

Notes on Carabid Beetles (Coleoptera, Carabidae) from Mt. Miao'er Shan in Northeastern Guangxi, South China

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Abstract Nine species of the genus *Carabus* are recorded from Mt. Miao'er Shan in northeastern Guangxi of South China, with descriptions of detailed structure of the male genital organ and some taxonomical notes. Three taxa, *cordithoracicus*, *philoscius*, and *adriaenssensi*, are downgraded to subspecies of previously known species.

Mt. Miao'er Shan, situated at the northeastern part of Guangxi Province near the Hunan borders, is the highest mountain in the southern part of the Chinese Continent, attaining to a height of 2,142 m. It is one of the most important nature protective areas in the same province, and a good natural forest is preserved particularly at the upper part of the mountain. However, nothing was known about the carabid fauna of this mountain range until recent years. It is DEUVE (1989, pp. 160–161) who first recorded the species belonging to the genus *Carabus* occurring on this mountain; he described two new species under the names *Carabus (Apotomopterus) guangxicus* and *C. (A.) toulgoeti* on the basis of the specimens preserved in the collection of the Academia Sinica in Beijing. Two other important papers on the carabid fauna of the same mountain range were subsequently published, first by LASSALLE and PRUNIER (1993) and then by CAVAZZUTI (1995), in which they added ten more taxa, including six "new species", to the carabid fauna of the mountain. Thus, Miao'er Shan is now known to be the place whose carabid fauna has been most satisfactorily investigated in China. It is worth noting that the mountain is above all abundant in the members of the subgenus *Apotomopterus*; as much as nine species belonging to this subgenus occur nearly sympatrically on the same range.

Late in the spring of 1996, I had an opportunity of investigating the carabid beetles of Mt. Miao'er Shan mainly at the upper part of the mountain, as one of the members of the 1996 expedition of the Sino-Japanese cooperative study on the soil fauna of Southwest China. I have succeeded in obtaining nine of twelve hitherto known species belonging to the genus *Carabus* (s. lat.). Herewith I give a list of these species, with descriptions mainly of detailed structure of the male genitalia and some notes on their taxonomic status or distribution, etc. Some specimens were immediately killed in 95% ethanol and transmitted for extraction of the mitochondrial DNA. The results will be reported in my other article to be prepared in cooperation with the staff of the Biohis-

tory Research Hall (Osaka).

Before going further, I wish to express my deep gratitude to Dr. Shun-Ichi UÉNO of the National Science Museum, Tokyo, who kindly supported me during the expedition and revised the manuscript of this paper. I am deeply indebted to the following members of the expedition for their kind help during the survey: Professor Masataka SATÔ, Professor Yoshiaki NISHIKAWA and Dr. Akiko SAITO. Hearty thanks are also due to Professor YIN Wen-ying of the Shanghai Institute of Entomology, Academia Sinica, for her kind help extended to our research, and Messrs. XIE Rong-dong of the same institute and ZHAO Cui-min of the Nanning branch for their kind assistance in the field.

1. *Carabus* (s. str.) *nanosomus cordithoracicus* DEUVE, 1989, stat. nov.

(Fig. 1)

Carabus (*Apotomopterus*) *cordithoracicus* DEUVE, 1989, *Nouv. Revue Ent.*, (N. S.), **6**, p. 163; type locality: Chine, Guangxi, Longsheng Xian, Huaping, 1,420 m.

Carabus (s. str.) *cordithoracicus*: DEUVE, 1991, *Bibliothèque Entomologique*, **4**, p. 31. — DEUVE, 1994, *ibid.*, **5**, p. 88.

Male genitalia. Aedeagus as shown in Fig. 1 a–c. Digitulus sagittiform, about 1.6 times as long as wide, widest at the base, and gradually narrowed to the apex which is rather obtusely pointed; viewed laterally, central part of the basal ridge strikingly protuberant to form a trapezoidal projection.

Specimens examined. 1 ♂, Tieshan Ping (2,000 m), 25–V–1996; 2 ♂♂, 3 ♀♀, above Antang Ping (1,820 m), 25–27–V–1996; 3 ♂♂, 5 ♀♀, above Liangshui (1,700–1,750 m), 26–27–V–1996, all on Mt. Miao'er Shan in Xing'an Xian of northeastern Guangxi, South China, collected by Y. IMURA.

