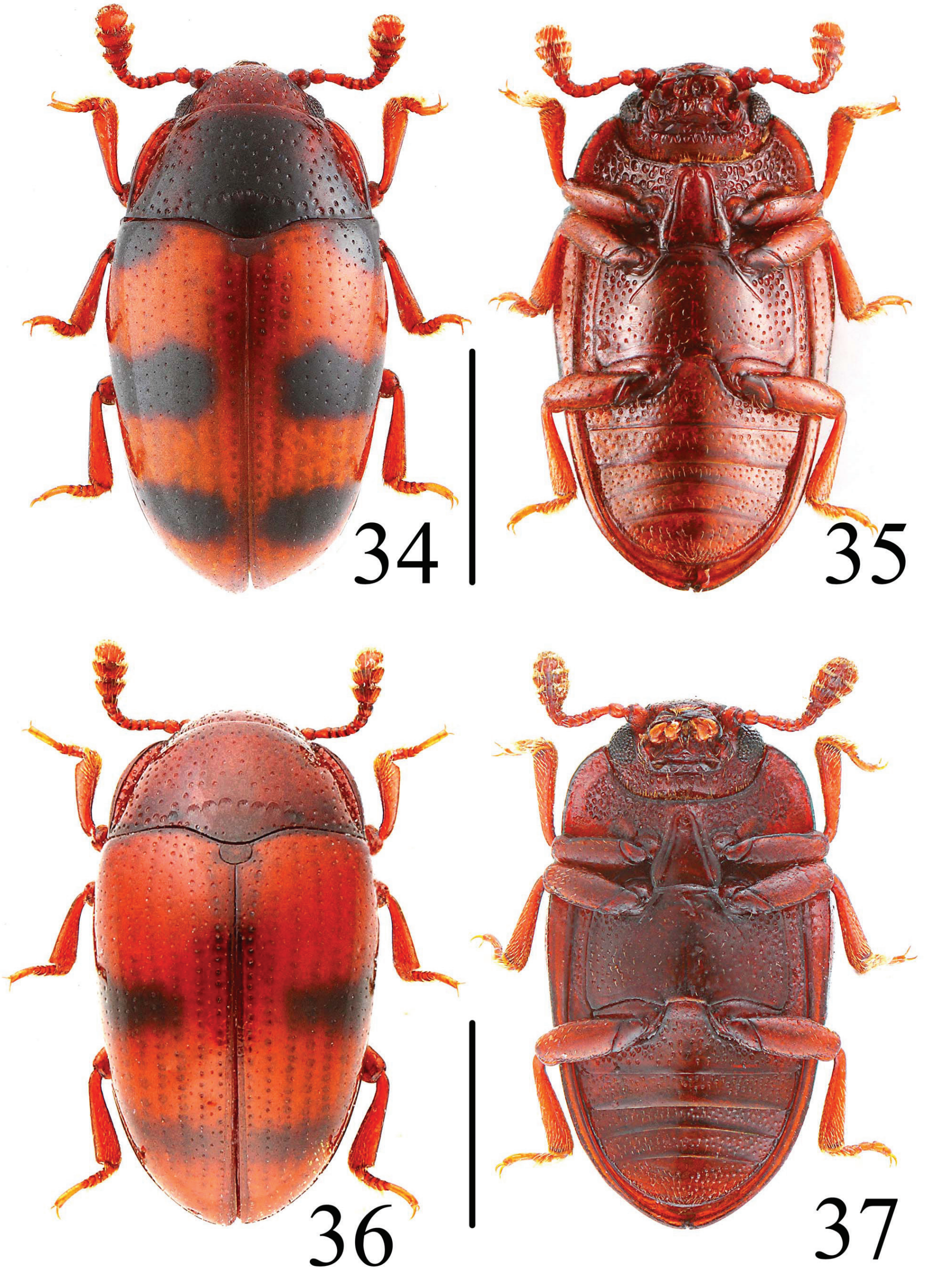
http://zoobank.org/1568C347-1E24-4D94-8DAB-4F603588102F
http://species-id.net/wiki/Neosternus
Figs 34–37, 38–39, 43–44, 48–49, 53–54, 55–58, 65–68, 69–72, 76

Type species. *Microsternus higonius* Lewis, 1887, here designated.

Description. Body small, elongate oval (Figs 34–37, 76), with legs short and robust, the tarsi cylindrical, 5-jointed, the four basal joints short, nearly equal in size and not at all dilated, the last joint long. Antennae not very long, the latter with a broad 3-jointed club. Eyes coarsely facetted. Maxillary and labial terminal palpomeres (Figs 43, 44) acuminate, sensory area restricted to apex. Pronotum (Figs 48, 49) arched, widest at base; narrowed from base to apex, with a deep sulcus along each side, which is broadly margined and the bordering gradually widened anteriorly, which formed thicken lines in lateral view (Figs 53, 54); disk coarsely and sparsely punctured, except the impunctate medio-basal area, which is limited by an arched transverse row of coarse punctures. Prosternum (Figs 38, 39) with median area including its process elevated in an elongate triangular plane, which is distinctly bordered by a ridge on both sides and shortly rounded-subtruncate in front. Mesosternum almost concealed by prosternal process. Metasternum with a pair of mesocoxal lines strongly divergent posteriorly. Abdomen without metacoxal lines on basal visible sternite. Elytra strongly convex.

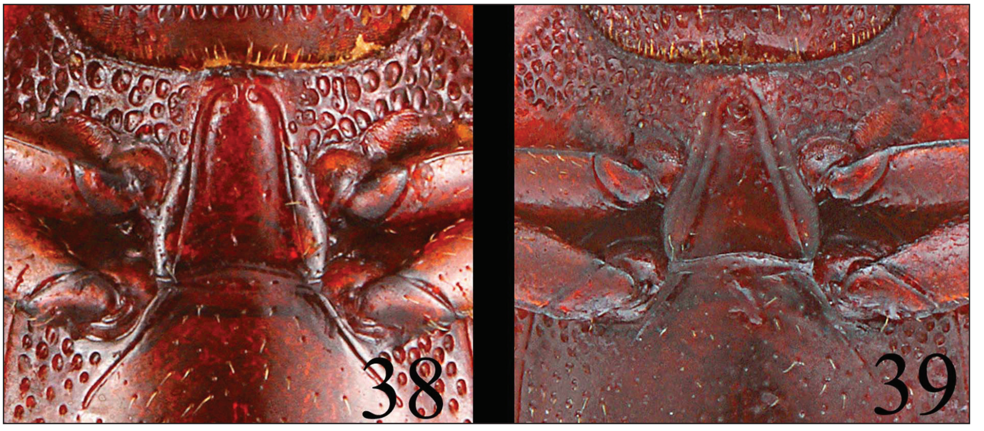
Distribution. China, Japan.

Diagnosis. This new genus can be distinguished from *Microsternus* by body elongate oval, head without the pit posterior to the postmandibular lobes, pronotum with a deep sulcus along each side, which is broadly margined in lateral view, male genitalia with flagellum bearing a arched mass on apical quarter (Figs 55–58). *Microsternus* body



Figures 34–37. Habitus of *Neosternus higonius* in dorsal and ventral view **34–35** Habitus of *Neosternus hisamatsui* in dorsal and ventral view **36–37**. Scale = 1 mm.

elongate, head with the pit posterior to the postmandibular lobes, pronotum without a deep sulcus along each side and narrowly margined in lateral view, male genitalia with flagellum bearing a straight mass on apical quarter (Figs 59–64).



Figures 38–39. Prosternum of *Neosternus higonius* **38** Prosternum of *Neosternus hisamatsui* **39**.

Etymology. As a uniquely new group within Dacnini, the generic name is derived from *Microsternus,* it is appropriate to call the genus "New *sternus*", and to abbreviate and combine the roots into a single word. The gender is masculine.

