



## A taxonomic study on the species of the genus *Phlugiolopsis* Zeuner (Orthoptera, Tettigoniidae, Meconematinae)

HANQIANG WANG<sup>1</sup>, KAI LI<sup>1,3</sup> & XIANWEI LIU<sup>2</sup>

<sup>1</sup>School of Life Science, East China Normal University, Shanghai, 200062, China. E-mail: kaili@admin.ecnu.edu.cn

<sup>2</sup>Shanghai Entomological Museum, Chinese Academy of Science, Shanghai, 200032, China. E-mail: liuxianwei2008@163.com

<sup>3</sup>Corresponding author

### Abstract

A taxonomic study of genus *Phlugiolopsis* Zeuner, 1940 is presented and 8 new species are described. A new key to all species of the genus is provided. All type specimens are deposited in the SEM (Shanghai Entomological Museum, CAS.) and Bishop Museum (U.S.A.).

**Key words:** Orthoptera, Tettigoniidae, Meconematinae, taxonomy, *Phlugiolopsis*, new species

### Introduction

The genus *Phlugiolopsis* Zeuner, 1940 is a small genus in Meconematini, a tribe of the Meconematinae. There are 9 species worldwide, mainly distributed in the Oriental Region. There are 7 species in China (Shi *et* Ou, 2005), but one of the species *Phlugiolopsis platycata* described by Shi *et* Zheng (1994), must be transferred to the genus *Acosmetura* Liu, 2000 (Liu, Zhou *et* Bi, 2008). In this paper 8 new species of *Phlugiolopsis* are described. Some figures of the species for which we have not seen specimens are modified from the original authors. A key to the known 17 species *Phlugiolopsis* is provided. The material is deposited in the SEM (Shanghai Entomological Museum, CAS.) and Bishop Museum (U.S.A.).

### *Phlugiolopsis* Zeuner, 1940

*Phlugiolopsis* Zeuner, 1940: 77; Beier, 1966: 286; Harz, 1969: 178; Yamasaki, 1986: 353; Jin *et* Xia, 1994:26; Kano, 1999:5; Shi *et* Ou, 2005: 358.

*Acyrtaspis* Bey-Bienko, 1955: 1261; Beier, 1966: 281; Gorochov, 1993: 87.

Type species: *Phlugiolopsis henryi* Zeuner, 1940

Body small, brachypterous. Fastigium of vertex conical with groove dorsally. Eyes circular, produced. Last segment of maxillary palpi longer than or equal with the preceding one. Pronotum extending posteriorly, ventral surface of lateral lobe without humeral sinus in hind margin. Auditory foramina of fore tibiae open on both sides. Hind tibiae with 3 pairs of apical spurs. Male tegmina shortened, with stridulating vein. Subgenital plate of male with hind margin produced, styli subapical, genitalia entirely membranous. Ovipositor short and heavy, ventral valve with apical hook. Body pale brown, head with 4 dark brown longitudinal lines dorsally, apex of hind femora darkened.

## Key to species of the genus *Phlugiolopsis* Zeuner

- 1 Pronotum with blackish lateral lobes .....2  
 - Pronotum with pale lateral lobes .....3  
 2 Cerci of male with long inner branch at base (Fig. 2); subgenital plate of female with roundly triangular hind margin (Fig. 3) .  
 ..... *P. grahami* (Tinkham, 1944)  
 - Cerci of male without inner branch at base (Fig. 5); subgenital plate of female with rounded hind margin (Fig. 6).....  
 .....*P. jinyunensis* (Shi et Zheng, 1994)  
 3 Tegmina extending beyond the hind margin of pronotum .....4  
 - Tegmina extending beyond the hind margin of pronotum .....11  
 4 Male cerci hardly excavated on inner surface of basal half , with 3 branches or lobes .....5  
 - Male cerci distinctly excavated on inner surface of basal half , with 1–2 branches or lobes .....7  
 5 Male cerci shorter, apical half angularly curved and bifurcate (Fig. 7); subgenital plate of female with apex deeply notched  
 (Fig. 10)..... *P. chayuenensis* **sp. nov.**  
 - Male cerci longer, apical half gradually curved and not bifurcate; subgenital plate of female with apex not notched .....6  
 6 Cerci of male with the upper branches nearly triangular, apex of cerci obliquely truncate (Figs. 11); male subgenital plate with  
 styli (Fig.13); subgenital plate of female with rounded middle lobe and distinct lateral concave (Fig. 14) .....  
 ..... *P. ramosissima* **sp. nov.**  
 - Cerci of male the upper basal lobe long finger-shaped, apex of cerci obtuse (Figs. 15); subgenital plate without styli (Fig. 17);  
 subgenital plate with hind margin broadly rounded and with a depression at both sides (Fig. 18). .... *P. longicerca* **sp. nov.**  
 7 Male cerci with a long inner branch at middle and with truncate apex (Fig. 19); subgenital plate of female with 3 keels (Fig.22)  
 ..... *P. minuta* (Tinkham, 1943)  
 - Cerci of male and subgenital plate of female not as above.....8  
 8 Male cerci with inner upper lobe with projecting apical angle (Fig. 23), lower lobe with truncate apex, apical half of cerci com-  
 pressed, with oblique truncate apex (Fig. 24); hind margin of female subgenital plate with 3 lobes, middle lobe longer than lat-  
 eral lobes, broadly rounded, with an oblique keel near lateral lobes (Fig. 26) ..... *P. vietnamica* **sp. nov.**  
 - Male cerci and female subgenital plate not as above .....9  
 9 Legs with dark brown spots; cerci of male with finger-shape upper lobe and rounded lower lobe at base (Figs. 28–30).....  
 ..... *P. punctata* **sp. nov.**  
 - Legs without dark brown spots; cerci of male without finger-shape upper lobe.....10  
 10 10<sup>th</sup> abdominal tergite of male shallowly concave (Fig. 31); subgenital plate of female with a pointed median projection (Fig.  
 34) ..... *P. brevis* Hsia et Liu, 1993  
 - 10<sup>th</sup> abdominal tergite of male with a deep “V” median notch (Fig. 35); subgenital plate of female with hind margin slightly  
 concave (Fig. 39)..... *P. tuberculata* Hsia et Liu, 1993  
 11 Male cerci with hooked apex (Fig. 41) .....12  
 - Male cerci without hooked apex .....14  
 12 Subgenital plate of male with parallel lateral margins in apical half (Fig. 43); 8<sup>th</sup> abdominal tergite of female with a tubercle on  
 each side (Fig. 44); subgenital plate of female nearly hexagon (Fig. 45)..... *P. montana* **sp. nov.**  
 - Subgenital plate of male not as above; 8<sup>th</sup> abdominal tergite of female without tubercle.....13  
 13 Upper lobe of male cerci rounded (Fig. 46); subgenital plate of female with rounded hind margin(Fig. 49) .....  
 ..... *P. mistshenkoi* (Gorochov,1993)  
 - Upper lobe of male cerci with acute apical corner (Fig. 50); subgenital plate of female butterfly-shaped (Fig. 51).....  
 ..... *P. yunnanensis* Shi et Ou, 2005  
 14 Male cerci gently incurved and with internal tooth.....15  
 - Male cerci almost straight or apex incurved only, without internal tooth.....16  
 15 Subgenital plate of female with subangular median lobe (Fig. 52), apex truncate or excised; male cerci gently incurved and  
 with internal tooth (Fig. 53) ..... *P. henryi* Zeuner, 1940  
 - Subgenital plate of female with broad rounded median lobe and shallowly notched (Fig. 55) .....*P. carinata* **sp. nov.**  
 16 Male cerci with apex strongly incurved and triangular (Fig. 56); subgenital plate of female with hind margin nearly triangular,  
 apex notched, lateral margin straight and with a short keel (Fig. 59)..... *P. ventralis* **sp. nov.**  
 - Male cerci almost straight, apical pointed (Fig. 60–62); subgenital plate of female with hind margin widely rounded and hardly  
 concave medially (Fig. 63) ..... *P. yaeyamensis* Yamasaki, 1986

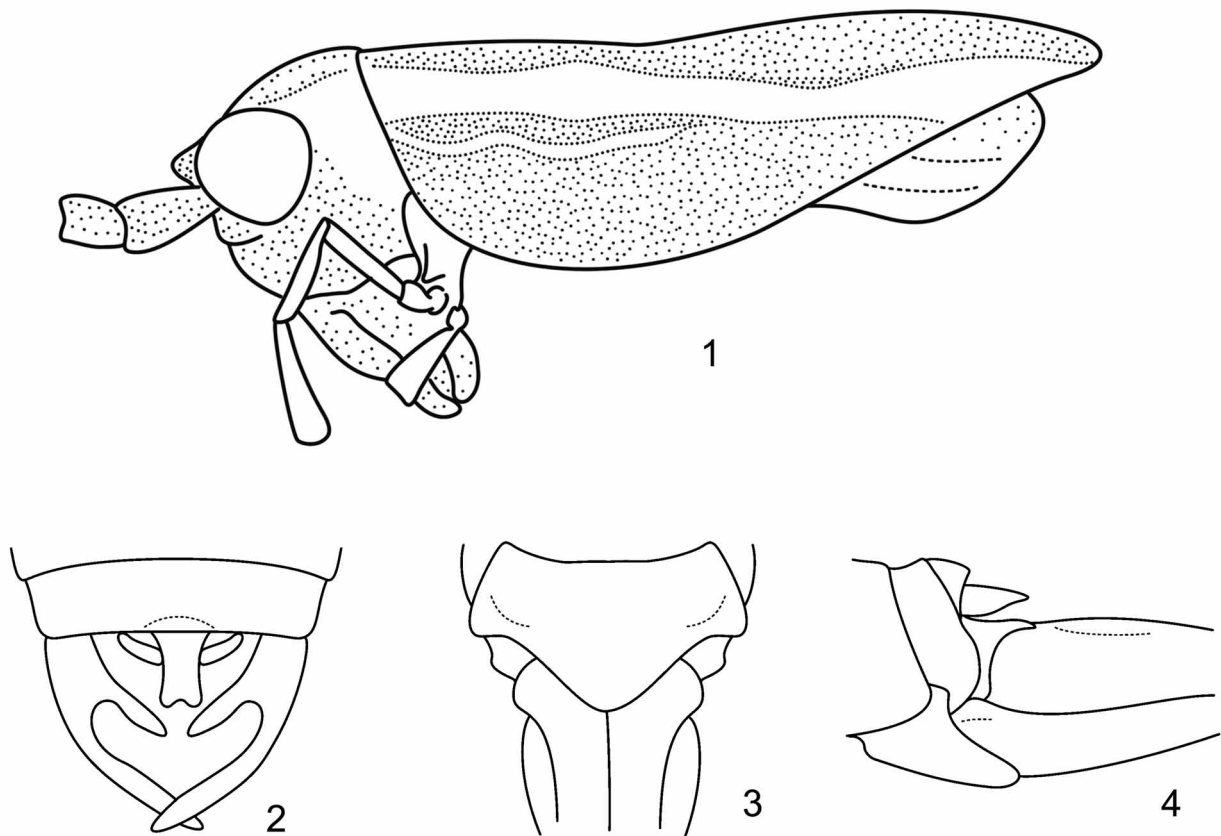
### *Phlugiolopsis grahami* (Tinkham, 1944) (Figs. 1–4)

*Xiphidiopsis grahami* Tinkham, 1944: 510; Tinkham, 1956: 3, 5.