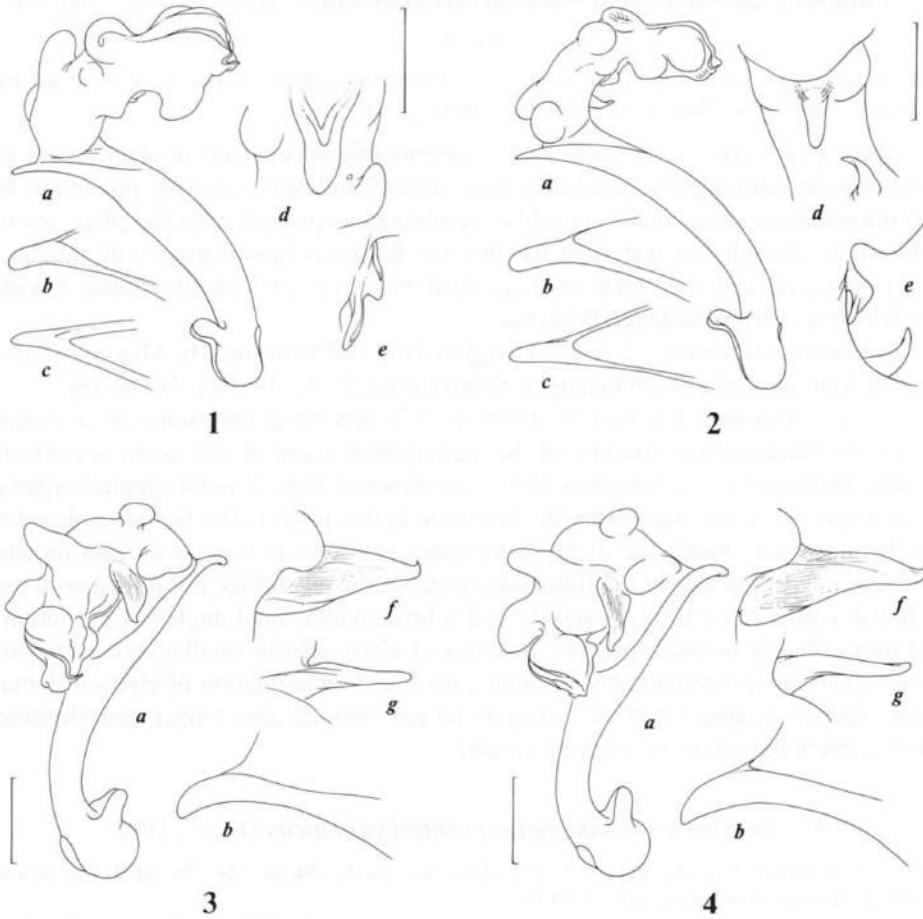
Notes. Though originally described as a distinct species, conformation of the male genitalia of this taxon agrees with the specific characters of *Carabus nanosomus* HAUSER distributed on Mt. Jinfo Shan of SE Sichuan. It is therefore downgraded to a subspecies of the latter species. Subsp. *cordithoracicus* differs from the nominotypical one in the following points: size larger; pronotum a little more elongate and more strongly narrowed towards hind angles; elytra longer and slenderer; tertiary intervals of elytra much less frequently segmented; tarsi and legs longer and slenderer; apical part of aedeagus longer; digitulus less sharply pointed at the tip, with the basal ridge more elongate longitudinally and more strongly protrudent dorsad.

2. *Carabus* (*Isiocarabus*) *miaorum* LASSALLE et PRUNIER, 1993

(Fig. 2)

Carabus (*Isiocarabus*) *miaorum* LASSALLE et PRUNIER, 1993, *Bull. Acorep*, **17**, p. 17, figs. 4, 9; type locality: Chine, Guangxi, E. Longsheng, Mts. Miao Er Shan, 1,500 m.