Key to species of genus *Neosternus*

1	Pronotum entirely reddish-brown, without markings.................................. .... ***Neosternus hisamatsui* (Nakane)**
–	Pronotum black or reddish-brown, with markings.....................................**2**
2	Pronotum black, with a pair of red markings ...***Neosternus higonius* (Lewis)**
–	Pronotum reddish-brown, with a subtriangular black marking at each side of median part of anterior area and also a pair of transverse black markings at middle of base.. ***Neosternus taiwanus* (Chûjô)**

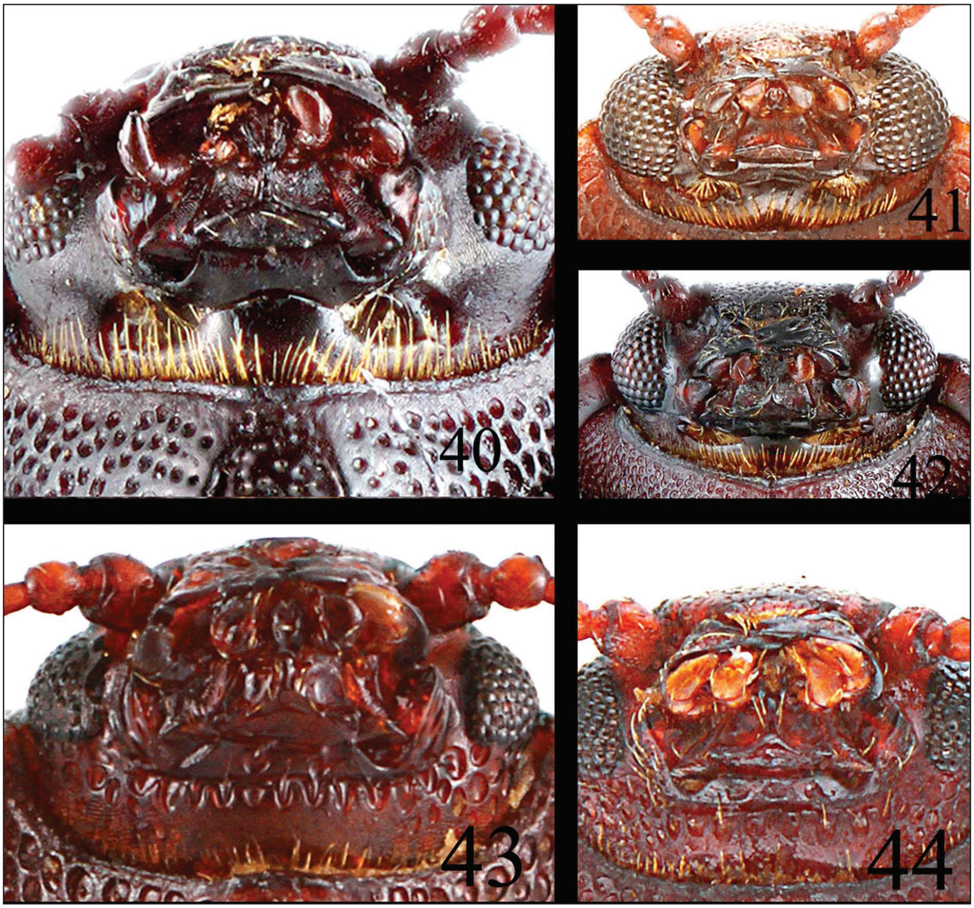
***Neosternus higonius* (Lewis, 1887), comb. n.**

http://species-id.net/wiki/Neosternus_higonius
Figs 34–35, 38, 43, 48, 53, 55–56, 65–68, 76

Microsternus higonius Lewis, 1887.

Material examined. CHINA: Fujian Prov.: 1♂, Wuyishan City, Guadun village, 27°44'N, 117°38'E, alt. 1200 m, 29.V.2012, Peng & Dai leg. (SNUC)

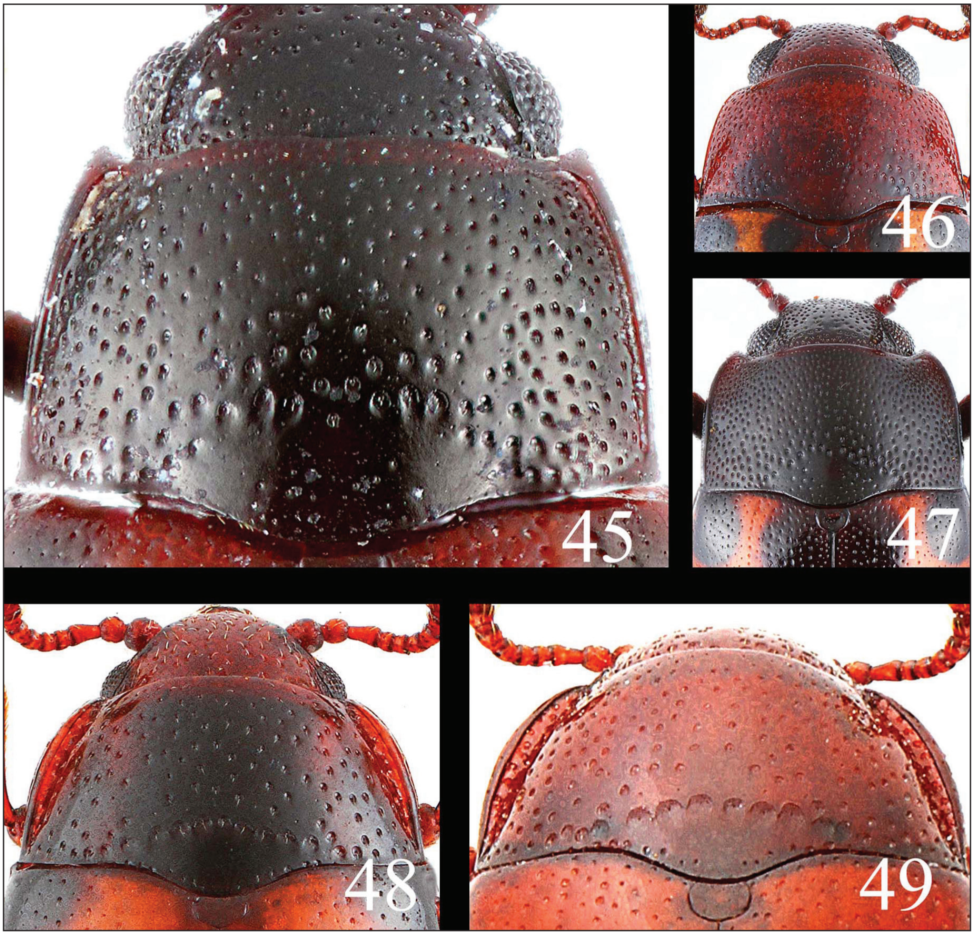
Description. Body (Figs 34, 35, 76) elongate oval, length: 2.2–3.0 mm; width: 1.1–1.4 mm. Head and elytra reddish-brown; pronotum general black with reddish-brown sides; legs, palpi and base of antennae reddish-brown. Each elytron with three or four black bands.



Figures 40–44. Mouth part of *Microsternus ulkei* **40** Mouth part of *Microsternus tricolor* **41** Mouth part of *Microsternus perforatus* **42** Mouth part of *Neosternus higonius* **43** Mouth part of *Neosternus hisamatsui* **44**.

Head width between eyes = 8 times eye diameter in dorsal view; punctation coarse, sparse, separated by 3-4 puncture diameters; epistome truncate, lacking marginal line on anterior margin; stridulatory files not evident. Eyes coarsely facetted. Antennomere III about 1.8 times as long as IV; antennomere VIII slightly wider than VII, about 1.2 times as wide as long; antennomere IX trapezoidal; antennomere X transverse; antennomere XI almost elliptic; relative lengths of antennomeres II–XI: 15: 18: 10: 10: 10: 10: 10: 14: 15: 17. Maxillary and labial terminal palpomeres acuminate, sensory area restricted to apex. Mentum broad with anterior projection, almost triangular, slightly more than 3.5 times wider than long.

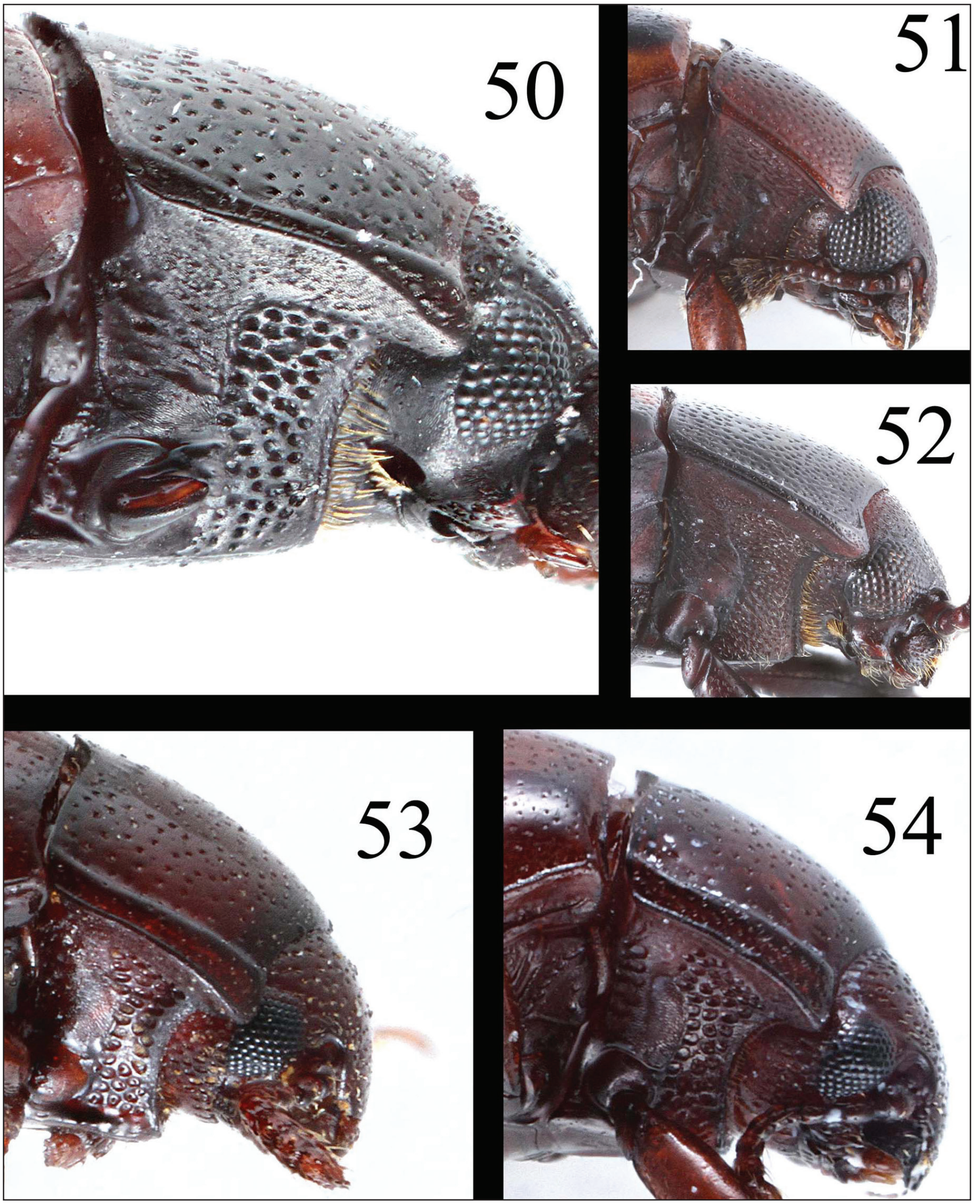
Pronotum arched, widest at base (pl/pw = 0.55); narrowed from base to apex, with a deep sulcus along each side, which is broadly margined and the bordering gradually widened anteriorly (Fig. 48), which formed thicken lines in lateral view (Fig. 53); disk