*Acyrtaspis grahami* Bey-Bienko, 1955: 1262; Beier, 1966: 281; Jin et Xia, 1994: 26; Liu et Jin, 1994: 108; Otte, 1997: 94.

*Phlugiolopsis grahami* Shi et Ou, 2005: 358.

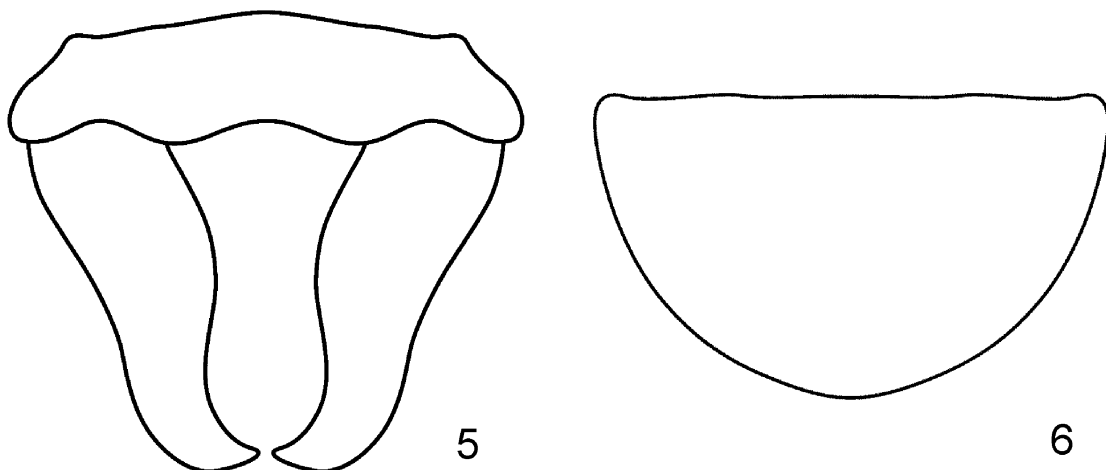
**Distribution.** China (Sichuan).



**FIGURES 1–4.** *Phlugiolopsis grahami* (Tinkham, 1944). 1. Head and pronotum, lateral view; 2. Apex of male abdomen, dorsal view; 3. Subgenital plate of female, ventral view; 4. Apex of female abdomen, lateral view. (modified from Tinkham)

***Phlugiolopsis jinyunensis* (Shi et Zheng, 1994)**

(Figs. 5–6)



**FIGURES 5–6.** *Phlugiolopsis jinyunensis* (Shi et Zheng, 1994). 5. Apex of male abdomen, dorsal view; 6. Subgenital plate of female, ventral view. (imitate Shi et Zheng).

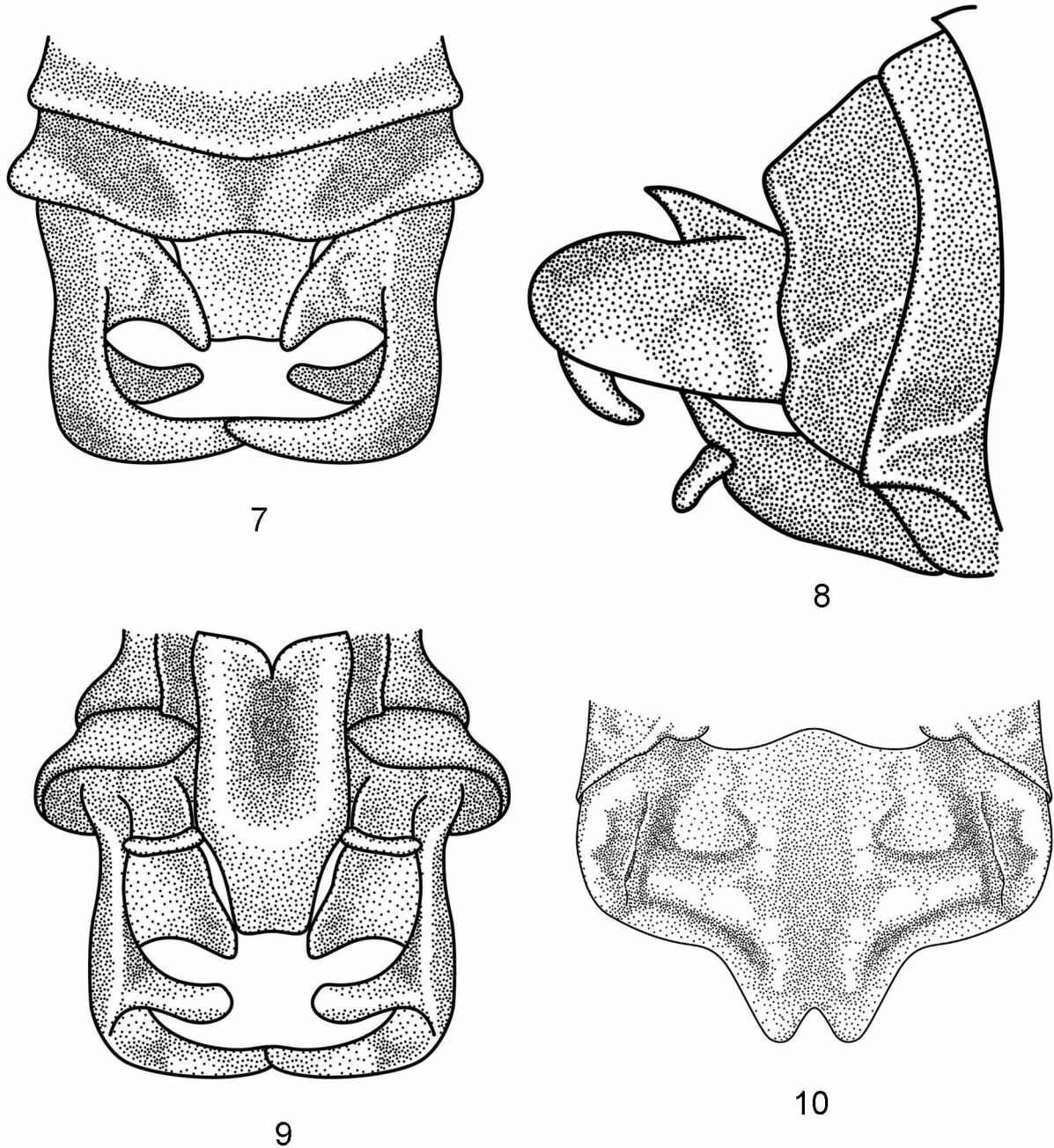
*Acyrtaspis jinyunensis* Shi et Zheng, 1994: 64; Otte, 1997: 94.  
*Phlugiolopsis jinyunensis* Shi et Ou, 2005: 359.

**Distribution.** China (Chongqing).

***Phlugiolopsis chayuensis* sp. nov.**

(Figs. 7–10)

**Material.** Holotype ♂, China: Tibet, Chayu, Xiachayu, Alt. 1600m, 2010.VIII.24–28, leg. Bi Wen-xuan; Paratype 1 ♀, same data as holotype; 1 ♀, China: Tibet, Motuo, Alt. 1100m, 2011. VIII. 16, leg. BI Wen-Xuan.



**FIGURE 7–10.** *Phlugiolopsis chayuensis* sp.nov. 7. Apex of male abdomen, dorsal view; 8. Apex of male abdomen, lateral view; 9. Apex of male abdomen, ventral view; 10. Subgenital plate of female, ventral view.

**Description.** Male. Fore tibiae armed 4,5(1,1), middle tibiae with 4 inner and 5 outer spines, hind tibiae with 20–24 teeth on both margins of dorsal surface, and with 3 pairs of apical spurs. Tegmina not exceeding hind margin of pronotum. 10<sup>th</sup> abdominal tergite with hind margin very slightly incurved in middle. Cerci short, inner surface of basal half hardly excavated, with a triangular branch; apical half angularly curved and bifurcate (Fig. 7). Subgenital plate elongate, hind margin roundly truncate (Fig. 9); styli elongate.

Female. Subgenital plate transverse, hind margin nearly triangular and apex deeply notched forming two narrow lobes (Fig. 10); ventral surface with a paired keels and depressions. Ovipositor shorter than hind femora, ventral valve with apical hook.

**Coloration.** Body yellowish brown. Dorsal surface of head with 4 darkish longitudinal lines, antennae with few and scattered darkish rings. Dorsal surface of pronotum with a wide pale brown longitudinal band and 2 brown lateral stripes, apex of femora darkish.

**Measurements.** (length in mm)

	Body	Pronotum	Tegmina	Hind femora	Ovipositor
♂	7.0	4.0	1.0	7.5	/
♀	8.0~8.3	3.6~4.1	1.0	8.0~8.2	5.0~5.2

**Discussion.** This new species with apical half of male cerci angularly curved and bifurcate, subgenital plate of female with apex deeply notched into narrowly lobes distinguishable from all other known species of the genus.

**Etymology.** The new species is named after its locality.

**Distribution.** China (Tibet).

#### *Phlugiolopsis ramosissima* sp. nov.

(Figs. 11–14)

**Material.** Holotype ♂, China: Tibet, 2011. VI–IX, leg. BI Wen-Xuan. Paratype 1♂, 3♀♀, same data as holotype.

**Description.** Male. Fore tibiae with spines 4,4(1,1), middle tibiae with 3 inner and 4 outer spines, hind tibiae with 26–29 teeth on both margins of dorsal surface, and with 3 pairs of apical spurs. Tegmina very slightly exceeding hind margin of pronotum. 10<sup>th</sup> abdominal tergite with truncated hind margin, median portion of apex of dorsal surface with quadrate excavation. Cerci elongate, gradually curved, inner surface of basal half hardly excavate, with 3 branches (Fig. 11), the upper two branches nearly triangular; apical half thin and curved inwards, apex obliquely truncate. Subgenital plate short, hind margin with a small median process (Fig. 13); styli shorter.

Female. Subgenital plate wide in base, with narrow apex, hind margin rounded truncate, middle of base with a paired of weak keels. Ovipositor shorter than hind femora, ventral valve with apical hook.

**Coloration.** Body blackish brown. Dorsal surface of head with 4 black longitudinal lines of which two inner merged, antennae with few and scattered dark rings, dorsal surface of pronotum with a dark brown longitudinal band which and 2 black lateral stripes in metazona, abdomen entirely black, apical portion of femora darkish.