Male genitalia. Aedeagus and endophallus as shown in Fig. 2 a–e. Apical lobe of aedeagus long and slender, subparallel-sided and gently rounded at the tip in



Figs. 1–4. Male genital organ of *Carabus* (s. lat.) spp. from Mt. Miao'er Shan (1–2, 4) and Mt. Daming Shan (3) of Guangxi Province in South China. — 1, *Carabus* (s. str.) *nanosomus cordithoracicus* stat. nov.; 2, *C. (Isiocarabus) miaorum*; 3, *C. (Apotomopterus) wumingensis*; 4, *C. (A.) w. philoscus* stat. nov.; a, aedeagus with fully everted endophallus in right (1, 2) and left (3, 4) lateral view; b, apical part of aedeagus in right lateral view; c, ditto in dorsal view; d, digitulus in dorsal view; e, ditto in right lateral view; f, spinula in dorsal view; g, ditto in basal view. Scale: 2 mm for a, 1 mm for b–g.

lateral view. Paraligula strongly developed and projected dorsad like a horn as shown in Fig. 2 a, d–e. Digitulus rather long and slender in dorsal view, and much thickened at the median portion to form an L-shaped sclerite in lateral view.

Specimens examined. 1 ♂, above Antang Ping (1,820 m), 27–V–1996; 8 ♂♂, 17 ♀♀, Hongjun Ting (1,550 m), 27–V–1996; 5 ♂♂, 4 ♀♀, Dujuan Yuan (1,200 m), 27–V–1996, all on Mt. Miao'er Shan in Xing'an Xian of northeastern Guangxi, South China, collected by Y. IMURA.

3. *Carabus (Apotomopterus) wumingensis philoscus* CAVAZZUTI, 1995, stat. nov.

(Fig. 4)

Carabus (Apotomopterus) philoscus CAVAZZUTI, 1995, Lambillionea, **95**, p. 35, figs. 1 c-d, 3 c-d, 4 e; type locality: Mao Er [sic] Shan, 1,200-1,500 m, Guanxi [sic] sett., Cina.

Male genitalia. Aedeagus not so remarkably specialized in shape, with the apical portion subtriangular, gradually bent ventrad and rather sharply pointed at the tip. Endophallus with a small hump-like membranous projection at the place for the median lobe, though it is uncertain whether the former is homologous with the latter. Spinula elongate and triangular in shape in dorsal view, and gently sinuate towards apex which is sharply hooked left laterad.

Specimens examined. 1 ♂, 1 ♀, Hongjun Ting (1,550 m) on Mt. Miao'er Shan in Xing'an Xian of northeastern Guangxi, South China, 27-V-1996, Y. IMURA leg.

Notes. Although CAVAZZUTI (1995, p. 35) described *philoscus* as a distinct species, the fundamental structure of the male genital organ of this taxon is evidently the same as that of *C. wumingensis* DEUVE as shown in Figs. 3 and 4 (genital organ of DEUVE's species is also figured for the first time in this paper). The former is therefore regarded as a mere local race of the latter species. Subsp. *philoscus* is discriminated from subsp. *wumingensis* in the following respects: dorsal surface not tinged with purple-bluish colour but entirely blackish, and a little matter; hind angles of pronotum a little more sharply pointed; primary foveoles of elytra a little smaller; secondary and tertiary intervals less remarkably crenulate; preapical emargination of elytra in female a little shallower; apical part of aedeagus longer; spinula also longer and slenderer, with the apical portion more strongly sinuate.

4. *Carabus (Apotomopterus) sauteri yunkaicus* DEUVE, 1992

Carabus (Apotomopterus) yunkaicus DEUVE, 1991, Bull. Soc. ent. Fr., **96**, pp. 224, 226, fig. 3; type locality: Chine, Guangxi, Longsheng Xian, 1,420 m.

Carabus (Apotomopterus) sauteri yunkaicus: IMURA, 1994, Elytra, Tokyo, **22**, pp. 12-13, figs. 14-15, 23, 31, 40.

Specimens examined. 1 ♂, 1 ♀, near the summit of Mt. Miao'er Shan (2,100 m), 26~27-V-1996; 11 ♂♂, 11 ♀♀, above Antang Ping (1,820 m), 25~27-V-1996; 4 ♂♂, above Liangshui (1,700-1,750 m), 26~27-V-1996, 5 ♂♂ 5 ♀♀, Hongjun Ting (1,550 m), 27-V-1996, all on Mt. Miao'er Shan in Xing'an Xian of northeastern Guangxi, South China, collected by Y. IMURA.

Notes. This carabid beetle was obtained from Hongjun Ting (1,550 m in altitude) to near the summit of the mountain (ca. 2,100 m in altitude), and its vertical distribution seems to be widest of all the species recorded by our expedition.