Figures 45–49. Pronotum of *Microsternus ulkei* in dorsal view **45** Pronotum of *Microsternus tricolor* in dorsal view **46** Pronotum of *Microsternus perforatus* in dorsal view **47** Pronotum of *Neosternus higonius* in dorsal view **48** Pronotum of *Neosternus hisamatsui* in dorsal view **49**.

coarsely and sparsely punctured, except the impunctate medio-basal area, which is limited by an arched transverse row of coarse punctures.

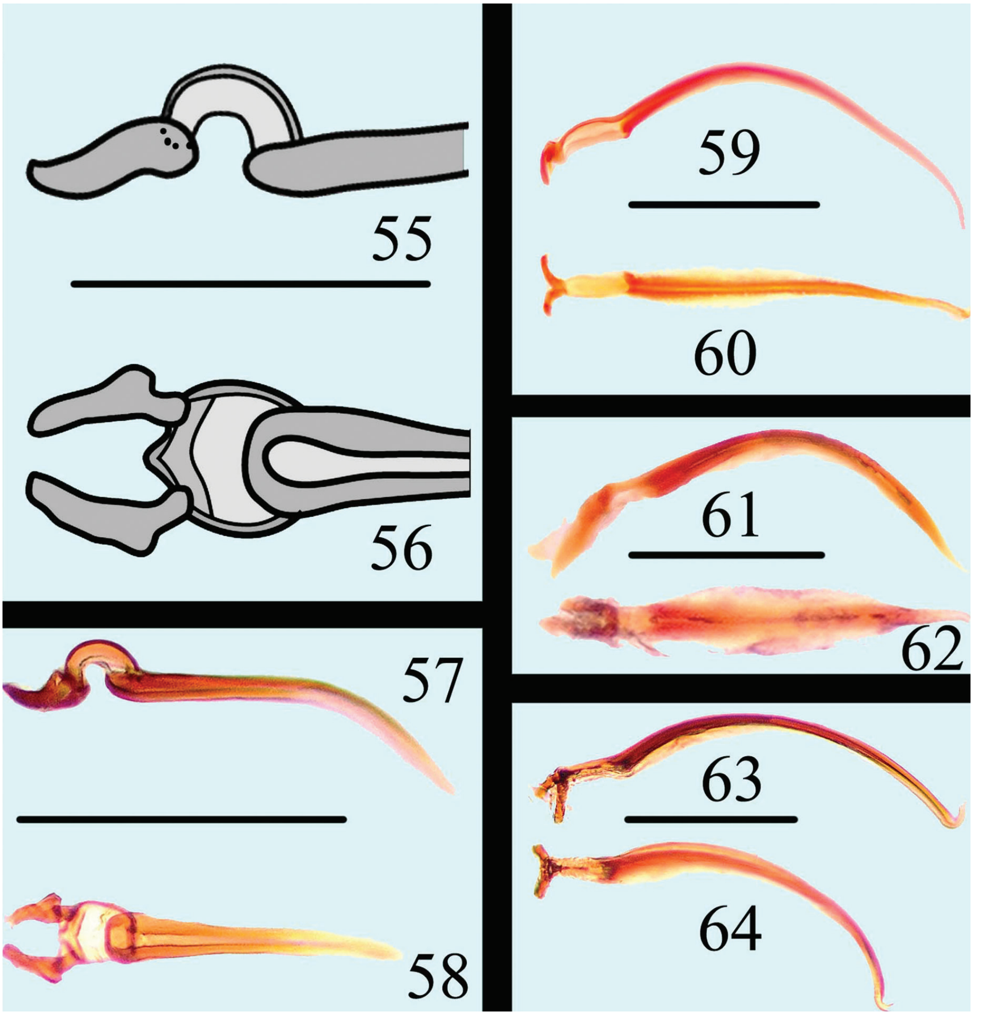
Prosternum (Fig. 38) with median area including its process elevated in an elongate triangular plane, which is distinctly bordered by a ridge on both sides and shortly rounded-subtruncate in front, bearing a few fine punctures; sides rugose, coarsely and densely punctured. Mesosternum almost concealed by prosternal process, impunctate as the mesepisterna, which is somewhat concave. Metasternum rather sparsely and strongly punctured on lateral areas, some finer punctures on median area, with a pair of mesocoxal lines strongly divergent posteriorly. Abdomen rather strongly and closely punctured, but median areas of four basal visible sternites and medio-basal area of last visible sternite with few punctures respectively; without metacoxal lines on basal visible sternite. Legs rather robust.



Figures 50–54. Pronotum of *Microsternus ulkei* in lateral view **50** Pronotum of *Microsternus tricolor* in lateral view **51** Pronotum of *Microsternus perforatus* in lateral view **52** Pronotum of *Neosternus higonius* in lateral view **53** Pronotum of *Neosternus hisamatsui* in lateral view **54**.

Scutellum pentagonal, with each corner rounded, flattish and almost impunctate on surface.

Elytra strongly convex, with eight striae of distinct punctures on each elytron and each interstice with a row of extremely fine punctures.

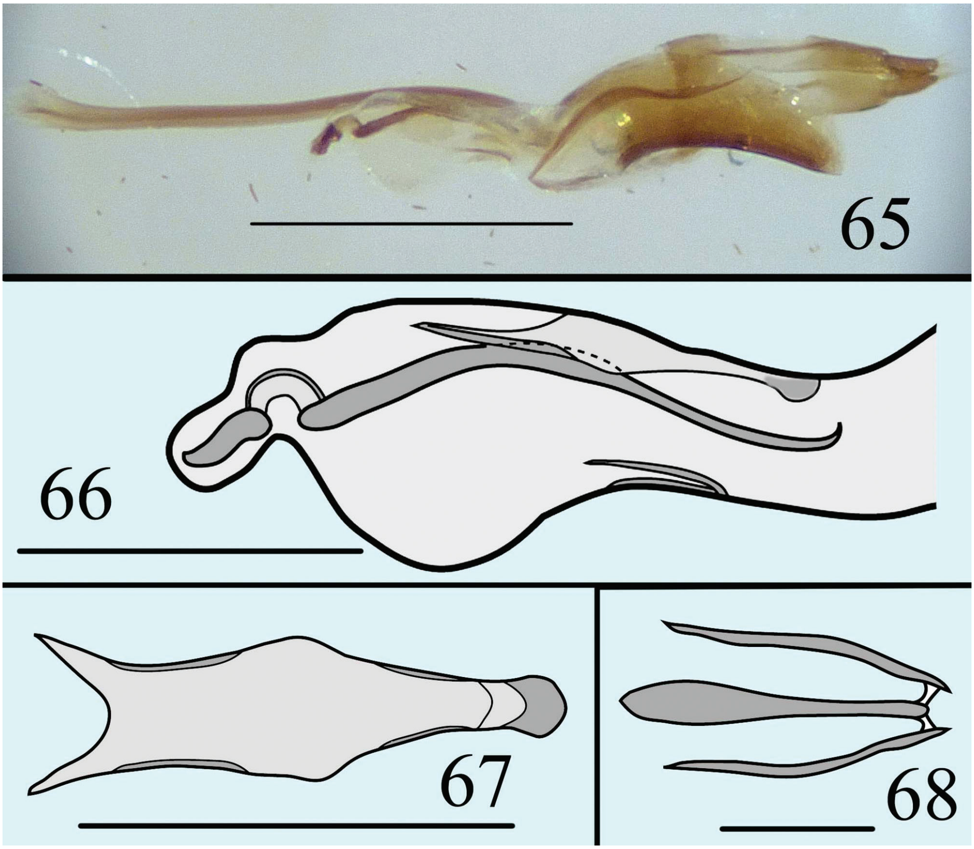


Figures 55–64. Flagellum of *Neosternus higonius* in lateral view **55** Flagellum of *Neosternus higonius* in dorsal view **56** Flagellum of *Neosternus hisamatsui* in lateral view **57** Flagellum of *Neosternus hisamatsui* in dorsal view **58** Flagellum of *Microsternus ulkei* in lateral view **59** Flagellum of *Microsternus ulkei* in dorsal view **60** Flagellum of *Microsternus tricolor* in lateral view **61** Flagellum of *Microsternus tricolor* in dorsal view **62** Flagellum of *Microsternus perforatus* in lateral view **63** Flagellum of *Microsternus perforatus* in dorsal view **64**. Scale=0.1mm (**55–56**), Scale=0.2mm (**57–64**).