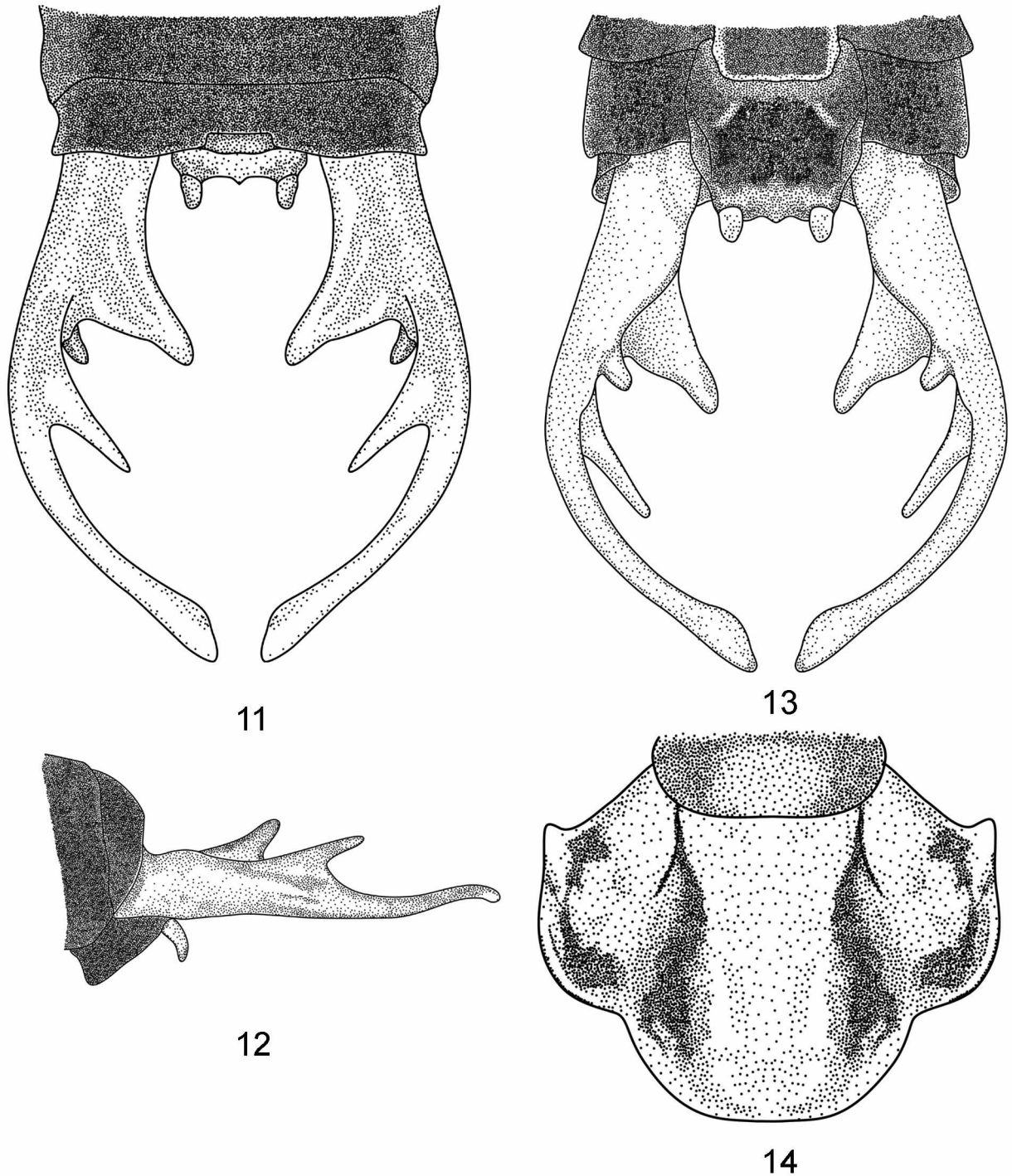
**Measurements.**(length in mm)

	Body	Pronotum	Tegmina	Hind femora	Ovipositor
♂	8.9~9.0	4.1~4.2	1.0	8.7~8.9	/
♀	8.1~8.3	4.1~4.7	1.0	7.9~8.3	5.0~5.4

**Discussion.** This new species is similar to *Phlugiolopsis chayuensis* sp. nov, but differs from it by the longer male cerci gradually curved, with obliquely truncate apex. Subgenital plate of female with rounded middle lobe and distinct laterally concave.

**Etymology.** The specific name is derived from Latin ramosissima, referring to the cerci with its many branches.

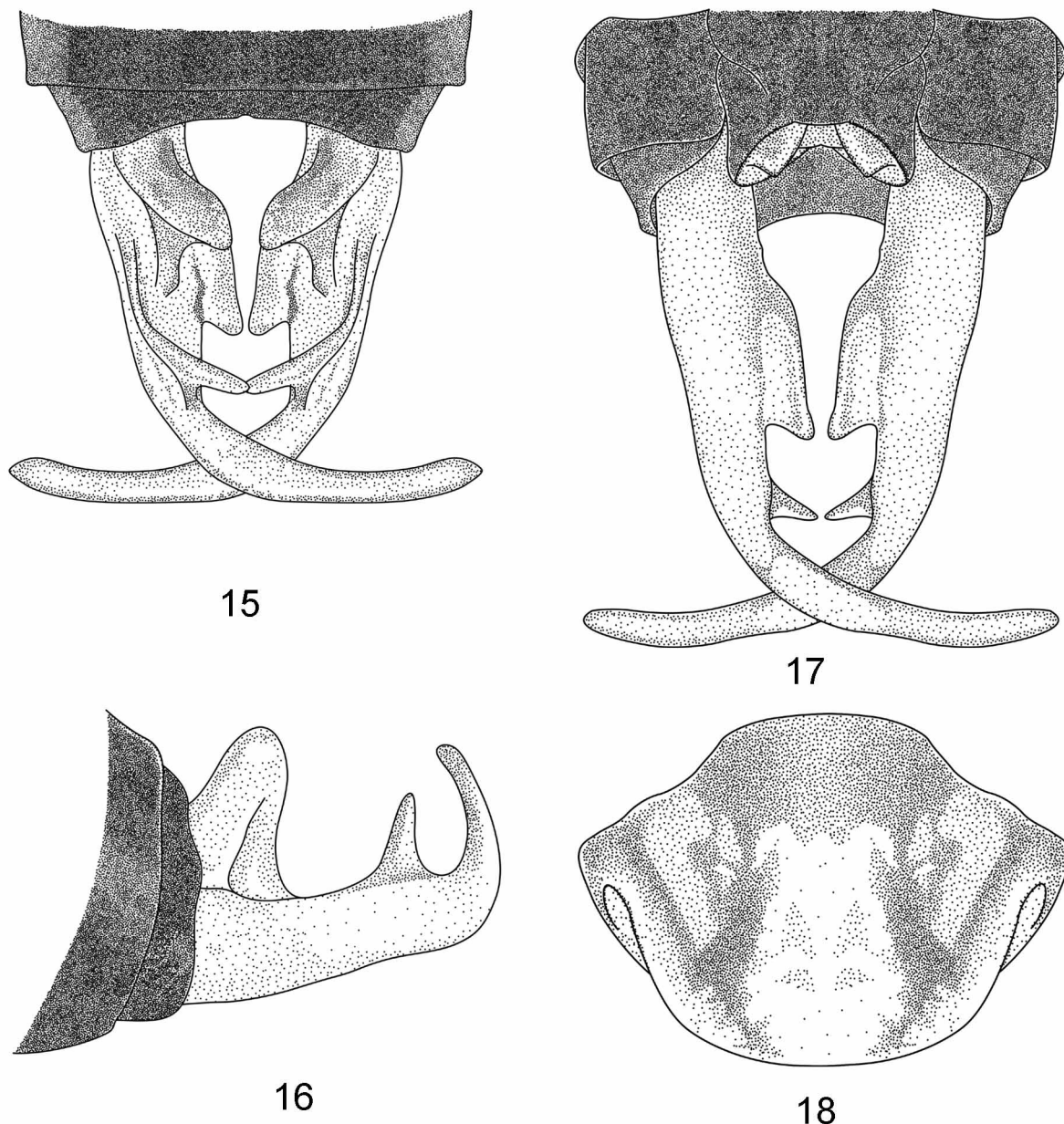
**Distribution.** China (Tibet).



**FIGURES 11–14.** *Phlugiolopsis ramosissima* sp. nov. 11. Apex of male abdomen, dorsal view; 12. Apex of male abdomen, lateral view; 13. Apex of male abdomen, ventral view; 14. Subgenital plate of female, ventral view.

***Phlugiolopsis longicerca* sp. nov.**  
(Figs. 15–18)

**Material.** Holotype ♂, China: Tibet, Motuo, Beibeng, Alt. 1560m, 2011. VIII. 12, leg. BI Wen-Xuan. Paratype 2♀, same data as holotype.



**FIGURES 15–18.** *Phlugiolopsis longicerca* sp. nov. 15. Apex of male abdomen, dorsal view; 16. Apex of male abdomen, lateral view; 17. Apex of male abdomen, ventral view; 18. Subgenital plate of female, ventral view.

**Description.** Male. Fore tibiae with spines 4,4(1,1), middle tibiae with 3 inner and 4 outer spines, hind tibiae with 28–31 dorsal teeth both inner and outer margins, and with 3 pairs of apical spurs. Tegmina not exceeding hind margin of pronotum. Hind margin of 10<sup>th</sup> abdominal tergite concave, with a median notch. Cerci long, strongly curved, inner surface excavate, with 3 processes: long triangular medial lobe, long conical upper process and wide blunt lower lobe; apical half slender, bent inwards and upwards, apex truncate and slightly extended. Subgenital plate long and narrow.

Female. Base of subgenital plate widened, middle of hind part convex, hind margin semicircular and near each lateral with a concave. Ovipositor is shorter than hind femora, ventral valve with apical hook.

**Coloration.** Darkish brown. Dorsal surface of head with 4 darkish longitudinal lines, antennae with few and scattered darkish rings. Dorsal surface of pronotum with 1 wide darkish brown longitudinal band and 2 blackish lateral stripes, apex of hind femora darkish.

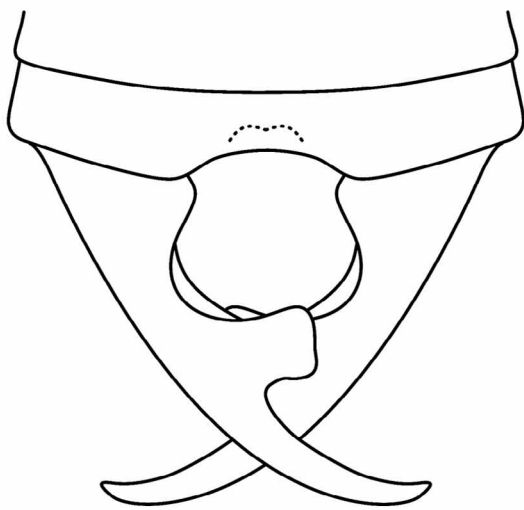
**Measurements.** (in mm).

	Body	Pronotum	Tegmina	Hind femora	Ovipositor
♂	7.4	4.2	1.0	8.8	/
♀	5.9~6.1	4.0~4.3	1.0	7.9~8.3	4.9~5.0

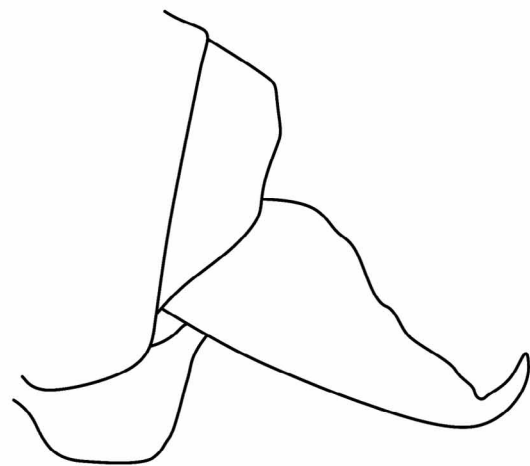
**Discussion.** This new species is similar to *Phlugiopsis ramosissima* sp. nov. , but differs in that the male cerci has 3 lobes (Figs. 15–17), the upper basal lobe long finger-shaped, upper apical lobe short and conical, lower middle lobe nearly square and with projecting apical corner. Subgenital plate of female with hind margin broadly rounded and with a depression at both sides. Styli not found on male subgenital plate.

