

***Burmagomphus schneideri* sp. nov., a new dragonfly from the south of Vietnam (Odonata: Gomphidae)**

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Burmagomphus schneideri sp. nov. (Rung Giong, Kanak commune, K' Bang district, 14° 8' 42.05" N, 108° 36' 37.33" E Gia Lai Province in the southern part of Vietnam, leg. Do, 27 iv 2010, to be deposited in Vietnam National Museum of Nature) is described from the male sex and compared with males of the closely related species *B. vermicularis* and *B. arboreus*. Full illustrations of topotypical male *B. vermicularis* are provided the first time (Huu Lien, Lang Son, North Vietnam).

Keywords: Odonata; dragonfly; new species; Gomphidae; *Burmagomphus schneideri*; *Burmagomphus vermicularis*; Gia Lai; Lang Son; Vietnam

Introduction

The first member of the genus, *Burmagomphus vermicularis* was described by Martin (1904) in the genus *Gomphus*. *Burmagomphus* was erected by Williamson (1908) for specimens collected from Myanmar (Burma) and misidentified as *vermicularis* (misspelled as *vermiculatus* by Williamson), which was made the generotype. Fraser (1926) showed that the Burmese specimens are a distinct species but gave it the preoccupied name *williamsoni*; Lieftinck (1940, p. 111) renamed it *B. arboreus*.

Martin (1904) described *vermicularis* based on specimens collected from Tonkin and Annam; Martin's description is very poor and without illustrations. Williamson sent a specimen of the Burmese species to Martin, who wrote "It is a species very near to *vermiculatus* but slenderer, the stripes of the thorax different, the inferior appendage slenderer and more divaricate" (Williamson 1908, p. 301). Lieftinck (1953), when comparing *B. javicus* Schmidt, 1934 (now considered a subspecies of *B. williamsoni* Förster, 1914) to *B. vermicularis* collected from Mau Son near Than Muoi ("Than Moi") Tonkin (Lang Son Province, North Vietnam), illustrated the thorax marking of both male and female and the female occipital plate of *B. vermicularis* collected by H. Fruhstorfer. Lieftinck (1953) also noted that: "Examples of *vermicularis* which I have seen from China (ex. Coll. Hsiu-Fu Chao) are in all probability racially distinct from Martin's Tonkinese insect and will be treated as such by Mr. Chao in his forthcoming monograph of Chinese Gomphidae".

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When Chao (1990) published his study of the Chinese Gomphidae, he listed *B. vermicularis* in the identification key with its distribution as Fujian and Taiwan. However in the poor figures presented by Chao, at least the thoracic markings are not similar to those shown in the figure by Lieftick (1953, p. 168, fig. 31). Since then there has been no more detailed information published on true *B. vermicularis* from Vietnam.

On a trip to southern Vietnam in April 2010 I observed two, but collected only one, male *Burmagomphus*, close to *B. vermicularis*, from Ka Nak, K'Bang district, Gia Lai province. Then in June 2010 I collected two topotypical males of *B. vermicularis* from Huu Lien Nature Reserve, Lang Son province, northern Vietnam. Additionally, male specimens of *B. vermicularis* that were collected by Matti Hämäläinen from Huanghua stream, Yingxifenglin, Guangdong, China were compared with the holotype of the new species. Specimens of *B. vermicularis* collected both from Vietnam and China were confirmed in structure by comparison the holotype in the Muséum national d'Histoire naturelle, Paris.

In this paper the new *Burmagomphus* species is described and compared with *B. vermicularis* and *B. arboreus*. Some additional characteristics of the male topotype *B. vermicularis* are discussed and illustrated.

***Burmagomphus schneideri* sp. nov.**

(Figure 1)

Etymology

The species is named after Wolfgang Schneider, Past President of the Worldwide Dragonfly Association.