Male genitalia (Fig. 65) with flagellum (Fig. 66) curved, bearing a dorsal, arched, cartilaginous mass on apical quarter; flagellar apex acute with a well-separated ventral process; dorsal lobe of internal sac with separated front and triangular end (Fig. 67); ventral lobe of internal sac trident-like (Fig. 68).

Distribution. China, Japan.

Diagnosis. Characterized by its small body and black pronotum.



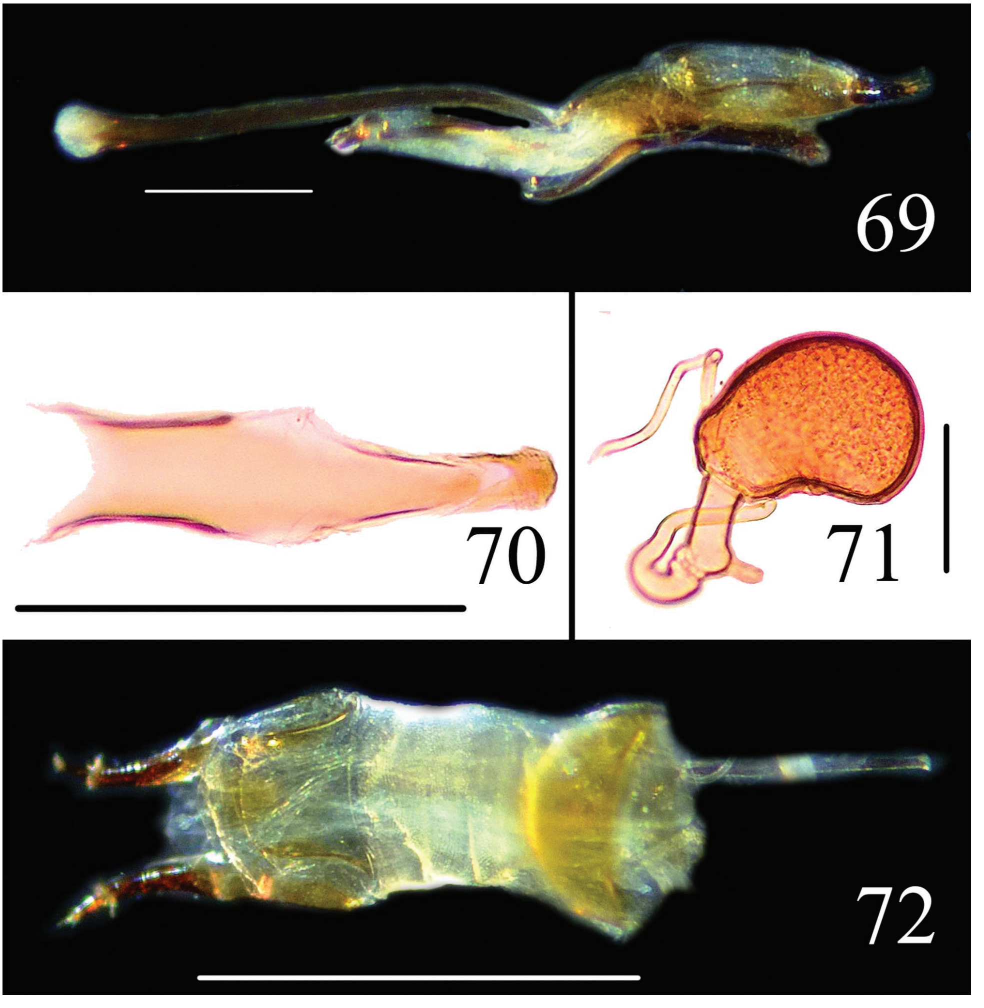
Figures 65–68. Male genitalia of *Neosternus higonius* in lateral view **65** Internal sac of *Neosternus higonius* in lateral view **66** Dorsal lobe of *Neosternus higonius* in dorsal view **6**, Ventral lobe of *Neosternus higonius* in dorsal view **68**. Scale=0.5mm (**65**), Scale=0.2mm (**66**, **67**), Scale=0.05mm (**68**).

Neosternus hisamatsui **(Nakane, 1982), comb. n.**
http://species-id.net/wiki/Neosternus_hisamatsui
Figs 36–37, 39, 44, 49, 54, 57–58, 69–72

Microsternus hisamatsui Nakane, 1982

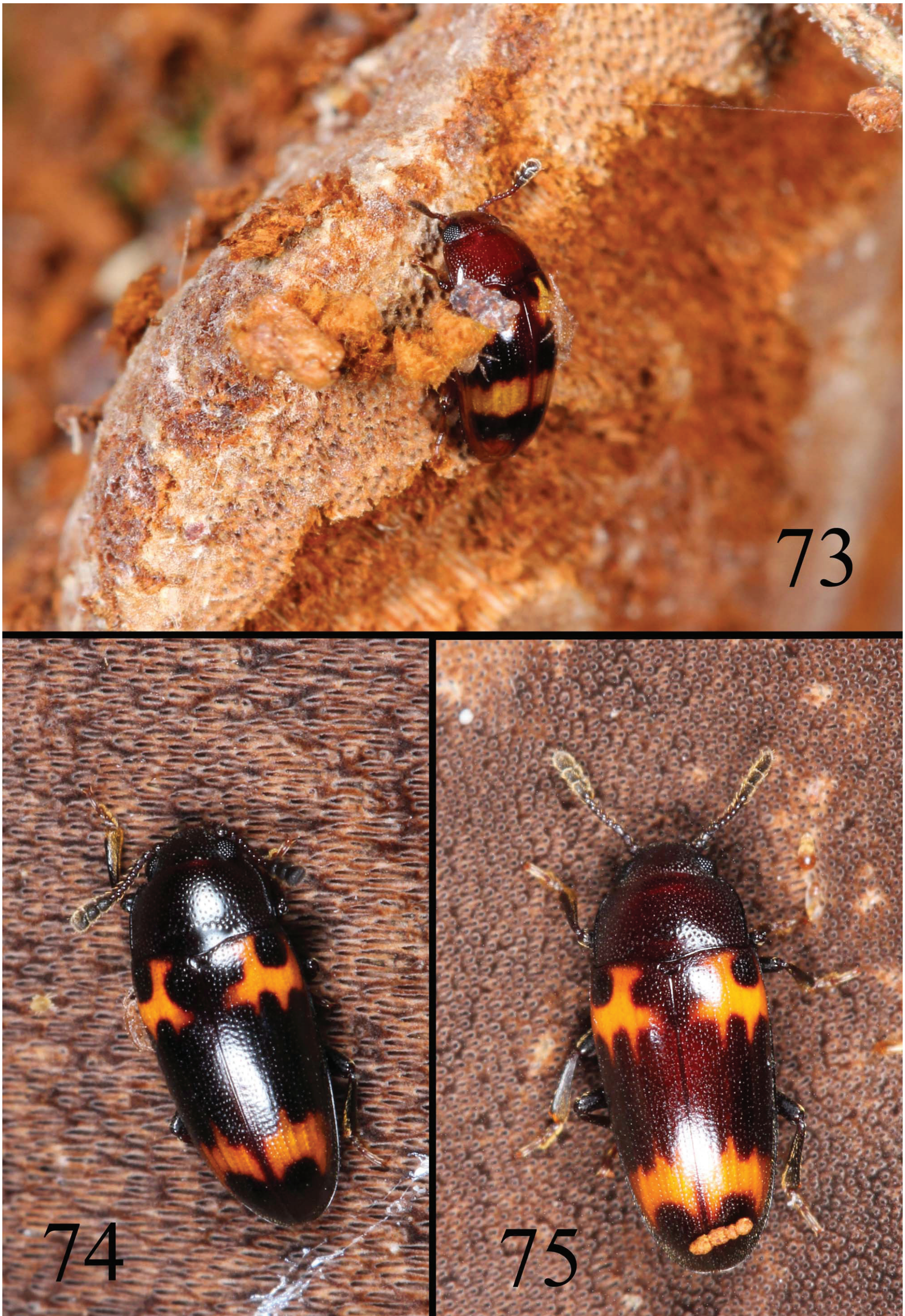
Material examined. CHINA: CHINA: Guangxi Prov.: 3♂♂, 2♀♀, Shangsi County, Mt. Shiwandashan, 21°54'N, 107°53'E, alt. 300–500 m, 25.IV.2011, PENG, ZHAI & ZHU leg. (SNUC); 1♂, Shangsi County, Mt. Shiwandashan, 21°54'N, 107°53'E, alt. 300–500 m, 4.V.2011, Liang Tang leg. (SNUC)

Description. Body (Figs 36, 37) elongate oval, length: 2.4–3.0 mm; width: 1.2–1.4 mm. Head and elytra reddish-brown; pronotum general reddish-brown; legs, palpi and base of antennae reddish-brown. Each elytron with two to four black bands.