5. *Carabus (Apotomopterus) inagakii liaorum* CAVAZZUTI, 1995

Carabus (Apotomopterus) inagakii liaorum CAVAZZUTI, 1995, Lambillionea, **95**, p. 38, figs. 2 b, 3 e-f, 4 c; type locality: Mao Er [sic] Shan, 1,500 m, Guanxi [sic] N-occidentale, Cina.

Specimens examined. 6 ♂♂, 9 ♀♀, Hongjun Ting (1,550 m), 27-V-1996; 1 ♂, 1 ♀, Dujuan Yuan (1,200 m), 27-V-1996, all on Mt. Miao'er Shan in Xing'an Xian of northeastern Guangxi, South China, Y. IMURA leg.

Notes. This taxon was obtained mainly from the middle altitudinal area, between the height of 1,200 m and 1,550 m. It is sympatric with such species as *C. miaorum*, *C. s. yunkaicus*, *C. w. philoscius* and *C. a. arrogantior*.

6. *Carabus (Apotomopterus) toulgoeti* DEUVE, 1989

(Fig. 5)

Carabus (Apotomopterus) toulgoeti DEUVE, 1989, Nouv. Revue Ent., (N. S.), **6**, p. 161; type locality: Chine, Guangxi, Miao'er Shan, 1,900 m.

Male genitalia. Aedeagus not remarkably specialized in shape, with the median portion long and almost parallel-sided, the apical lobe robust and rather acutely hooked ventrad. Endophallus also poor in the original characteristics as shown in Fig. 5 a. Spinula leaf-shaped in dorsal view, strongly narrowed towards apex, with the surface remarkably rugulose.

Specimens examined. 2 ♀♀, above Tian Hu (2,000 m), 25-V-1996; 8 ♀♀, Tieshan Ping (2,000 m), 24~25-V-1996; 5 ♂♂, 10 ♀♀, above Antang Ping (1,820 m), 25~27-V-1996; 12 ♂♂, 10 ♀♀, above Liangshui (1,700-1,750 m), 26~27-V-1996, all on Mt. Miao'er Shan in Xing'an Xian of northeastern Guangxi, South China, collected by Y. IMURA.

Notes. Although much specialized in colour and external appearance, and obviously showing a tendency of convergence to *C. l. acorep* LASSALLE et PRUNIER, this unique species is considered to belong to the group of *C. sauteri* ROESCHKE, judging from the conformation of the male genital organ.

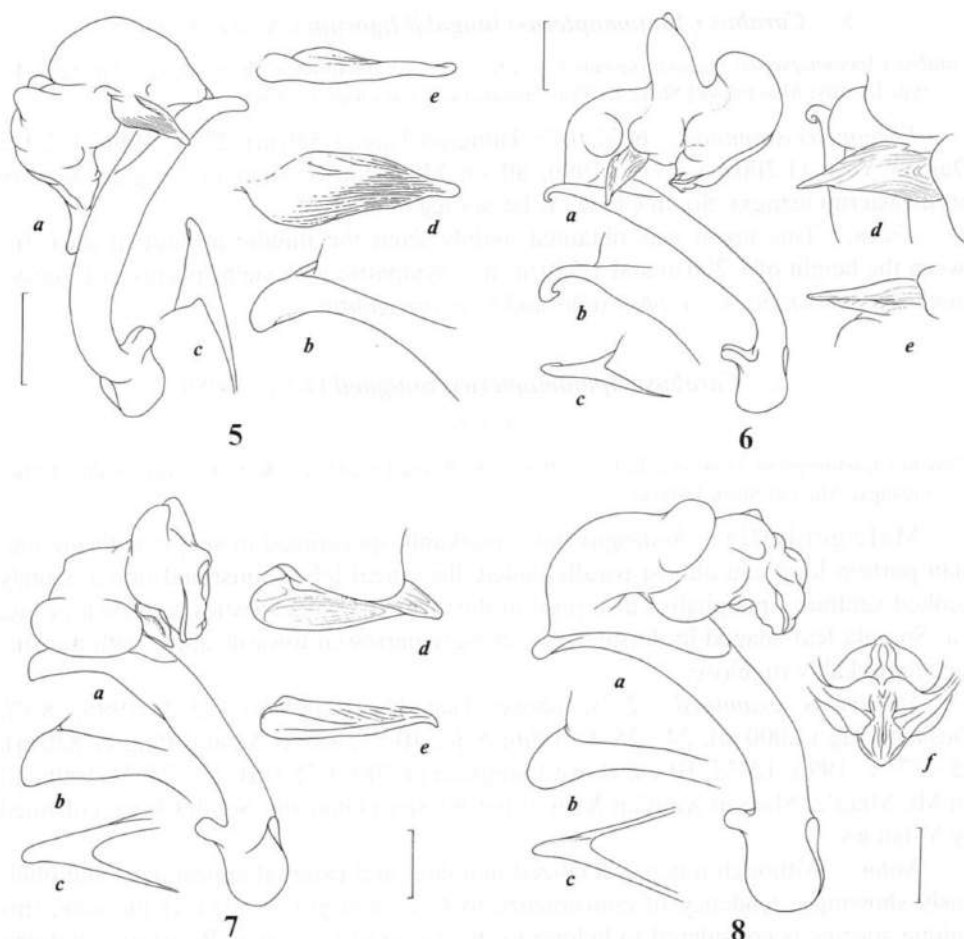
7. *Carabus (Apotomopterus) longeantennatus acorep* LASSALLE et PRUNIER, 1993