Specimens examined

Holotype ♂: Rung Giong, Ka Nak commune, K'Bang district (14° 8'42.05" N, 108° 36'37.33" E, 350 m), Gia Lai Province in the southern part of Vietnam, 27 April 2010, leg. Do, to be deposited in Vietnam National Museum of Nature. Specimens of *B. vermicularis* studied for comparison: 2 ♂ from Huu Lien Nature Reserve, Lang Son Province, 21 June 2010, leg. Do, deposited in coll. Do. 2 ♂ from Huanghua stream, Yingxifenglin, Guangdong China, 2 August 2010 leg. Hamalainen, deposited in coll. Do.

Description of holotype male

A small dragonfly, black and greenish marking, with hyaline wings (Figure 1a, g, f).

Head. Occiput black, somewhat concave with row of hairs at posterior margin, vertex black, frons black with two upper white greenish markings on dorsal side. Clypeus black with whitish anterior part. White greenish spot on each side of gena. Labrum black with two white greenish markings. Mandible black with basal white greenish marking (Figure 1b). Labium hairy, yellow whitish with black markings as follows: palpal lobes whitish with black at apex, movable hooks entirely black; prementum whitish with a narrow black line on apical margin in ventral view (Figure 1c).

Thorax. Prothorax black with two greenish spots on each side, upper spot larger than lower spot, which is very close to greenish stripe on coxa of front leg in lateral view. Anterior lobe