Figures 69–72. Male genitalia of *Neosternus hisamatsui* in lateral view **69** Dorsal lobe of *Neosternus hisamatsui* in dorsal view **70** Female genitalia of *Neosternus hisamatsui* in dorsal view **71** Female spermatheca of *Neosternus hisamatsui* **72**. Scale=1mm (**72**), Scale=0.3mm (**69**), Scale=0.2mm (**70**), Scale=0.1mm (**71**).

Head width between eyes = 8 times eye diameter in dorsal view; punctation coarse, sparse, separated by 3-4 puncture diameters; epistome truncate, lacking marginal line on anterior margin; stridulatory files not evident. Eyes coarsely facetted. Antennomere III about 1.8 times as long as IV; antennomere VIII slightly wider than VII, about 1.2 times as wide as long; antennomere IX trapezoidal; antennomere X transverse; antennomere XI almost elliptic; relative lengths of antennomeres II–XI: 15: 18: 10: 10: 10: 10: 10: 14: 15: 17. Maxillary and labial terminal palpomeres acuminate, sensory area restricted to apex. Mentum broad with anterior projection, almost triangular, slightly more than 3.5 times wider than long.



Figures 73–75. Habitat and adult feeding fungues of *Microsternus tricolor* **73** Habitat and adult feeding fungues of *Microsternus perforatus* **74–75**.

Figures 76–78. Type material of *Neosternus higonius* **76** Type material of *Microsternus tricolor* **77** Type material of *Microsternus perforatus* **78**. (NHM).

Pronotum arched, widest at base (pl/pw = 0.55); narrowed from base to apex, with a deep sulcus along each side, which is broadly margined and the bordering gradually widened anteriorly (Fig. 49), which formed thicken lines in lateral view (Fig. 54); disk coarsely and sparsely punctured, except the impunctate medio-basal area, which is limited by an arched transverse row of coarse punctures.

Prosternum (Fig. 39) with median area including its process elevated in an elongate triangular plane, which is distinctly bordered by a ridge on both sides and shortly rounded-subtruncate in front, bearing a few fine punctures; sides rugose, coarsely and densely punctured. Mesosternum almost conceled by prosternal process, impunctate as the mesepisterna, which is somewhat concave. Metasternum rather sparsely and strongly punctured on lateral areas, some finer punctures on median area, with a pair of mesocoxal lines strongly divergent posteriorly. Abdomen rather strongly and closely punctured, but median areas of four basal visible sternites and medio-basal area of last visible sternite with few punctures respectively; without metacoxal lines on basal visible sternite. Legs rather robust.

Scutellum pentagonal, with each corner rounded, flattish and almost impunctate on surface.

Elytra strongly convex, with eight striae of distinct punctures on each elytron and each interstice with a row of extremely fine punctures.

Male genitalia (Fig. 69) with flagellum (Figs 57–58) curved, bearing a dorsal, arched, cartilaginous mass on apical quarter; flagellar apex acute with a well-separated ventral process; dorsal lobe (Fig. 70) of internal sac with separated front and triangular end; ventral lobe of internal sac trident-like.

Female genitalia (Fig. 72) and spermatheca (Fig. 71) simple.

Distribution. China, Japan.

Diagnosis. Characterized by its small body and entirely reddish-brown pronotum.

Comment. *Neosternus hisamatsui* Nakane is similar to *Neosternus higonius* Lewis in the form and color pattern of the body. *Neosternus hisamatsui* can be distinguished from *N. higonius* by the pronotum entirely reddish-brown. *Neosternus higonius* has pronotum black with reddish-brown sides. Though the male genitalia and dorsal lobe of internal sac of *N. higonius* is similar to *N. hisamatsui*, with only one specimen of *N. higonius* available and no Japanese specimens, we can't consider *N. hisamatsui* as a synonym of *N. higonius.* This should be considered after maor materials are available for study.

***Neosternus taiwanus* (Chûjô, 1976), comb. n.**
http://species-id.net/wiki/Neosternus_taiwanus

Microsternus taiwanus Chûjô, 1976.

Distribution. China (Taiwan).

Diagnosis. Characterized by its small body and markings of pronotum.

Comment. Chûjô described *Microsternus taiwanus* from Taiwan. According Chûjô's description, *Neosternus taiwanus* is very similar to *Neosternus higonius*. The only difference between these two species were the bands of pronotum and elytra as noted in the key to species. No specimens are available for study.

Acknowledgements

We thank Paul E. Skelley, Florida State Collection of Arthropods, USA for specimen loans and helpful discussions on distinction and relationship between *Microsternus* and *Neosternus*. We thank Richard A.B. Leschen, New Zealand for assistance with methods and information for this study. We thank Wen-xuan Bi for providing specimens and ecological photo for this work. We thank Zhong Peng for collecting erotylid specimens from China. We thank Yi-kai Zhang for taking type material photos from NHM. We thank Shi-bi Gao for providing photos about *Microsternus* specimens from Taiwan. We thank my teachers and all the collectors mentioned in the paper. The research was supported by the National Natural Science Foundation of China (No. 31101659 and No. 31172134), the Innovation Program of Shanghai Municipal Education Commission (No. 12YZ077) and by Shanghai Normal University (DZL125).

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REVIEW ARTICLE

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Redescription of the enigmatic genus *Genuotermes* Emerson (Isoptera, Termitidae, Termitinae)

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Abstract

The imago and soldier castes of the Neotropical Termitinae species *Genuotermes spinifer* Emerson are redescribed. The gut anatomy of the worker is described in detail for the first time, and morphological variations in the soldier are noted and illustrated. The known geographical distribution of *G. spinifer* is greatly expanded.

Keywords

Taxonomy, morphology, worker gut anatomy, new distributional records, Neotropical region

Introduction

The subfamily Termitinae is represented in the Neotropical region by 18 genera and 96 species (Constantino 2013). Some Neotropical Termitinae genera were recently revised, and the remaining genera are very heterogeneous and poorly defined, much in need of redefinition of the specific limits.

The genus *Genuotermes* was first described by Emerson (1950) from a single soldier specimen collected under a log in the municipality of Corumbá, state of Mato Grosso do Sul, Brazil. Later, Mathews (1977) collected specimens of *Genuotermes spinifer* Emerson, the type-species of *Genuotermes*, inside *Cornitermes* nests in the Serra do Roncador, state of Mato Grosso, and described the imago and worker caste and redescribed the soldier caste, based on external morphological characters.

Re-examination of *Genuotermes* samples deposited in the MZUSP led to a revision of some of the diagnostic characters given in the earlier descriptions (Emerson 1950; Mathews 1977) and provides a set of morphological characters that distinguish *G. spinifer* from all other Neotropical Termitinae species. Notes and illustrations of morphological variations in the soldier caste are presented for the first time. Also, new distributional records are listed for *G. spinifer*, based on samples deposited in different Brazilian Isoptera collections.

Material and methods

The material examined is deposited in the Isoptera collection of the Museu de Zoologia da Universidade de São Paulo (MZUSP). All examinated material are from Brazil and listed under the species redescription, arranged by state (in italics), and the corresponding lot number from the MZUSP (in parentheses). An asterisk after the lot number indicates the samples that contain imagoes. The GPS coordinates are indicated in decimal degrees, and only in the cases that have been registered by the own collectors. The records of samples deposited in the Museu Paraense Emílio Goeldi (MPEG), the Instituto Nacional de Pesquisas da Amazônia (INPA) and the Universidade de Brasília (UnB) were also included to compose a comprehensive species distribution map. The line drawings were made with a camera lucida, and the photographs were taken with a digital camera coupled to a stereomicroscope at different focal points and merged with software. The enteric valve and crop of a worker were mounted on a slide with glycerin and photographed under an optical microscope.