**Etymology.** The specific is derived from Latin longicerca, referring to the male cerci.

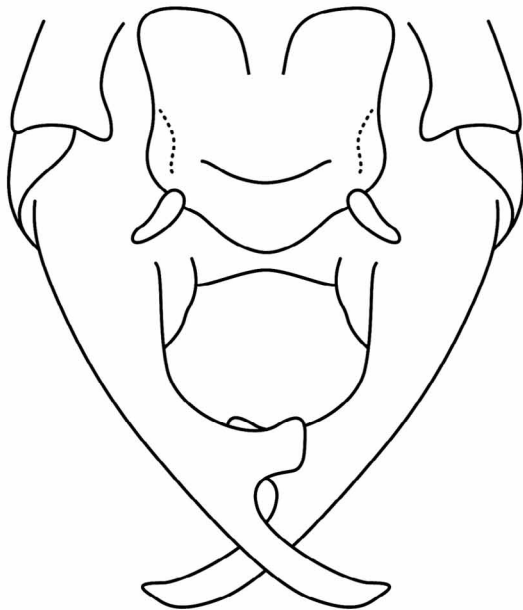
**Distribution.** China (Tibet).



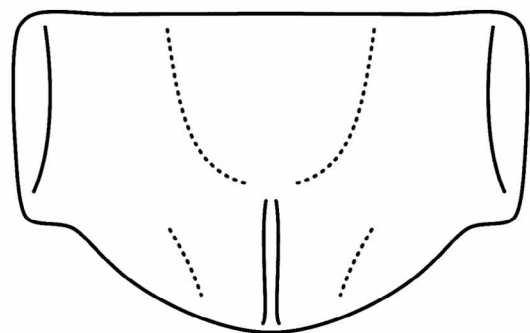
19



20



21



22

**FIGURES 19–22.** *Phlugiopsis minuta* (Tinkham, 1943). 19. Apex of male abdomen, dorsal view; 20. Apex of male abdomen, lateral view; 21. Apex of male abdomen, ventral view; 22. Subgenital plate of female, ventral view.



***Phlugiopsis minuta* (Tinkham, 1943)**

(Figs. 19–22)

*Xiphidiopsis minuta* Tinkham, 1943: 42; Tinkham, 1944: 508; Tinkham, 1956: 5; Beier, 1966: 274.

*Thaumaspis minuta* Bey-Bienko, 1957: 412.

*Phlugiopsis minuta* Yamasaki, 1986: 353; Jin *et* Xia, 1994:26; Liu *et* Jin, 1994: 109; Otte, 1997: 90; Liu *et* Zhang, 2001: 96; Shi *et* Ou, 2005: 358.

*Phlugiopsis fallax* Hsia *et* Liu, 1993: 93.

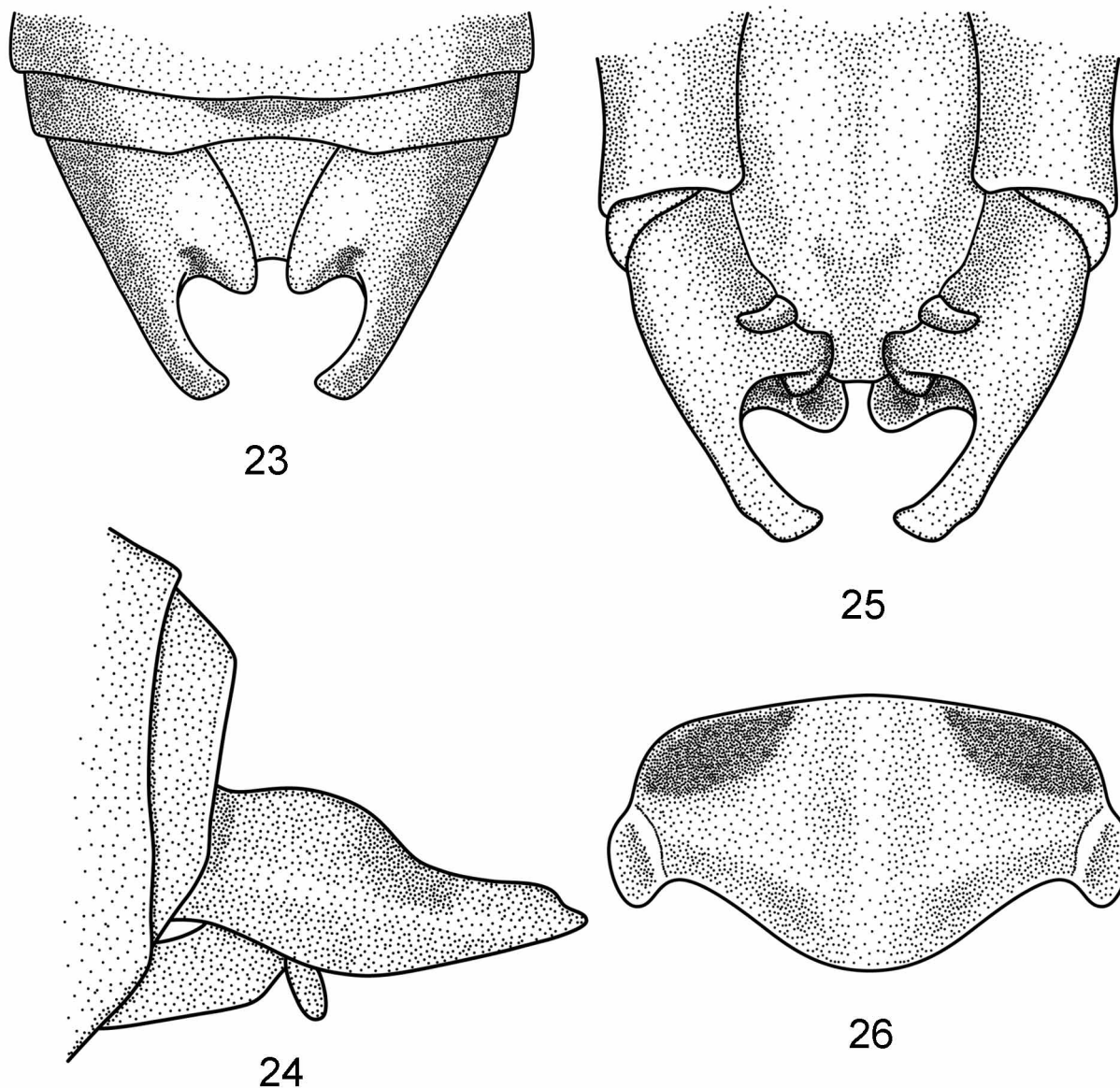
**Distribution.** China (Zhejiang, Jiangxi, Hunan, Guangxi).

***Phlugiopsis vietnamica* sp.nov.**

(Figs. 23–26)

**Material.** Holotype ♂, Vietnam: Fyan, Alt. 900–1000m, 1961.VII.11–VIII.9, leg. N.R.Spencer(Bishop Mus.).

Paratype 2♂♂, 3♀♀, same data as holotype.



**FIGURES 23–26.** *Phlugiopsis vietnamica* sp. nov. 23. Apex of male abdomen, dorsal view; 24. Apex of male abdomen, lateral view; 25. Apex of male abdomen, ventral view; 26. Subgenital plate of female, ventral view.

**Description.** Male. Fore tibiae with spines 4, 4(1. 1), mid tibiae with 4 inner and 5 outer spines, hind tibiae with 27–29 teeth on inner and outer margin of dorsal surface, and 3 pairs of apical spurs. Tegmina hardly exceeding hind margin of pronotum. 10<sup>th</sup> abdominal tergite with hind margin shallowly and widely incurved (Fig. 23). Cerci short, thick at basal half, inner surface strongly excavated, the upper lobe with projecting apical corner, lower lobe with truncate apex (Fig. 25); apical half slightly compressed, with obliquely truncate apex (Fig. 23). Subgenital plate with apical margin produced and with short styli.

Female. Subgenital plate transverse, hind margin with 3 lobes (Fig. 26), middle lobe is longer than lateral lobes, broadly rounded, near each lateral lobe with an oblique keel. Ovipositor is shorter than hind femora, apex ovipositor with a small hook on ventral margin.

**Coloration.** Yellowish brown. Dorsal surface of head with 4 darkish black longitudinal lines, antennae with few and scattered darkish rings, dorsal surface of pronotum with dark brown longitudinal band, kneel lobe of hind femora darkened.

**Measurements.**(length in mm)

	Body	Pronotum	Tegmina	Hind femora	Ovipositor
♂	6.9~7.0	3.6~3.9	1.0	7.8~8.0	/
♀	8.9~9.1	3.2~4.5	1.0	7.5	5.0

**Discussion.** This new species differs from other species of this genus in the male cerci with inner upper lobe with projecting inwards, lower lobe with truncate apex, and apical half of cerci compressed, with obliquely truncate apex. Hind margin of female subgenital plate with 3 lobes, middle lobe longer than lateral lobes, broadly rounded, with an oblique keel near lateral lobes.

**Distribution.** Vietnam.

***Phlugiolopsis punctata* sp. nov.**

(Figs. 27–30)

**Material.** Holotype ♂, China: Yunnan, Naban river, Bangganhani, Alt. 1800m, 2008.IX.13, leg. TANG Liang and HU Jia-Yao.

**Description.** Male. Fore tibiae with spines 4,4(1,1), middle tibiae with 3 inner and 4 outer spines, hind tibiae on each margin of dorsal surface with 27–30 teeth and 3 pairs of apical spurs. Tegmina hardly surpassing hind margin of pronotum. Hind margin of 10<sup>th</sup> abdominal tergite shallow, not widely incurved (Fig. 28). Cerci rather short, basal half robust, inner surface excavated, with upper lobe finger-shaped and lower lobe rounded; apical half cylindrical and strongly curved, apex acute. Subgenital plate becoming narrower apically, with apex truncate, styli shorter.

Female unknown.

**Coloration.** Yellowish brown. Dorsal surface of head with 4 darkish longitudinal lines, antennae with few and scattered darkish rings, dorsal surface of pronotum with a pale brown longitudinal band and two interrupted black lateral stripes, legs with much darker brown spots, external surface of hind femora with oblique brown stripes, dorsal surface of abdomen with a wide pale brown latitudinal band and blackish both sides.