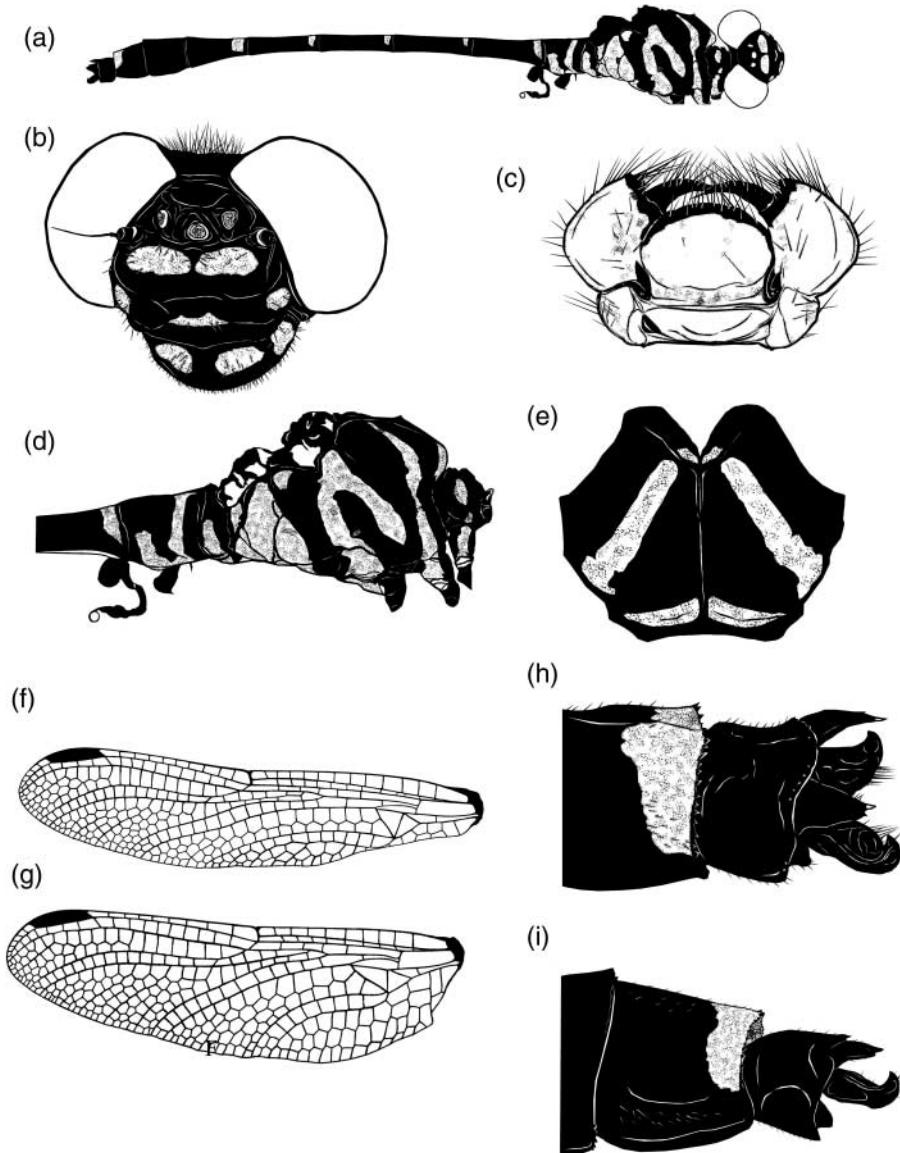


Figure 1. *Burmagomphus schneideri*, male holotype: (a) body, lateral; (b) head; (c) labium; (d) thorax, lateral; (e) synthorax, dorsal; (f) left forewing; (g) left hind wing; (h) anal appendages, oblique; (i) anal appendages, lateral; (j) anal appendages, dorsal; (k) anal appendages, ventral; (l) hamulus; (m) penis, lateral; (n) distant segment of penis, ventral; (o) vesicle, anterior and oblique. Not to scale.

of prothorax marked with greenish on dorsal rim (Figure 1d). Synthorax black with greenish markings as follows: mesepisternum with anterodorsal marking and stripe, slender mediadorsally then broadening further downward and connecting to stripe on coxa of middle leg. Two stripes on metepisternum and mesepimeron, fused at top and posterior branch extending onto venter behind posterior coxa, upper posterior corner of mesepimeron with a small dot. Metapleuron nearly entirely greenish except posterior border.

Wings hyaline, antenodals 12 in first row and 11 in second row of Fw; 9 in both first and second rows of Hw. Postnodals 9 in first row of Fw, 8 in first row of Hw. Pterostigma dark brown, covering