The terminology adopted for the worker digestive tube follows Noirot (2001). The morphometric characters used here and their correspondences with Roonwal's system (Roonwal 1970) are indicated in parentheses, as follows: cross length of mandible, CLM (39); width of head capsule, WH (18); length of head capsule, LH (9); maximum width of pronotum, MWP (68); length of left hind tibia, LT (85). The "distance from the first marginal teeth to the apex" (DMA) is also included, as explained in Fig. 1 (black arrow), as also the cross length of mandible (white arrow). The maximum and minimum values follow the description (N= 32 soldiers from all samples examined).

Taxonomy

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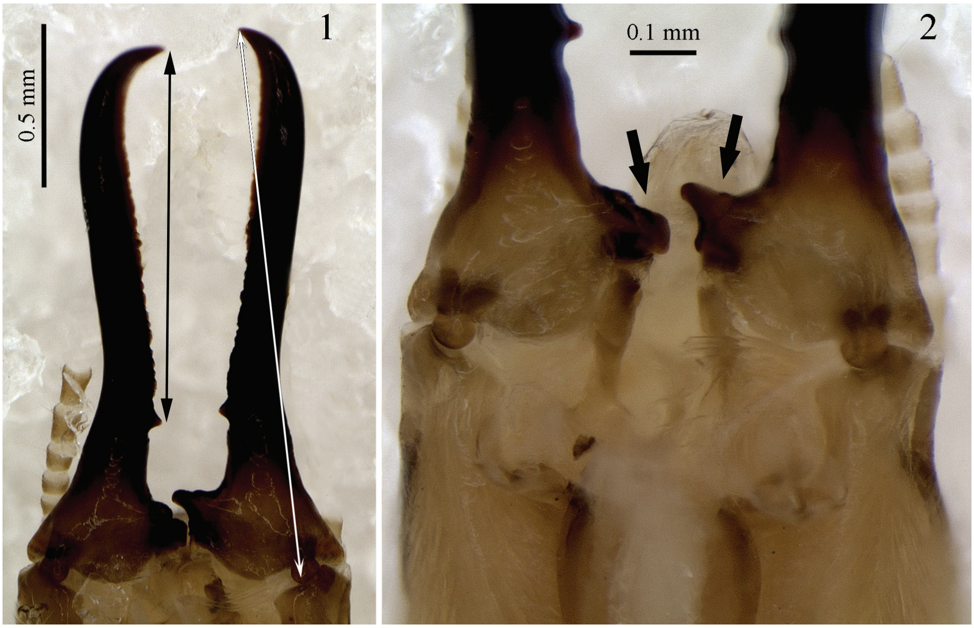
Type-species. *Genuotermes spinifer* Emerson, by monotypy Emerson 1950: p. 5–6 (soldier, Fig. 2).

Mathews 1977: p. 121 (soldier redescription, no figures; imago description, figs 51, 63; worker description, plate 25).



Figures 1–2. *Genuotermes spinifer*: Soldier mandibles in ventral view (mentum and maxillae removed): **1** Distance from the first marginal teeth to the apex (black arrow) and the cross length of mandible (white arrow) **2** Detail of the molar plate and prominence (arrows).

Description. *Imago*. Eyes semispherical, oval in profile, close to but not touching lower margin of head and ocellus (Fig. 4). Fontanelle indistinct, resembling a small slit on the dorsal surface of the head (Fig. 3). Pronotum subtrapezoidal, with anterolateral margins rounded. Posterior margin of mesonotum deeply notched and acute, margin of metanotum more shallow and rounded (Fig. 5). notched Formula for tibial spurs 3:2:2. Head and labrum covered with moderately dense layer of erect bristles, remainder of body covered with very dense layer of decumbent bristles.

Soldier. Mandibles elongated, elbowed at proximal one-third, distal two-thirds with serrated blade on inner surface and salient tooth at base (Figs 1, 6–9). Molar plate and prominence visible at the base (Fig. 2, arrows). Head capsule subrectangular in dorsal view, with a characteristic frontal projection, best viewed in profile (Figs 10–13). Frontal gland aperture at tip of head projection, oriented anteriorly. Labrum subrectangular. Formula for tibial spurs 3:2:2. Head with very sparse bristles, denser on postclypeus and labrum surface, and around the frontal gland aperture. Pro-, meso- and metanotum with bristles only around all margins. Tergites, sternites and legs covered with bristles of variable length, denser than on remainder of body.

Worker. Head capsule rounded in dorsal view. Fontanelle inconspicuous. Antenna with 14–15 articles. Mandibles as in Fig. 19; apical tooth much more developed than marginal teeth, the latter with recognizable tips. Head capsule pilosity similar to imago; thorax and abdomen pilosity similar to soldier.

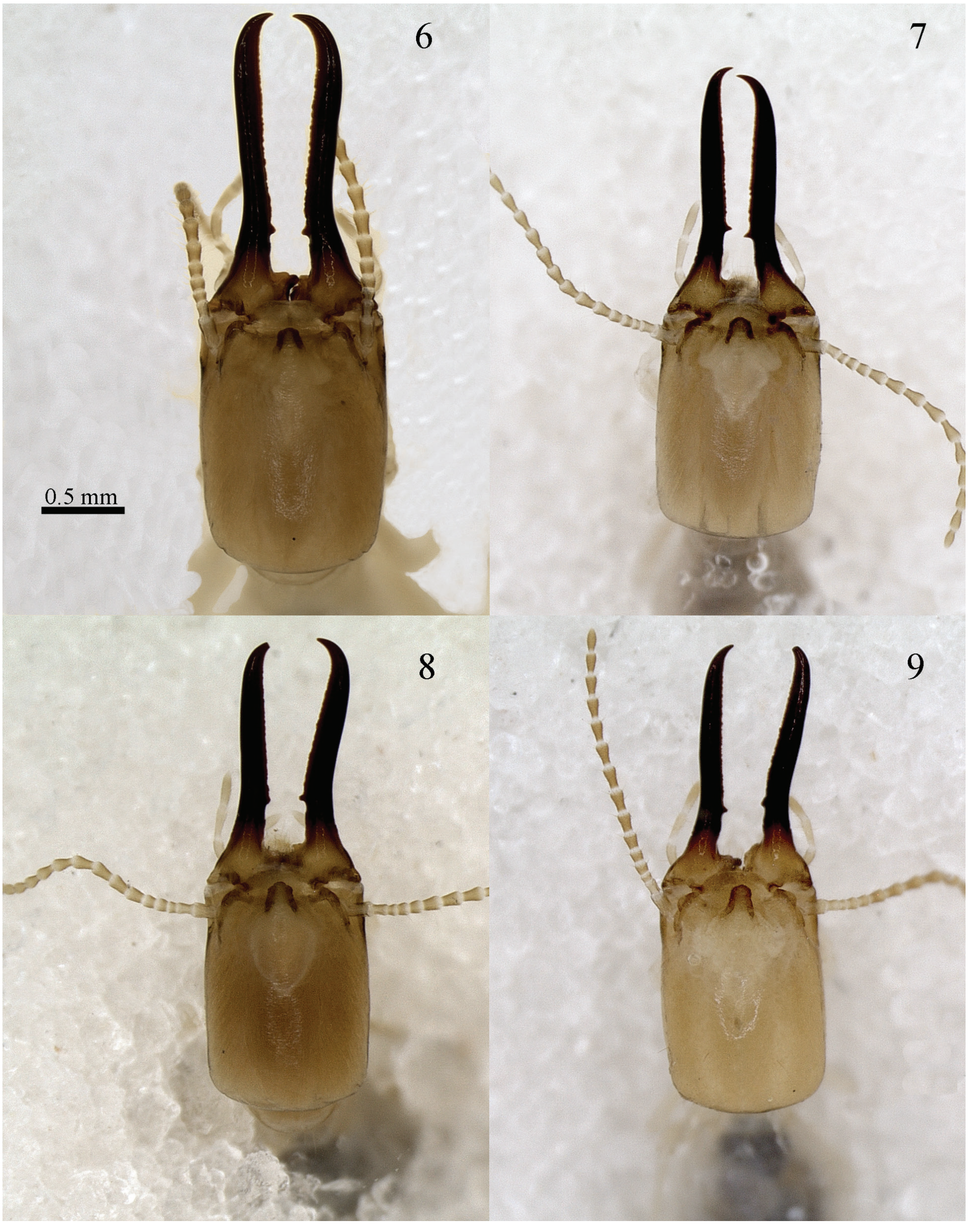
Figures 3–5. *Genuotermes spinifer* imago, female: **3** Dorsal view of head **4** Profile view of head **5** Pronotum and posterior margins in dorsal view.

Digestive tube. Gizzard (Figs 20 and 21) having a columnar belt with 24 visible folds, six of the first order, six of second, and 12 of third, first-order folds with distinctive ornamentation of spines (Fig. 21), pulvilli of second order one-third as large as first-order pulvilli. Mesenteric tongue (MT) elongated, of uniform width, covering half length of mesenteric arch and facing anterodorsal region of body (Figs 15 and 16). Malpighian tubules inserted close to each other on inner surface of mesenteric arch (Fig. 18). P1 dilated, located on left side of body, with the final portion forming an elongated loop that reaches the dorsal region and down to insert on P3 (Fig. 14). Enteric valve (P2) composed by three equidistant longitudinal cushions (Fig. 22), slightly dilated at apex and covered with strong erect spines in a brushlike arrangement (Fig. 23), remaining surfaces with aciculiform and decumbent spines. P3a and P3b without a clear distinction, isthmus clearly recognizable, inserted subapically to beginning of P4 (Figs 14, 17). P4 short, situated in dorsal region of body.