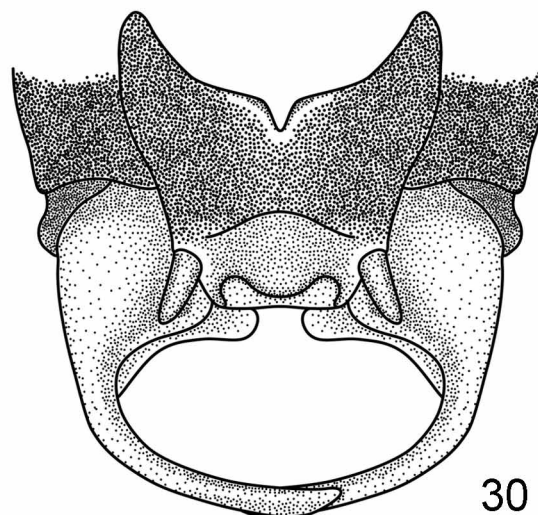
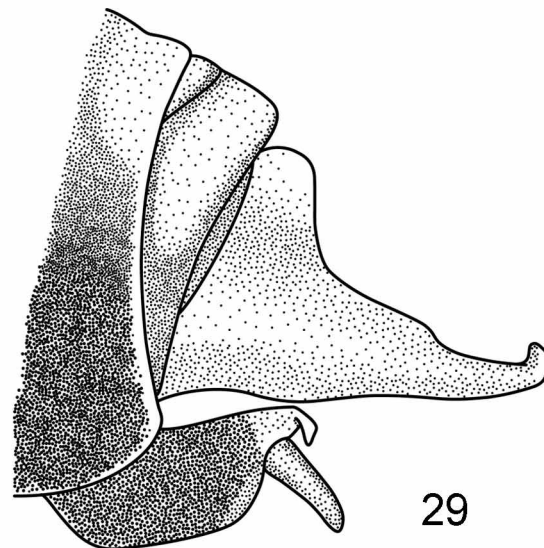
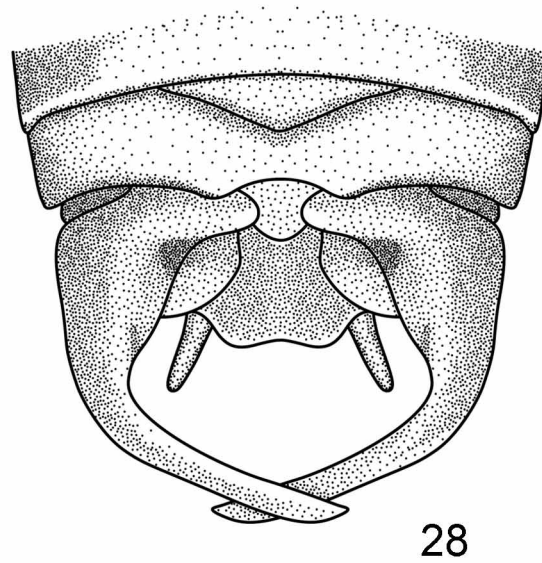
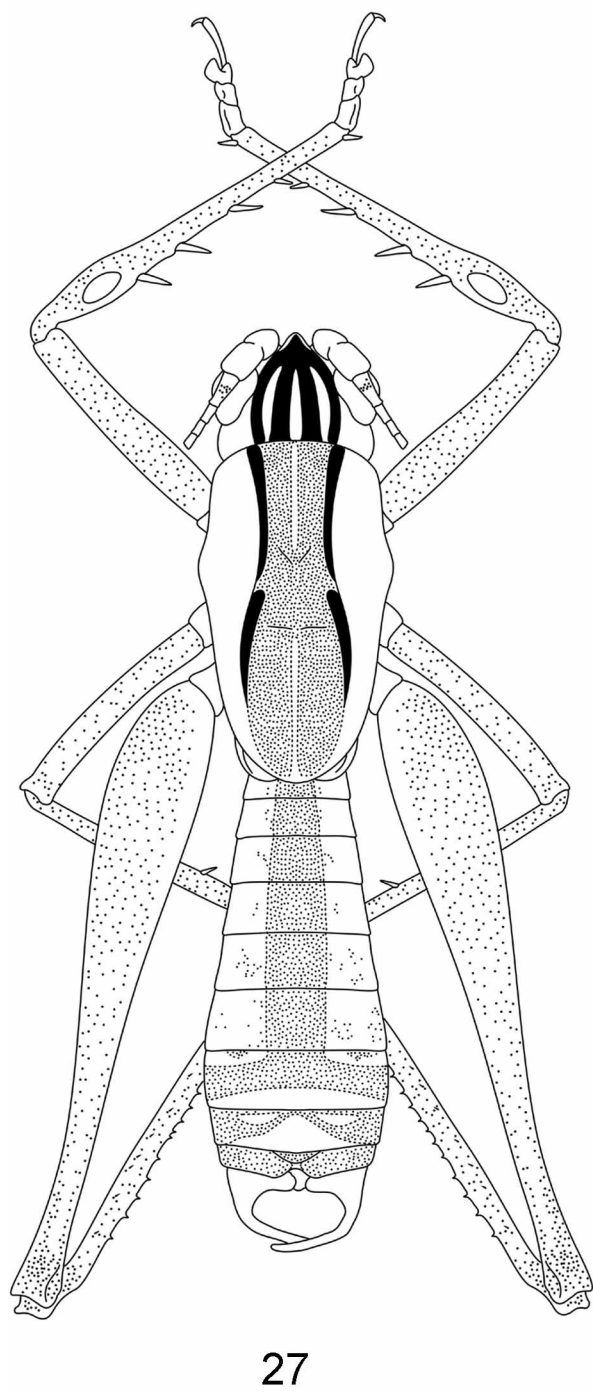
**Measurements.** (in mm)

	Body	Pronotum	Tegmina	Hind femora	Ovipositor
♂	8.0	3.3	1.0	7.0	/

**Discussion.** This new species is similar to *Phlugiolopsis yunnanensis* Shi et Ou, 2005, but distinguished from it by the legs with darkish brown spots and cerci of male with finger-shape upper lobe and round lower lobe at base.

**Etymology.** The name is derived from Latin punctata, referring to the legs with many dark brown spots.

**Distribution.** China (Yunnan).



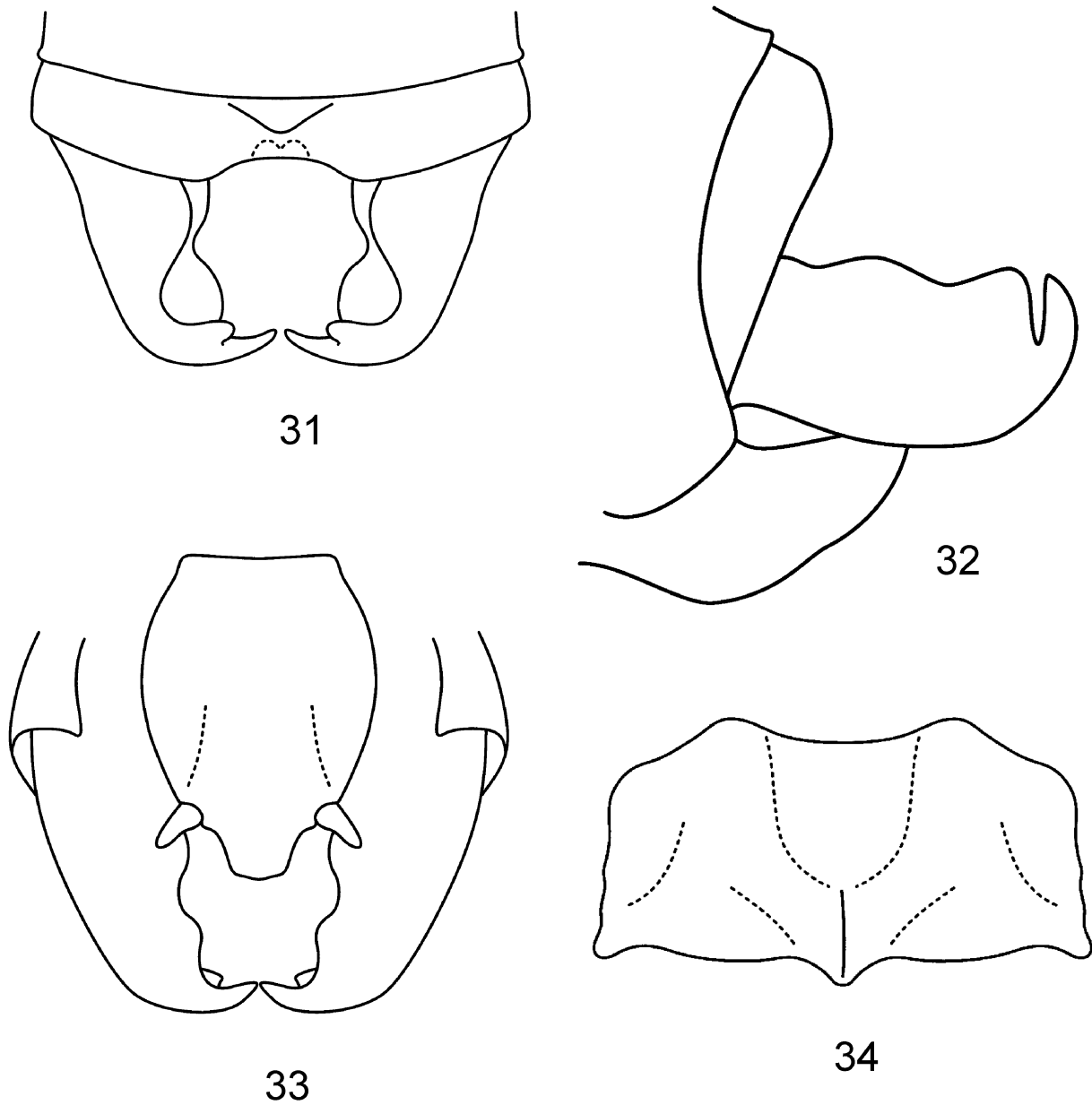
**FIGURES 27–30.** *Phlugiolopsis punctata* sp. n. 27. Body, dorsal view; 28. Apex of male abdomen, dorsal view; 29. Apex of male abdomen, lateral view; 30. Apex of male abdomen, ventral view.

***Phlugiopsis brevis* Hsia et Liu, 1993**

(Figs. 31–34)

*Phlugiopsis brevis* Hsia et Liu, 1993: 94; Jin et Xia, 1994: 26; Liu et Jin, 1994: 109; Otte, 1997: 90; Shi et Ou, 2005: 359; Shi et Wang, 2005: 70.