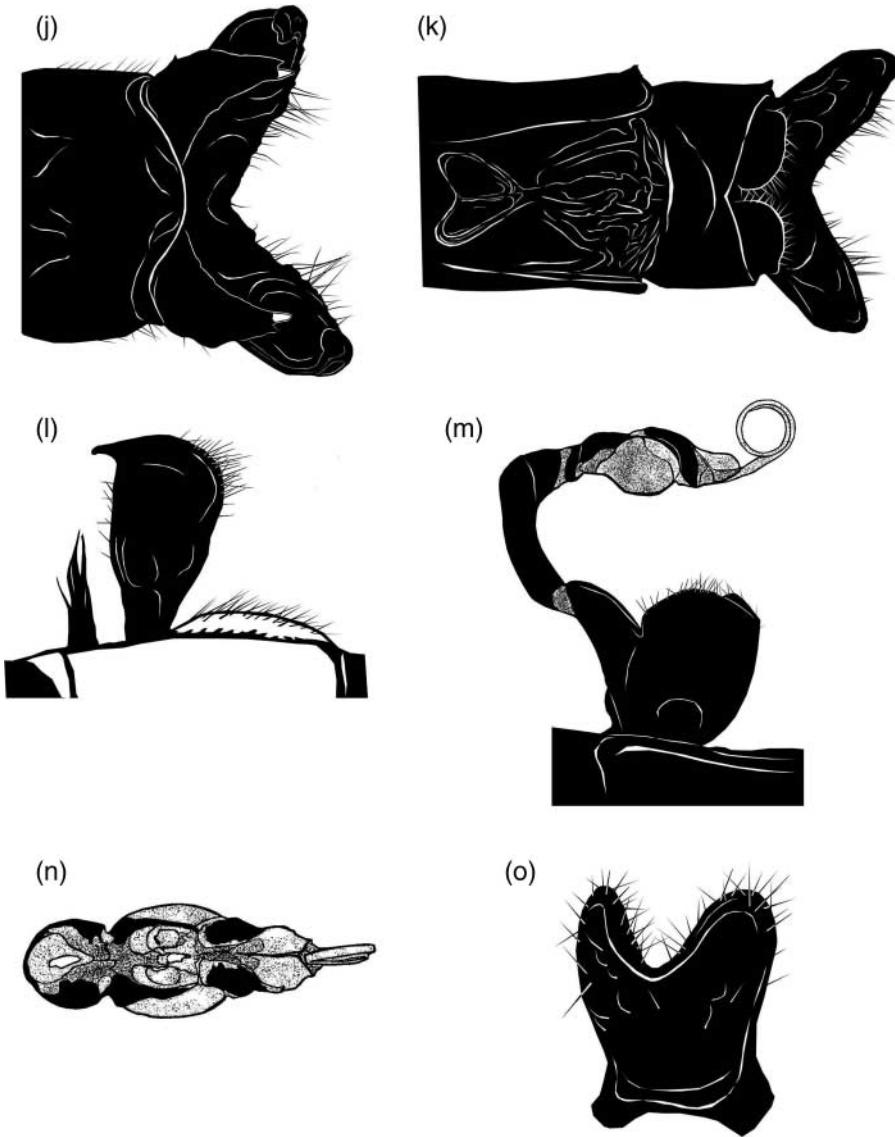


Figure 1. Continued.

4 cells of both Fw and Hw. Triangles not similar in two wings, neither with no cross veins. Two cross veins between RP- and MA+ from arculus to RP3- and RP1- junction in Fw but in Hw only a single crossvein (Figure 1f, g).

Abdomen. In lateral view S1 short, black with greenish marking at posterior lower part, S2 black with two greenish bands, anterior extending for full height of segment, posterior extending about 1/2 its height, the two bands fused along lower margin of segment, height of segment about 1/2 its length. S3 black with a greenish ring basally, S4-6 all similar, black with small greenish dot at base, S7 gradually expanded apically from middle, black with larger greenish dot at base and size. S8 as large as S2 or slightly wider at apex, wholly black and gradually expanded from base

to apex. S9 smaller, gradually narrowing from base to apex, black with dorsal apical greenish marking. S10 smaller than S9 and entirely black. (Figure 1a, d, h, i).

Anal appendages wholly black. Cercus pointed at apex with small lateral spine near apex, hence in oblique dorsal view appearing slightly bifid. In dorsal view, inner margin of cerci curve to form broad “U” shape. Epiproct stouter and clearly longer than cerci. Apex of epiproct bending upward in rounded curve and ending in obtuse apex. Dorsal surface of epiproct somewhat concave, particularly subapical bend. In dorsal and ventral view, inner margins of epiproct form clear “V” shape (Figure 1h, i, k, l).

Anterior hamulus simple, small with apical hair tuft; posterior hamulus more developed with apex expanded gradually, apical posterior margin round, apical anterior margin converging to sharp spine. In lateral view, base of posterior hamulus narrow and gradually expanded to middle but in anterolateral view appearing much larger with anterior margin more developed (Figure 1m), as in *B. vermicularis* (Figure 2l, m).

Penile organ typical with distal segment inflated and apical part modified to form a long coiled filament (Figure 1o, p). Vesicle black and hairy with a round medial cleft (Figure 1q).

Measurements (mm). Hw 24.8, abdomen (include appendages) 32, body (including head and appendages) 43.1.

Female

Female unknown.

Habitat and behavior

The species was found in disturbed forest with remnant old-growth trees; the type locality is protected from logging. The species is associated with clean open stream with sandy bottoms. In high humidity conditions, before rain, the male usually hovers above fast running streams and protects his territory.

Table 1. Diagnostic characters of *Burmagomphus schneideri*, *B. vermicularis*, and *B. arboreus*.