Comparisons with other Neotropical genera of Termitinae. *Imago*. The imago of many species are still unknown and it is difficult to make a comparison for this caste, however some combination of characters may be useful for a diagnosis of this species. The mandibles are very characteristic, with the apical teeth well developed and very acute, the marginal teeth are all well recognizable (in some soil feeder species the M3 of both mandibles are not prominent) and the interval between the M3 and molar plate is narrow. Other unusual characteristics of this species are the thorax and abdomen covered only with decumbent bristles, without any erect setae or bristle.

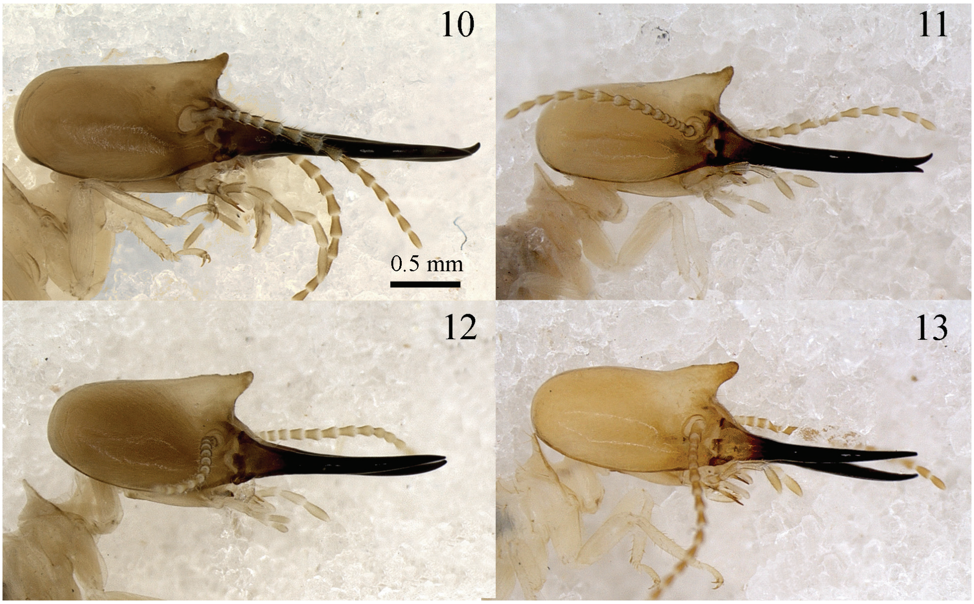
Soldiers. *Genuotermes* soldiers have a combination of characters that make it easily distinguishable from other Neotropical Termitinae genera. *Genuotermes* and *Orthognathotermes* Holmgren 1910 (supposed by Emerson as the closest genera) have elongate mandibles, slightly elbowed outward and symmetrical, a unique characteristic among all Neotropical Isoptera; however, there are some clear differences between the two genera. *Genuotermes* has a projection on the anterior dorsal region of the head, which is absent in *Orthognathotermes*. The frontal gland aperture is recognizable at the apex of projection, whereas in *Orthognathotermes* the aperture is inconspicuous. In the remaining Termitinae genera with similar head structures (*Cavitermes* Emerson, 1925; *Cornicapritermes* Emerson, 1950; *Dihoplotermes* Araujo, 1961; *Divinotermes* Carrijo and Cancello, 2011; *Inquilinitermes* Mathews, 1977; *Spinitermes* Wasmann, 1897; *Termes* Linnaeus, 1758) the gland opening is situated on the base of their respective projections. In the *Genuotermes* soldier the molar plate and prominence are visible at the base of the mandibles (Fig. 2, arrows), in *Orthognathotermes* these structures are absent.

Workers. In the gut the differences among other Neotropical Termitinae genera are much more evident. In *Orthognathotermes* the P1 is tubular, with the same diameter as the mesenteron; the enteric valve (P2) insertion is situated on the right side of the body; and the armature is composed of cushions with projections to the P3 lumen (see Rocha and Cancello 2009: p. 20). In *Genuotermes* the P1 is more enlarged than the mesenteron, with the distal end narrowed, forming a short neck prior to the attachment to P3, and inserted on the left side of the body. This conformation is similar to *Microcerotermes* Silvestri, 1901, *Amitermes* Silvestri, 1901 (see Sands 1998: p. 640–668, 395), *Neocapritermes* Holmgren, 1912 (see Constantino 1998) and some Syntermitinae species (is particularly very similar to *Curvitermes*, see Carvalho and



Figures 6–9. *Genuotermes spinifer*: Soldier morphological variations, dorsal view: **6** Fordlândia, PA (MZUSP-8383) **7** Chapada dos Guimarães, MT (MZUSP-6615) **8** Serra do Roncador, MT (MZUSP-7400) **9** UHE Santo Antônio (Módulo de Jirau), RO (MZUSP-16354).

Constantino 1998: p. 650; and *Silvestritermes*, see Rocha et al. 2012: p. 811–812). The enteric valve armature is very similar to *Neocapritermes*, with columnar cushions arranged triradially (Fig. 22), but, some Syntermitinae species apparently share this



Figures 10–13. *Genuotermes spinifer*: Soldier morphological variations, profile: **10** Fordlândia, PA (MZUSP-8383) **11** Chapada dos Guimarães, MT (MZUSP-6615) **12** Serra do Roncador, MT (MZUSP-7400) **13** UHE Santo Antônio (Módulo de Jirau), RO (MZUSP-16354).

triradial digitiform pattern (*Paracurvitermes*, see Constantino and Carvalho 2011 p. 285; *Cyrilliotermes*, Constantino and Carvalho 2012 p.38 and *Embiratermes festivellus*, see Rocha et al. 2012: p. 801), although not so similar.

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Figs 1–24

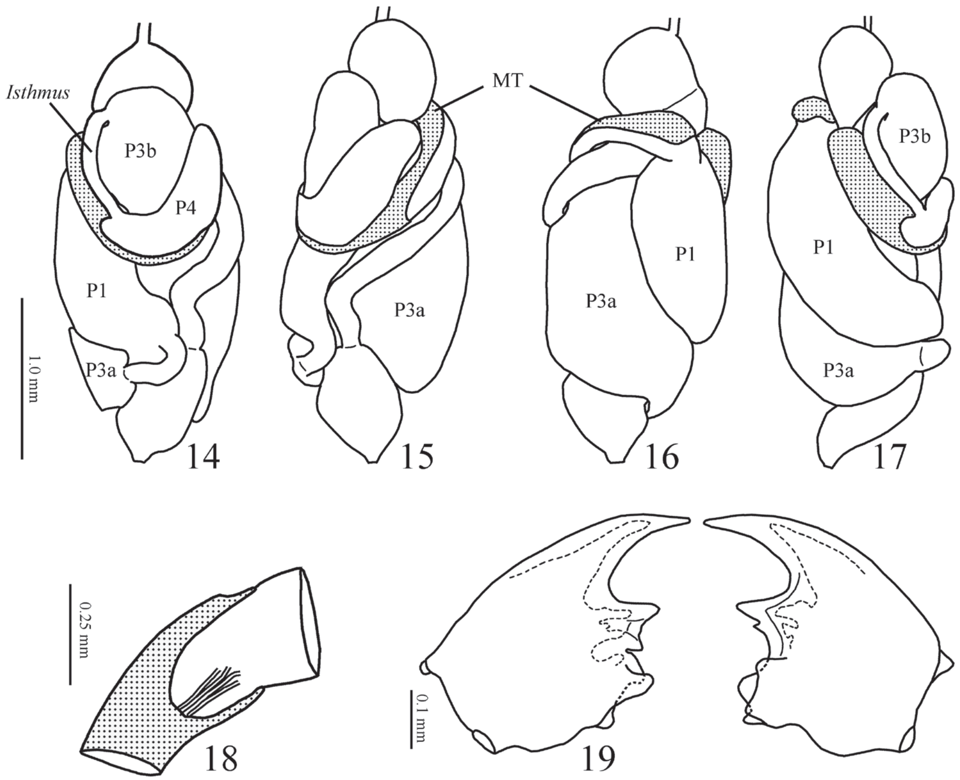
Holotype. One soldier deposited at the American Museum of Natural History (AMNH), from Brazil, Mato Grosso do Sul state, Serra do Urucum (Municipality of Corumbá), 14.viii.1926, K.P. Schmidt coll. (not examined).

Imago. As for the genus (*vide supra*). *Measurements*. See Mathews (1977: 124).