(Fig. 6)

Carabus (Apotomopterus) acorep LASSALLE et PRUNIER, 1993, Bull. Acorep, **17**, p. 18, figs. 7, 8; type locality: Chine, Guangxi, Mts. Miao Er Shan, 1,800 m.

Carabus (Apotomopterus) longeantennatus acorep: DEUVE, 1994, Bibliothèque Entomologique, **5**, p. 69.

Male genitalia. Aedeagus as was already figured by LASSALLE and PRUNIER (1993, p. 18), but more precisely as in Fig. 6 a-c in the present paper. Endophallus rather peculiar in shape for a member of the subgenus; parapraeputal lobes well-developed, long and strongly projected dorsad; apical portion extraordinarily inflated, with the praeputal pad vestigial; aggonoporus forming a short gonoporal plate, with the



Figs. 5–8. Male genital organ of *Carabus* (s. lat.) spp. from Mt. Miao'er Shan of NE Guangxi in South China. — 5, *Carabus* (*Apotomopterus*) *toulgoeti*; 6, *C. (A.) longeantennatus acorep*; 7, *C. (A.) arrowi arrogantior*; 8, *C. (Coptolabrus) pustulifer adriaenssensii* stat. nov.; a, aedeagus with fully everted endophallus in right (6–8) and left (5) lateral view; b, apical part of aedeagus in right lateral view; c, ditto in dorsal view; d, spinula in dorsal view; e, ditto in basal view; f, aggonoporus in ventral view. Scale: 2 mm for a, 1 mm for b–f.

basal part rather strongly sclerotized. Spinula as shown in Fig. 6 d–e, not so strongly sclerotized for the subgenus.

Specimens examined. 9 ♂♂, 15 ♀♀, above Antang Ping (1,820 m), 27–V–1996; 2 ♂♂, 1 ♀, above Liangshui (1,700–1,750 m), 27–V–1996, all on Mt. Miao'er Shan in Xing'an Xian of northeastern Guangxi, South China, collected by Y. IMURA.

Notes. Although the two French authors described *acorep* as a distinct species, basic structure of its male genital organ suggests that this taxon should be treated as a

subspecies of *C. longeantennatus* HAUSER, as was already pointed out by DEUVE (1994, p. 69). The former is distinguished from the latter by the following characteristics: size much larger; dorsal colour a little more dark bluish; median tooth of mentum narrower and more sharply pointed; hind angles of pronotum more strongly protruded posteriad; elytra longer and slenderer; primary intervals much wider to form rows of roundly shaped large tubercles; tertiary costae almost vestigial; spinula more narrowly contracted towards apex, with the tip more sharply pointed. Of the total eleven males examined, seven (64%) were normal in position of the aedeagus, whereas the remaining four (36%) showed inversion of the same organ as shown in Fig. 6.