Character	Species		
	<i>B. schneideri</i>	<i>B. vermicularis</i>	<i>B. arboreus</i> *
Size (mm)	Total length 43, abd. 32, hw 25	Total length 47, abd. 34, hw 27	Total length unknown, abd. 28, hw 23
Prementum	with narrow black apical margin	black in about apical 1/3	not known
Length of epiproct (lateral view)	~1.33 × length of cerci	~equal to cerci	~1.2 × length of cerci
Tip of epiproct (lateral view)	very strongly upcurved	slightly upcurved	slightly upcurved
Span of epiproct (dorsal view)	distinctly wider than span of cerci	Barely wider than span of cerci	distinctly wider than span of cerci
Posterior margin of epiproct (dorsal view)	V-shaped	U-shaped	U-shaped
Distal margin of posterior hamulus	rounded, with antero-ventral tooth only	rounded or slightly flattened, with antero-ventral tooth only	concave, with antero-ventral and postero-ventral teeth

*From Lieftinck (1964).

Discussion and diagnosis

Burmagomphus are small gomphids found from India to South-east Asia and China. In Vietnam, only two species of the genus have been recorded to date, *B. schneideri* sp. nov. and *B. vermicularis*. Based on the distribution of the genus in Asia, there are likely to be more species from the genus in Vietnam. Their habitats in Vietnam are medium to large open streams (2–5 m wide), in secondary or primary forests at elevations of c. 200–500 m asl.

The new species *B. schneideri* sp. nov. is clearly close to *B. arboreus* and *B. vermicularis*, which have similar markings on the head (Figures 1b, 2a) and thorax (Figures 1d, 2c), similar wing venation (Figures 1f, g, 2d, e), a similar vesica spermalis (Figures 1o, p, 2i) and hamulus