**Distribution.** China (Zhejiang, Hunan, Guizhou).



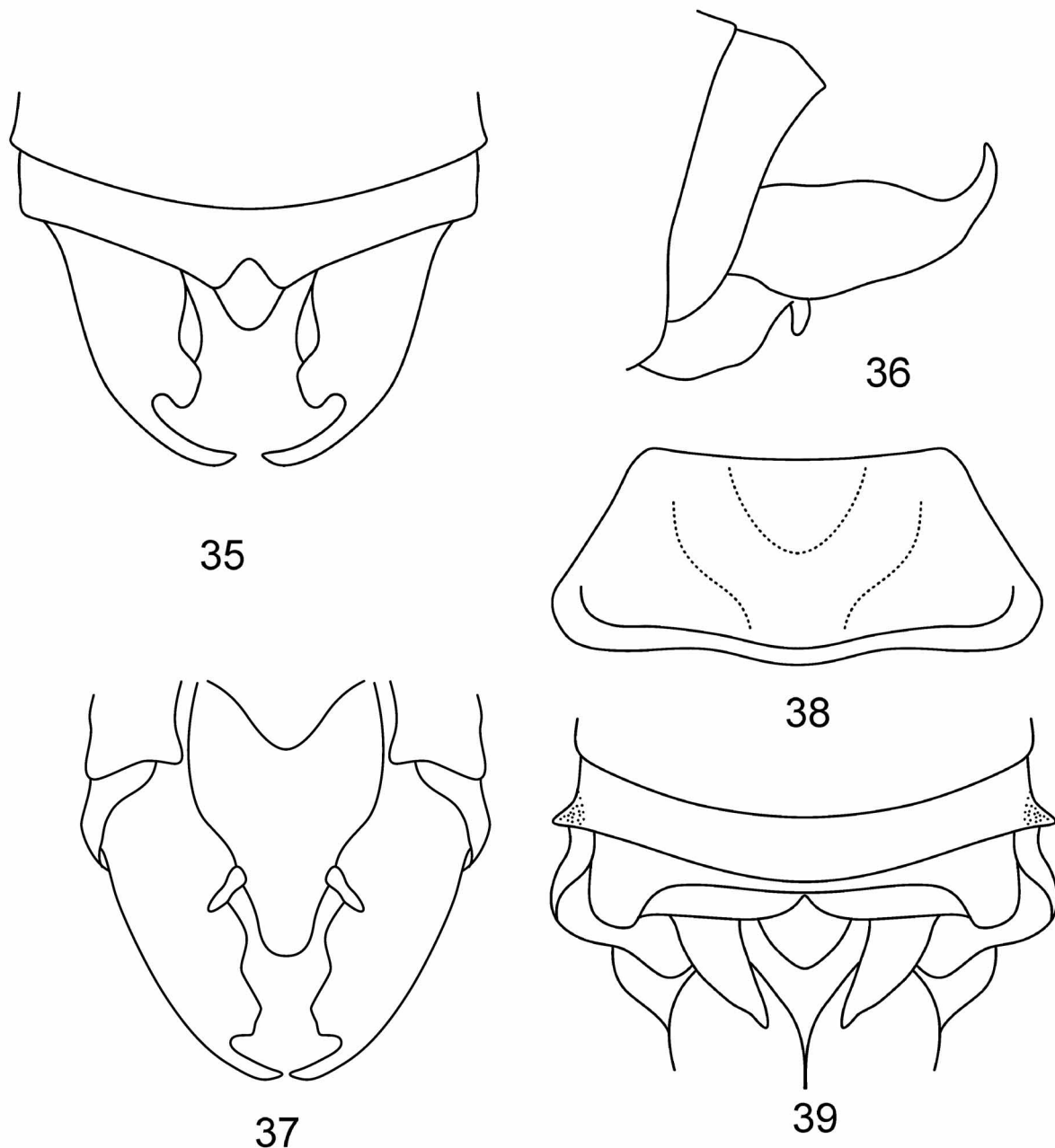
**FIGURES 31–34.** *Phlugiopsis brevis* Hsia et Liu, 1993. 31. Apex of male abdomen, dorsal view; 32. end of male abdomen, lateral view; 33. Apex of male abdomen, ventral view; 34. Subgenital plate of female, ventral view.

*Phlugiolopsis tuberculata* Hsia et Liu, 1993

(Figs. 35–39)

*Phlugiolopsis tuberculata* Hsia et Liu, 1993: 95; Jin et Xia, 1994: 26; Liu et Jin, 1994: 109; Otte, 1997: 90; Shi et Ou, 2005: 359; Shi et Chang, 2005: 122; Shi et Chang, 2006: 105; Shi et Du, 2006: 122.

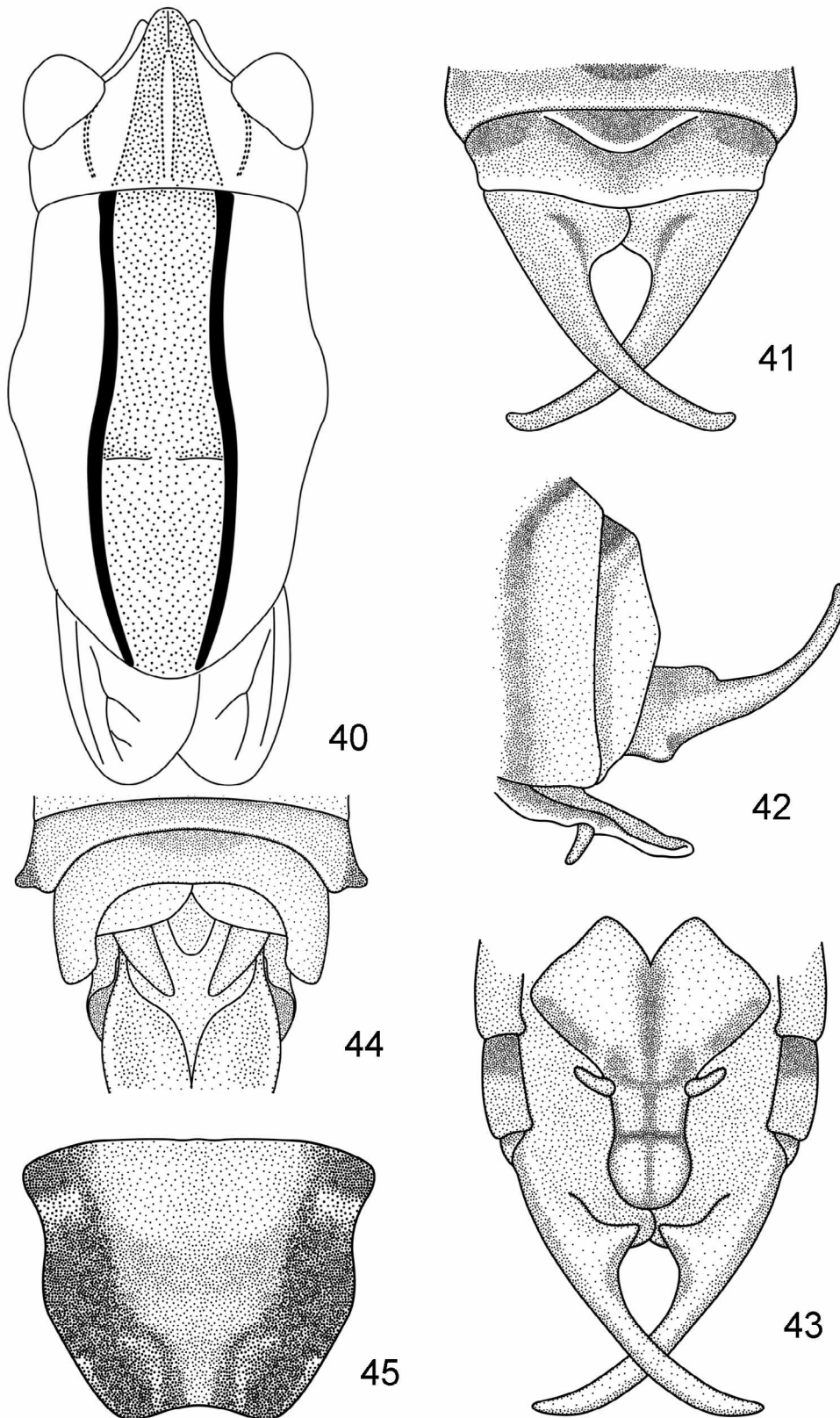
**Distribution.** China (Guizhou, Guangxi).



**FIGURES 35–39.** *Phlugiolopsis tuberculata* Hsia et Liu, 1993. 35. Apex of male abdomen, dorsal view; 36. Apex of male abdomen, lateral view; 37. Apex of male abdomen, ventral view; 38. Subgenital plate of female, ventral view; 39. Apex of female abdomen, dorsal view.

*Phlugiopsis montana* sp.nov.

(Figs. 40–45)



**FIGURES 40–45.** *Phlugiopsis montana* sp. nov. 40. Head and pronotum, dorsal view; 41. Apex of male abdomen, dorsal view; 42. Apex of male abdomen, lateral view; 43. Apex of male abdomen, ventral view; 44. Apex of female abdomen, dorsal view.; 45. Subgenital plate of female, ventral view.

**Material.** Holotype ♂, China: Yunnan, Baoshan, Beimiao reservoir, 1981.IX.20, leg. HE Xiu-Song; Paratype 4 ♀♀, China: Yunnan, Tenchong, Dahaoping, 1991.IX.17, leg. LIU Zu-Yao *et al.*

**Description.** Male. Fore tibiae armed 4,5(1,1), middle tibiae with 4 inner and 5 outer spines, hind tibiae each margin with 21–24 dorsal teeth, and 3 pairs of apical spurs. Tegmina distinctly surpassed hind margin of pronotum (Fig. 40). 10<sup>th</sup> abdominal tergite with hind margin median produced. Cerci with base thick, inner surface excavate, upper lobe rounded and lower lobe triangular; two-third apical cylindrical and moderately curved, with apex pointed (Figs. 41–42). Subgenital plate with parallel lateral margins in apical half, apex rounded, styli positioned in the median portion of subgenital plate (Fig. 43).

Female. 8<sup>th</sup> abdominal tergite both sides with tubercles (Fig. 44). Subgenital plate nearly hexagonal, slightly narrowed apically, with concave hind margin (Fig. 45). Ovipositor shorter than hind femora, ventral valve with apical hook.

**Coloration.** Yellowish brown. Dorsal surface of head with 4 dark black longitudinal lines, antennae with few and scattered darkish rings, dorsal surface of pronotum with a wide darkish brown longitudinal band and 2 blackish lateral stripes, apical part of hind femora slightly darkened.

**Measurements.**(length in mm)

	Body	Pronotum	Tegmina	Hind femora	Ovipositor
♂	7.0	3.0	1.2	7.0	/
♀	8.5~9.6	3.1~3.5	1.0~1.3	7.5	4.1~4.5

**Discussion.** This new species is similar to *Phlugiolopsis tuberculata* Hsia *et* Liu 1993, but distinguished from it by the shape of male cerci and subgenital plate. The cerci of male has a rounded upper lobe and triangular lower lobe at base. Subgenital plate of male with parallel lateral margins in apical half and rounded apex (Figs. 41–43); subgenital plate of female nearly hexagonal and with concave hind margin (Fig. 45).

**Etymology.** The new specific refers to physiognomy of locality.

**Distribution.** China (Yunnan).

### *Phlugiolopsis mistshenkoi* (Gorochov, 1993)

(Figs. 46–49)

*Acyrtaspis mistshenkoi* Gorochov, 1993:87.

*Phlugiolopsis mistshenkoi* Shi *et* Ou, 2005: 358.

**Distribution.** Vietnam (Hasonbinh).

### *Phlugiolopsis yunnanensis* Shi *et* Ou, 2005

(Figs. 50–51)

*Phlugiolopsis yunnanensis* Shi *et* Ou, 2005: 359.