8. *Carabus (Apotomopterus) arrowi arrogantiior* DEUVE, 1991

(Fig. 7)

- Carabus (Apotomopterus) arrogantiior* DEUVE, 1991, Nouv. Revue Ent., (N. S.), **8**, p. 102; type locality: Chine, Guangxi, Longsheng Gezu Zizhixian, Huaping. — LASSALLE & PRUNIER, 1993, Bull. Acorep, **17**, pp. 17–18, fig. 5. — DEUVE, 1991, Bibliothèque Entomologique, **4**, p. 21.
Carabus (Apotomopterus) arrowi arrogantiior: CAVAZZUTI, 1995, Lambillionea, **95**, p. 36.
Carabus (Apotomopterus) hector: DEUVE, 1994, Bull. Soc. Sci. Nat., (80), p. 15. — DEUVE, 1994, Bibliothèque Entomologique, **5**, p. 75.

Male genitalia. As shown in Fig. 7, fundamental structure of aedeagus and endophallus of this taxon is not remarkably different from that of the other subspecies of *C. arrowi* HAUSER, though the spinula is much wider at the base in dorsal view.

Specimens examined. 8 ♂♂, 9 ♀♀, above Antang Ping (1,820 m), 25–27–V–1996; 9 ♂♂, 7 ♀♀, above Liangshui (1,700–1,750 m), 26–27–V–1996, 2 ♂♂, 1 ♀, Hongjun Ting (1,550 m), 27–V–1996, all on Mt. Miao'er Shan in Xing'an Xian of northeastern Guangxi, South China, collected by Y. IMURA.

Notes. In the present subspecies, primary intervals consist of rows of large tubercles and the tertiary intervals are almost vestigial, and they seem to be the most noticeable subspecific characters, which are shared with subsp. *hector* BREUNING from Hunan Province. There is little doubt that these two taxa are very closely allied to each other, and the former may be regarded as a synonym of the latter, as DEUVE (1994) did so. However, I prefer to treat *arrogantiior* as a distinct subspecies of *C. arrowi*, since nothing has been known about the male of subsp. *hector*. So far as I have examined, all the 19 male specimens did not show inversion of the aedeagus, a phenomenon which is commonly observed in the other subspecies of *C. arrowi*.

9. *Carabus (Coptolabrus) pustulifer adriaenssensi*

LASSALLE et PRUNIER, 1993, stat nov.

(Fig. 8)

- Carabus (Coptolabrus) adriaenssensi* LASSALLE et PRUNIER, 1993, Bull. Acorep, **17**, p. 18, fig. 3; type locality: Chine, Guangxi, E. Longsheng, Mts. Miao Er Shan, 900–1,500 m. — DEUVE, 1994, Bibliothèque Entomologique, **5**, p. 244.

Male genitalia. Aedeagus with the median portion comparatively long and parallel-sided, membranous ostium comparatively small, and the apical portion longer and rather strongly bent ventrad. Parapraepitular lobes very small and not strongly protrudent dorsad. Aggonoporiis is recognised as a short triangularly shaped gonoporal plate with weak pigmentation.

Specimen examined. 1 ♂, Tieshang Ping (2,000 m), on Mt. Miao'er Shan in Xing'an Xian of northeastern Guangxi, South China, 27-V-1996, Y. IMURA leg.

Notes. Both the external and genitalic morphologies of this taxon reveal that it should be regarded as a mere local race of *C. pustulifer* LUCAS, though it is worth noting that the basal three segments of the male foretarsus are dilated and hairy in the present subspecies. This character is very unique for the species, since all the segments of the male foretarsus are neither dilated nor hairy in most subspecies of *C. pustulifer*, except for subsp. *mirificus* KRAATZ of Hubei Province whose male foretarsus is dilated and hairy in the basal two segments.

要 約

井村有希：中国广西省苗儿山のオサムシ。——苗儿山 Maio'er Shan は中国广西省の北東端に位置し、同省の重要な自然保護区のひとつで、中腹より上には豊かな原生林が残されている。この山のオサムシに関しては、1989年以後の7年間に、フランスやイタリアの研究者による報告があい次ぎ、今では中国のなかでもオサムシ相のもっともよく知られた山のひとつになっている。本論文では、1996年5月下旬に同山において行われた中日共同学術調査によって得られた9種のオサムシをリストアップしたうえで、7種の♂交尾器を詳細に図示、再記載し、あわせて若干の分類学的位置や分布に関する知見を与えた。このうち、みつつの分類単位に関しては、主として♂交尾器の基本形態に基づき、独立種から既知種の亜種へと降格した。

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