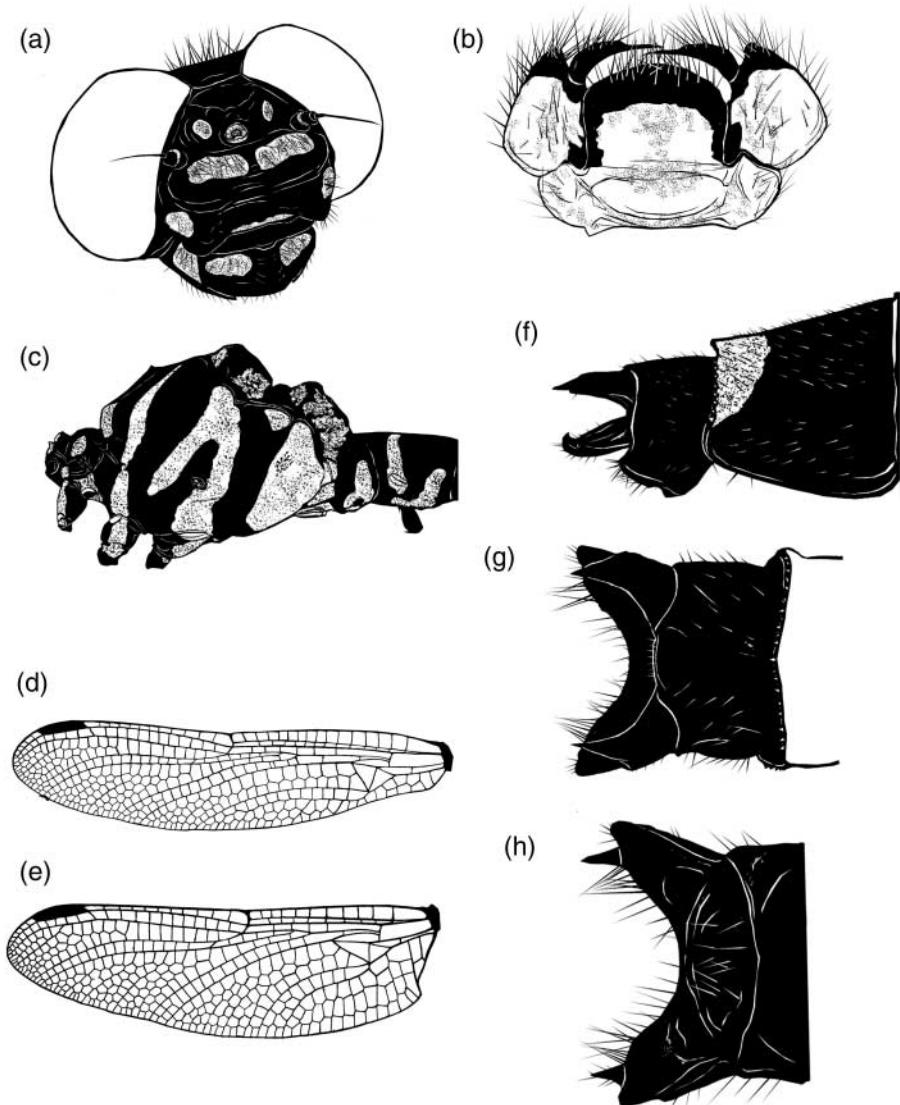


Figure 2. *Burmagomphus vermicularis*, male topotype: (a) head; (b) labium; (c) thorax, lateral; (d) left forewing; (e) left hind wing; (f) anal appendages, lateral; (g) anal appendages, dorsal; (h) anal appendages, ventral; (i) penis, lateral; (j) anterior hamulus, lateral; (k) posterior hamulus, lateral; (l) same, anterior lateral. Not to scale.

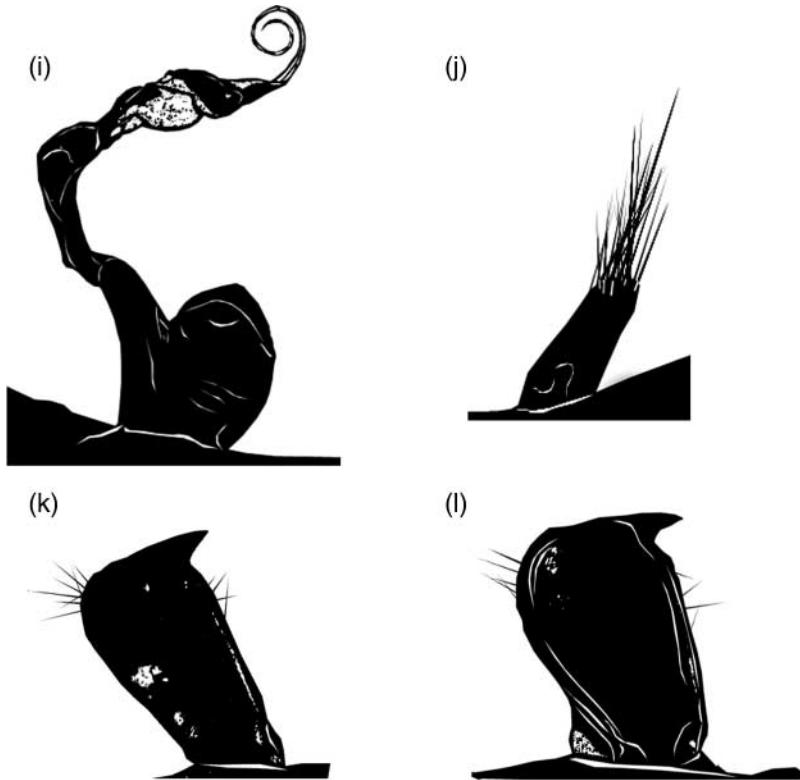


Figure 2. Continued.