Soldier. As for the genus (*vide supra*). *Measurements* (mm): DMA: 1.05–1.40; CLM: 1.65–1.95; WH: 1.05–1.25; LH: 1.50–1.75; MWP: 0.68–0.93; LT: 0.85–1.00.

Worker. As for the genus (*vide supra*).

Biology and habits. Information about the life habits of *Genuotermes* is sparse and comes only from field notes of collectors. This species apparently lives in diffuse galleries in the soil, and is sometimes found in the nest of other termites (*Labiotermes leptothrix*, *Cornitermes cumulans* and *Cornitermes silvestrii*). They probably feed on hu-

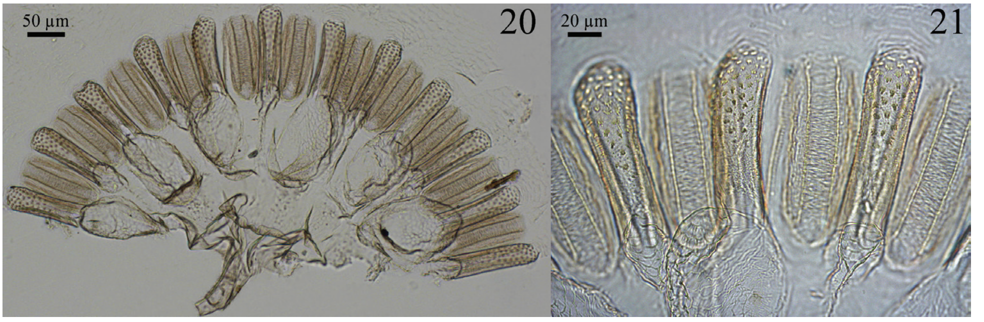


Figures 14–19. 14–17 *Genuotermes spinifer* worker gut *in situ*. **14** Dorsal **15** Right **16** Ventral **17** Left (MT= mesenteric tongue; P1= first proctodeal segment (ileum); P3a and b = third proctodeal segment (paunch); P4a= first part of fourth proctodeal segment (colon) **18** Malpighian tubules insertion **19** Worker mandibles, dorsal view.

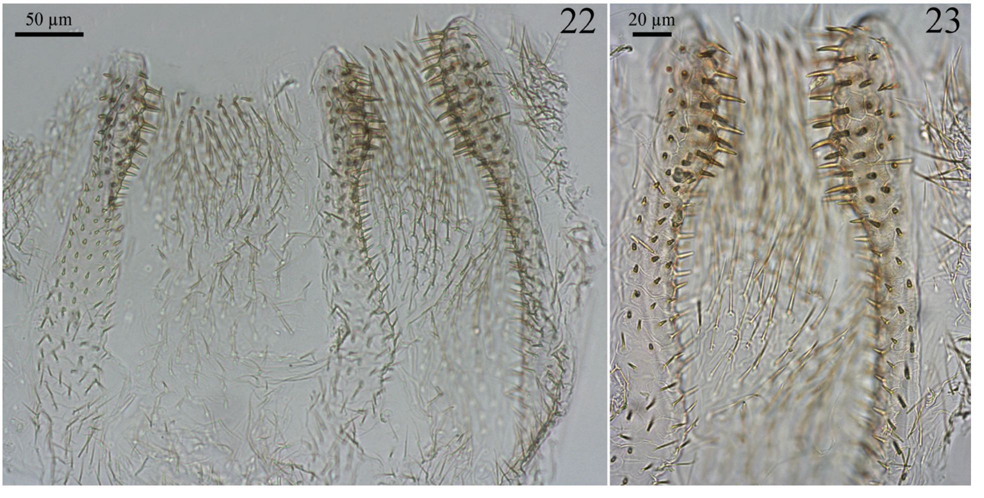
mus in subterranean galleries. The morphology of the worker mandibles (humivorous type) and the finding of sand particles in the gut (personal observation) concord with this hypothesis.

Geographical distribution. The records of *Genuotermes spinifer* presented here represent a significant extension of the previously known distribution. The species' occurrence now includes different vegetation zones, the Brazilian Cerrado and the Amazon Forest.

Material examined. BRAZIL. *Amazonas:* Itacoatiara, 04.xi.1977, A. Bandeira (7479); 23.v.1977 (8353). *Goiás:* Cana Brava (Faz. Itaúna), 07.v.1975, K. Kitayama (7310). *Mato Grosso:* Cuiabá (14 Km NW), 15.ii.1976, R.L. Araujo (6526); Cuiabá (Vale do Rio Mutuca), 06-10.viii.2009, S.P. Rosa (12643); Chapada dos Guimarães, 10.ii.1976, R.L. Araujo (6633, 6615); Cotriguaçu (-9.857; -58.413), 29.xi.2011, R.C. Paula (16352); Coxipó, 14.ii.1976, R.L. Araujo (6703); 18.ii.1976



Figures 20–21. *Genuotermes spinifer* worker gizzard: **20** Columnar and pulvillar belts **21** Detail of ornamentation on the columns.



Figures 22–23. *Genuotermes spinifer* worker enteric valve: **22** Arrangement of the cushions **23** Detail of the cushions.

(7217); 17.ii.1976 (6857); Serra do Roncador, ix–x.1968, A.G.A. Mathews (7400, 7399*). *Pará:* Belterra, 31.i.1949, C.R. Gonlçalvez (4306); Fordlândia, ii.1957, A.M. Almeida (8383). *Piauí:* Floriano, 5–12.xi.1991, E.M. Cancello and M.T. Ponte (10188); Sete Cidades, 14.xii.1976, R.L. Araujo (7194). *Rondônia:* Porto Velho (Hydroelectric Reservoir of Jirau, Mutum-Paraná, -9.607; -65.050), 26.ii–13.iii.2010, T. Carrijo and R. Santos (13009); Porto Velho (UHE Santo Antônio, Jaci-Paraná, -9.4559; -64.388), 08.iv.2011, R. Santos and C. Mandai (16355); 09.ix.2011, R. Santos and J. Cabral (16253); 06.iii.2012, T. Carrijo and J. Cabral (16356); Porto Velho (UHE Santo Antônio, Jirau, -9.312; -64.726), 18.ix.2010, T. Carrijo and R. Santos (16354*).

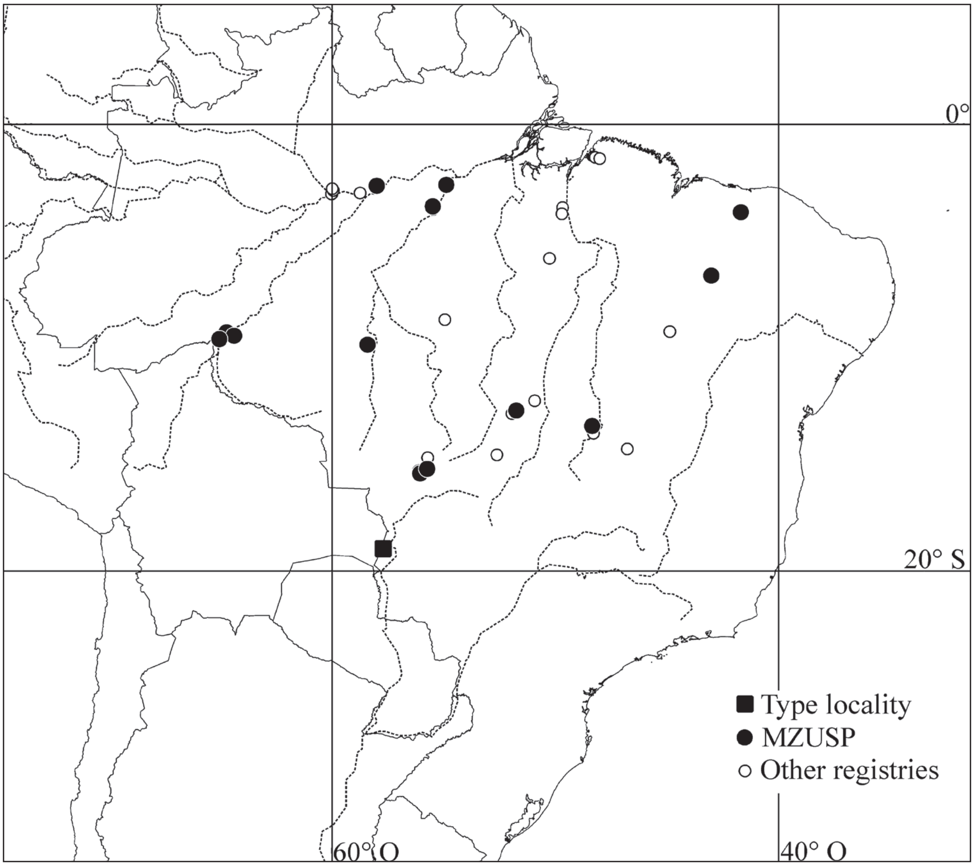


Figure 24. Geographic records of *Genuotermes spinifer* from type-locality (black square), material examined from MZUSP (black circle), and samples deposited at INPA, MPEG and UnB.

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