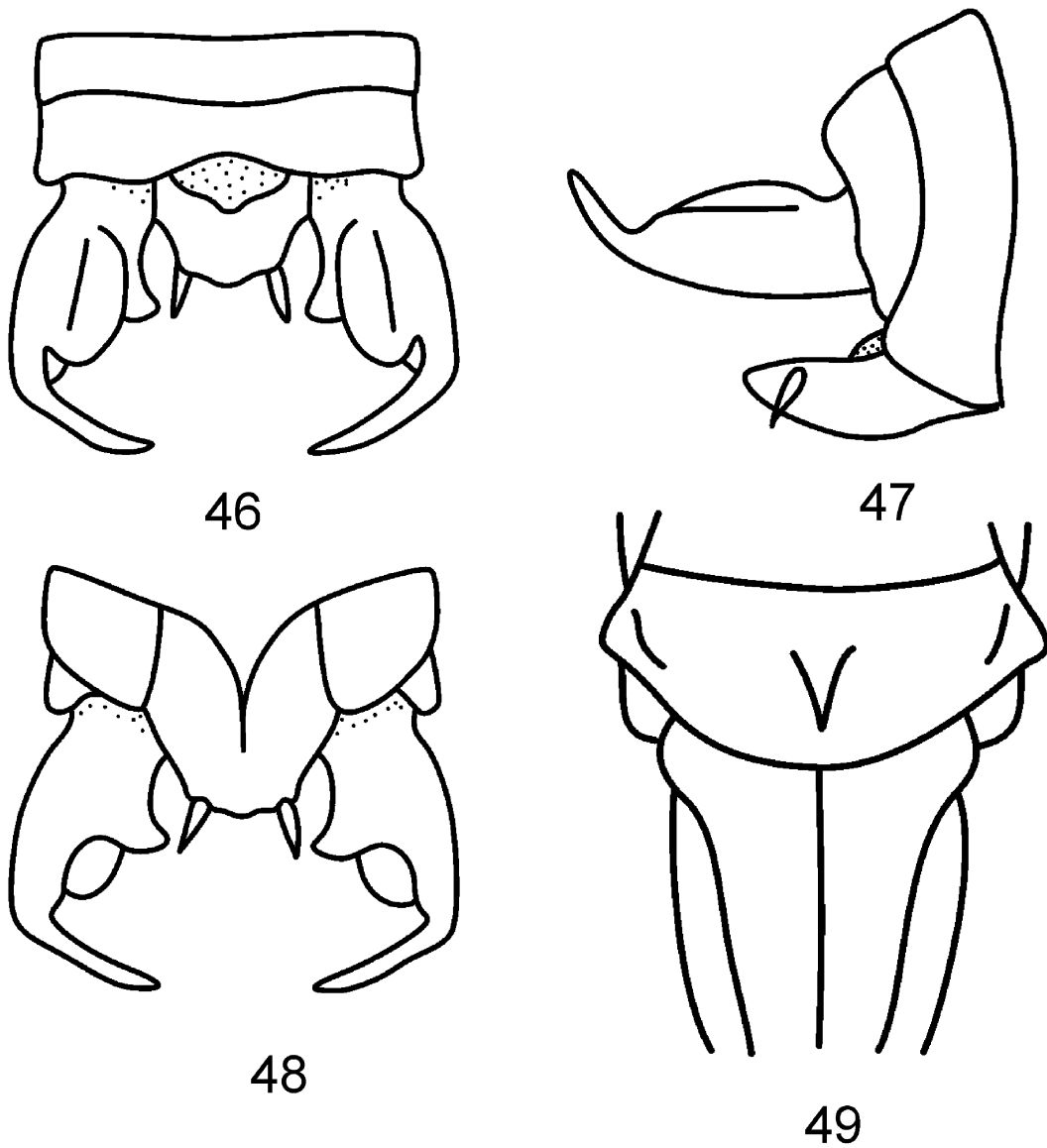
**Distribution.** China (Yunnan).

### *Phlugiolopsis henryi* Zeuner, 1940

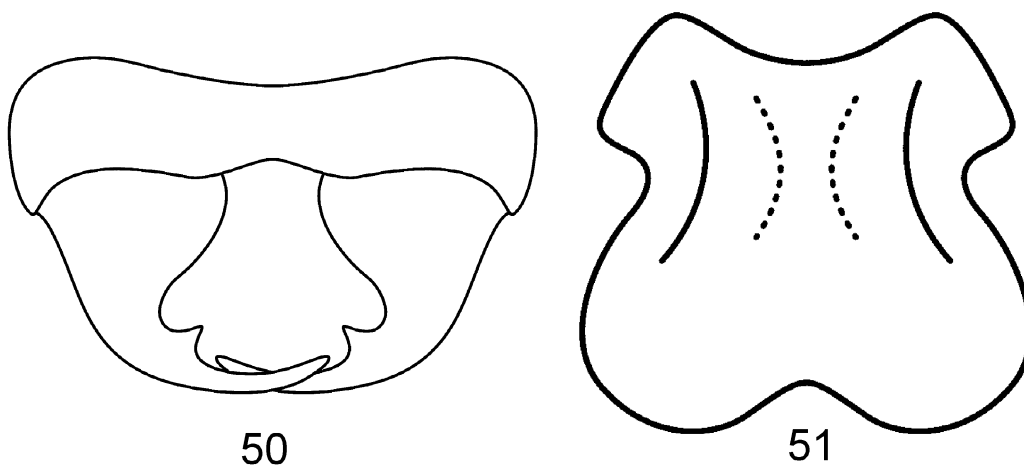
(Figs. 52–53)

*Phlugiolopsis henryi* Zeuner, 1940: 78; Eichler, 1952: 28; Kevan, 1952: 169; Kevan, 1961: 191; Beier, 1966: 287; Heller, 1988: 74; Harz, 1969: 178; Yamasaki, 1986: 357.

**Distribution.** Tropical origin.

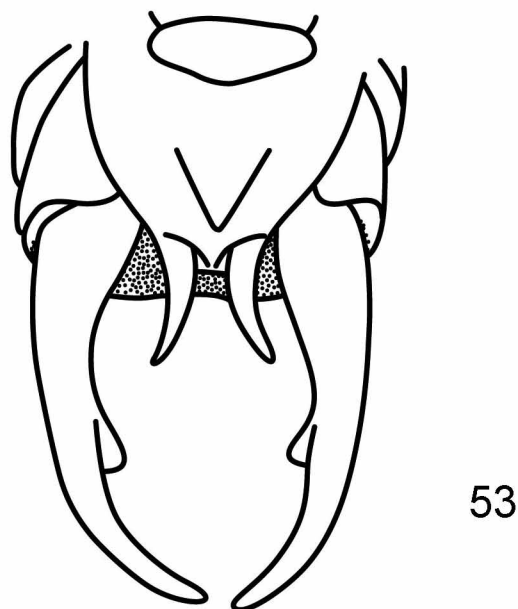
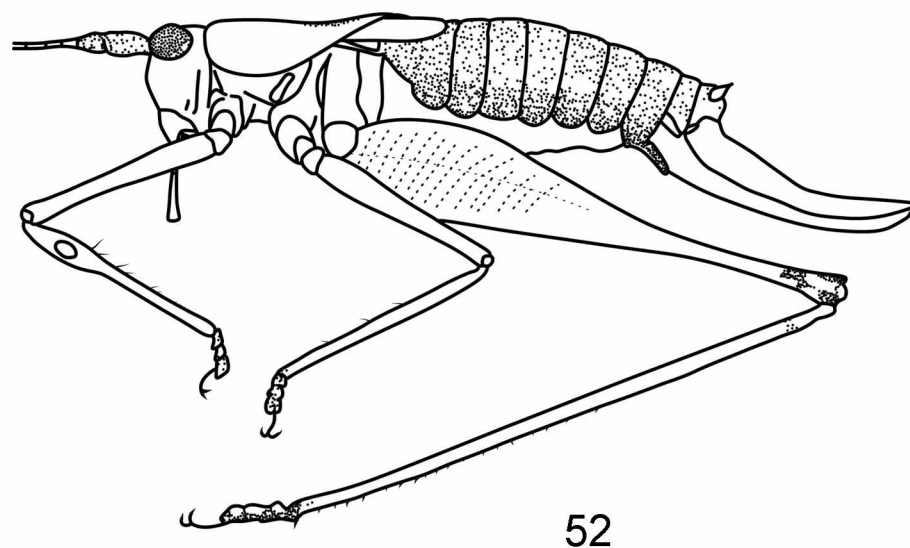


**FIGURES 46–49.** *Phlugiolopsis mistshenkoi* (Gorochov, 1993) 46. Apex of male abdomen, dorsal view; 47. Apex of male abdomen, lateral view; 48. Apex of male abdomen, ventral view; 49. Subgenital plate of female, ventral view. (from Gorochov).



**FIGURES 50–51.** *Phlugiolopsis yunnanensis* Shi *et* Ou, 2005. 50. Apex of male abdomen, dorsal view; 51. Subgenital plate of female, ventral view. (modified from Shi *et* Ou).





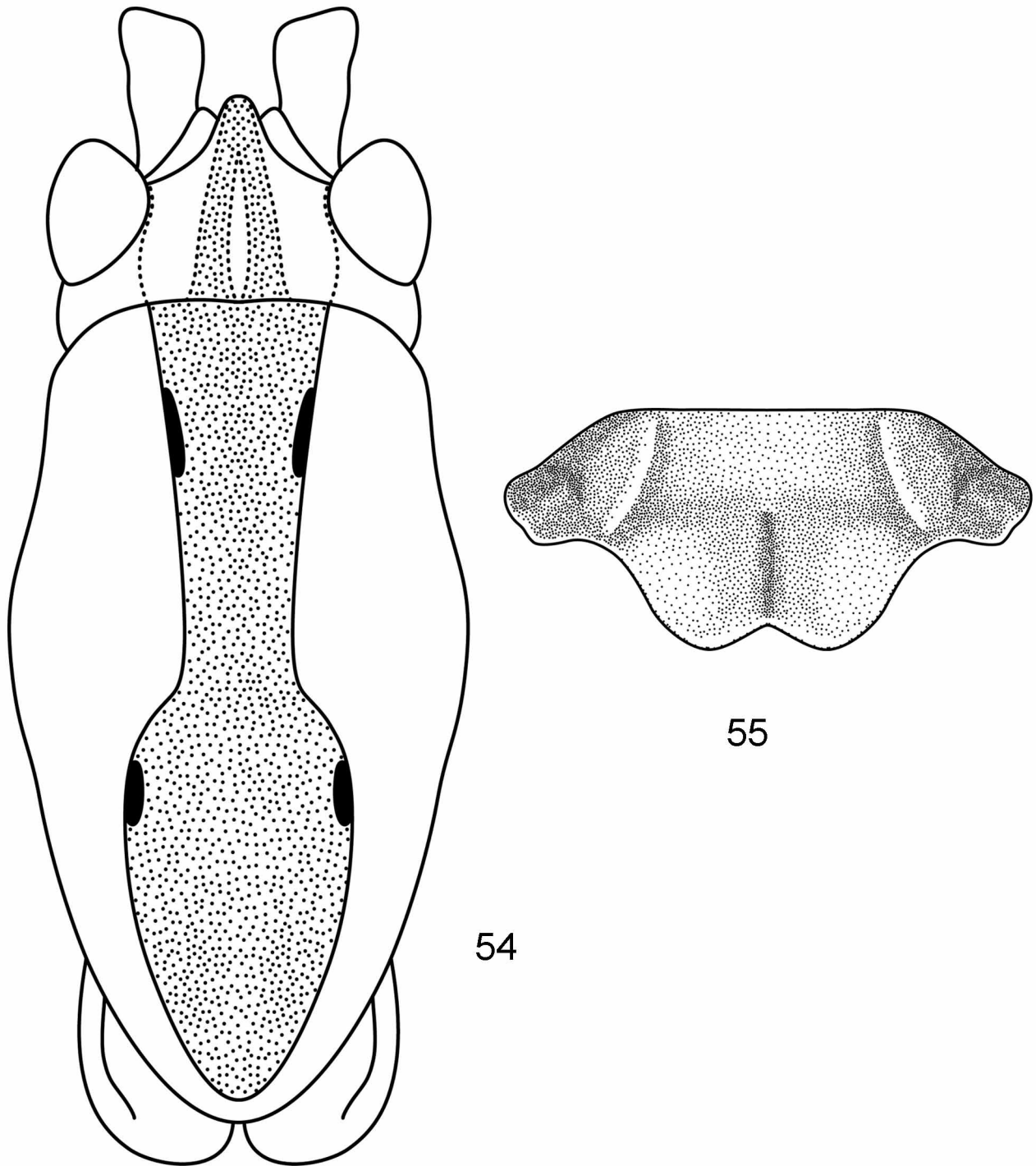
**FIGURES 52–53.** *Phlugiolopsis henryi* Zeuner, 1940. 52. Body, lateral view; 53. Apex of male abdomen, ventral view. (Modified from Zeuner).