(Figures 1m, 2k, 1, m). However, the male of *B. schneideri* sp. nov. differs in several characters (Table 1), the most important of which are:

- Labium of *B. schneideri* with prementum (median lobe) whitish, only a narrow black line at the apical margin with a little black at tips and base of palps (lateral lobes); prementum of *B. vermicularis* shining black in the apical 1/3, with black more extensive on palps (Figures 1c, 2b).
- In lateral view, epiproct clearly longer than cerci in *B. schneideri*, with apices strongly upcurved; slightly longer than cerci with apices slightly upcurved at extreme tip in *B. arboreus*; about equal to cerci in length and slightly upcurved at tip in *B. vermicularis* (Figures 1i, 2f).
- In dorsal view, inner margin of epiproct of *B. schneideri* V-shaped and its branches spread well laterad of cerci; U-shaped with widely spread apices in *B. arboreus*; U-shaped with branches barely surpassing cerci laterally in *B. vermicularis* (Figures 1k, 1, 2g, h).
- Posterior hamulus rounded or straight on ventral edge, with single anteroventral hook in *B. schneideri* and *B. vermicularis*; in *B. arboreus* with concave ventral edge and small posteroventral spine in addition to anteroventral hook.

B. vermicularis from Lang Son province, North Vietnam may be different from the species that was recorded from Taiwan and Fujian, judging by Chao's figures (1990), in which the thoracic marking and the anal appendages differ. Indeed the long greenish strip on the meseisternum that connects to the greenish marking on the anterior coxa is narrow and simple in specimens from Lang Son province (Figure 2c), but it almost divides into two branches in Chao's figures.

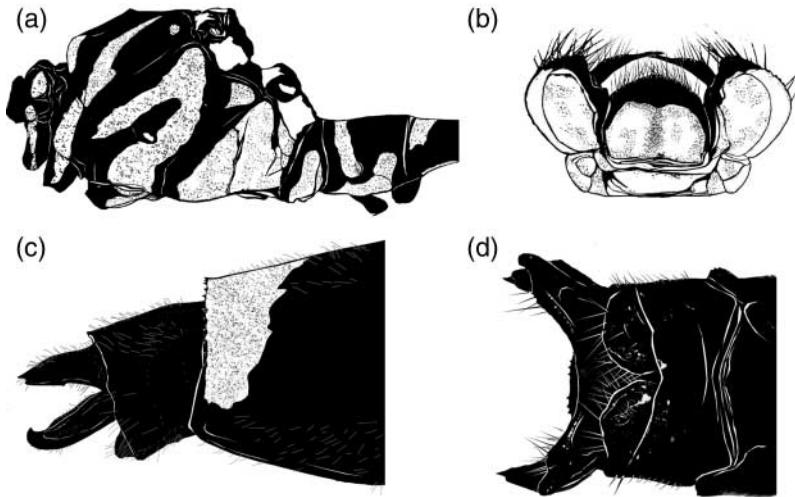


Figure 3. *Burmagomphus vermicularis* from Guangdong, China: (a) thorax, lateral; (b) labium; (c) anal appendages, lateral; (d) anal appendages, ventral.

The epiproct shown in Chao's figures looks stouter than that of *B. vermicularis* from Lang Son province (Figure 2f).

Based on the structure of penis, hamulus and anal appendages, the specimens from Guangdong, China are *B. vermicularis* (Figure 3), and are clearly different from *B. schneideri*. As they have a U-shaped epiproct in dorsal and ventral view (Figure 3d) and in lateral view, the cerci and epiproct are equal in length (Figure 3c). However the epiproct differs in details from that shown Chao's figures, which is stouter in lateral view and not as widely divaricated in dorsal view as in *B. vermicularis*.

The thoracic markings of *B. vermicularis* from Lang Son province (Tonkin) and *B. schneideri* sp. nov. from Gia Lai province (south of Annam) match very well with Lieftinck's figures in 1953. The thoracic markings of specimen from Guangdong, China are similar to Chao's figure but there is an additional small dot on the upper mesepisternum.

The holotype of *B. vermicularis* matches very well to the topotype from Huu Lien, Lang Son and the materials from Guangdong, China as well (confirmed by Prof. Jean Legrand). The small dot on upper mesepisternum on Guangdong specimens is not a strong enough characteristic to separate it from the species *B. vermicularis*. The specimen *B. vermicularis* from Fujian and Taiwan that Chao draw in 1990 should be confirmed in the structure of stouter epiproct in lateral view.

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