***Phlugiolopsis carinata* sp. nov.**

(Figs. 54–55)

**Material.** Holotype ♀, China: Zhejiang, Qingyan Baishanzu, Alt. 1100m, 2006.IX.2–5, leg. LIU Xian-Wei.

**Description.** Female. Fore tibiae armed with spines 4,5(1,1), mid tibiae with 3 inner and 4 outer spines, hind tibiae with 28 teeth on each margin of dorsal surface, and 3 pairs of apical spurs. Tegmina distinctly surpassed hind margin of pronotum. 8<sup>th</sup> abdominal tergite extended backwards laterally. Cerci short, conical. Subgenital plate transverse, hind margin with a wider medial lobe and shallowly notched at the apex (Fig. 55); ventral surface with gradually divergent lateral keels in basal half, and with a medial groove in apical half. Ovipositor is shorter than hind femora, ventral valve with apical hook.



**FIGURES 54–55.** *Phlugiolopsis carinata* sp. n. 54. Head and pronotum, dorsal view; 55. Subgenital plate of female, ventral view.

Male unknown.

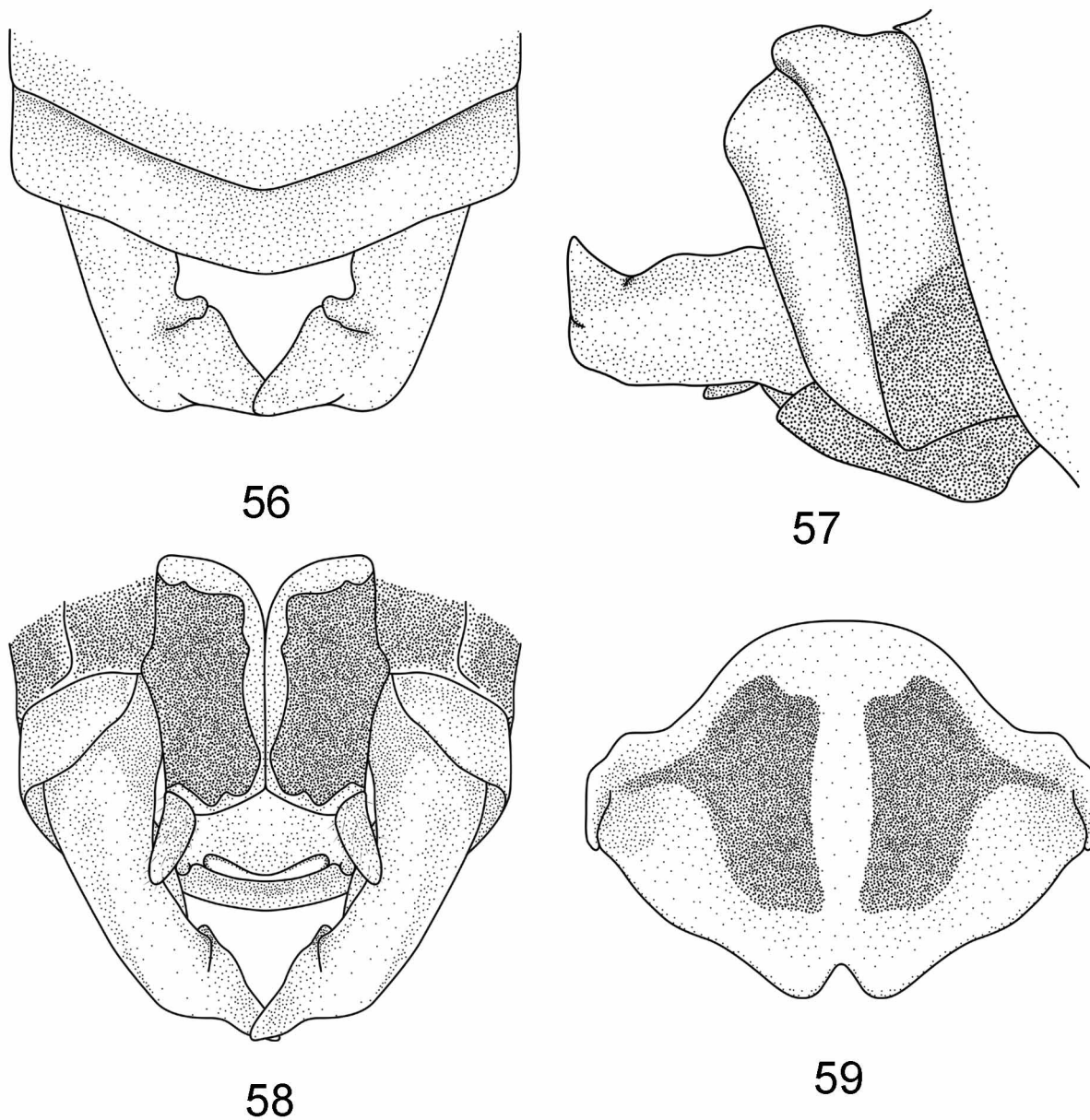
**Coloration.** Yellowish brown. Dorsal surface of head with 4 dark black longitudinal lines, antennae with few and scattered dark rings, dorsal surface of pronotum with a wide dark brown longitudinal band and 2 two interrupted black lateral stripes, apical part of hind femora darkish.

**Measurement.**(length in mm)

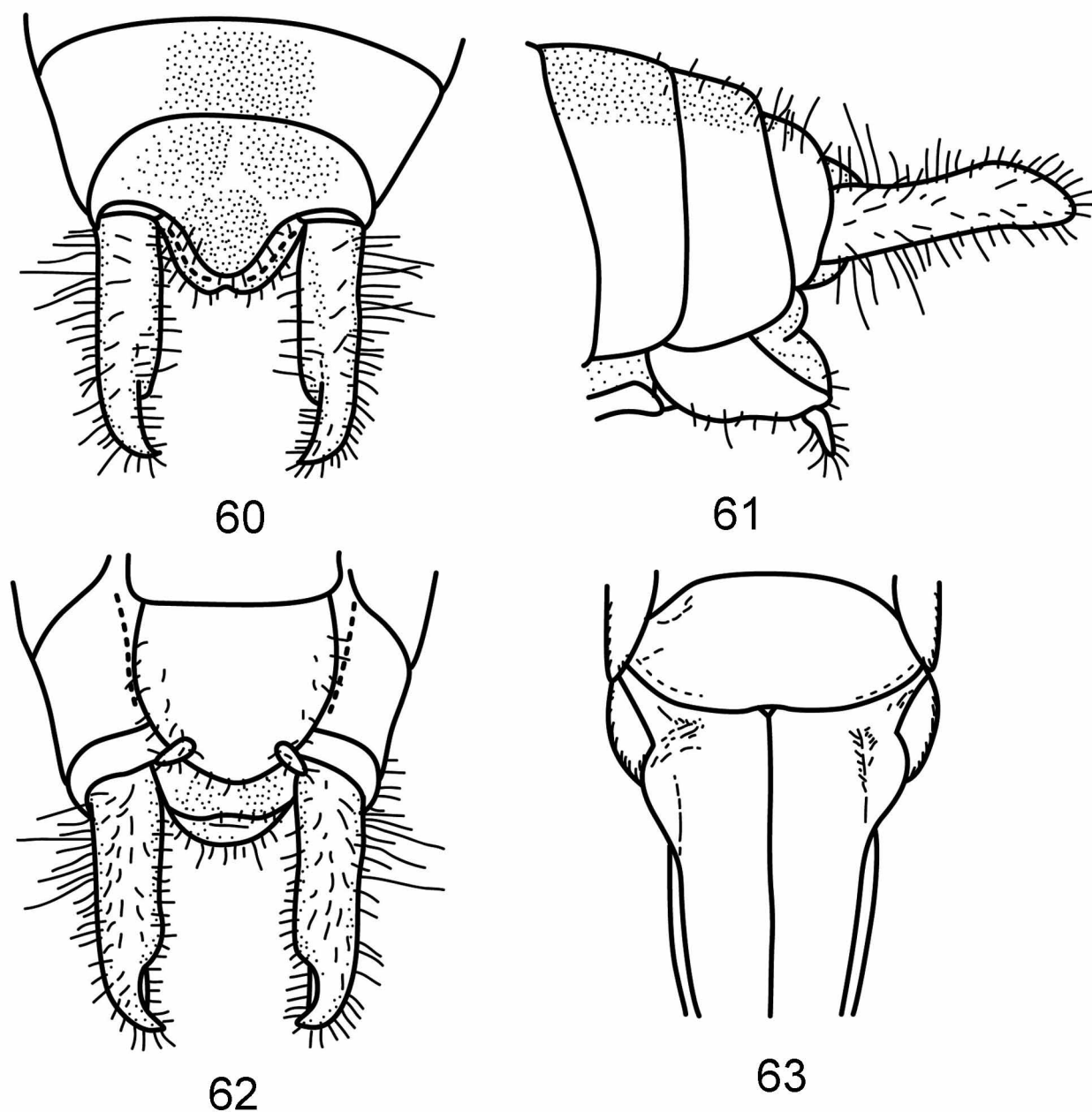
	Body	Pronotum	Tegmina	Hind femora	Ovipositor
♀	7.0	3.5	1.5	8.7	5.0

**Discussion.** This new species is similar to *P. henryi* Zeuner, 1940, but distinguished from it by the smaller size and the shape of female subgenital plate.

**Distribution.** China (Zhejiang).



**FIGURES 56–59.** *Phlugiolopsis ventralis* sp. nov. 56. Apex of male abdomen, dorsal view; 57. Apex of male abdomen, lateral view; 58. Apex of male abdomen, ventral view; 59. Subgenital plate of female, ventral view.



**FIGURES 60–63.** *Phlugiolopsis yaeyamensis* Yamasaki, 1986. 60. Apex of male abdomen, dorsal view; 61. Apex of male abdomen, lateral view; 62. Apex of male abdomen, ventral view; 63. Subgenital plate of female, ventral view.(modified from Yamasaki).

***Phlugiolopsis ventralis* sp.nov.**

(Figs. 56–59)

**Material.** Holotype ♂, China: Yunnan, Kunming, West Mountain, 2010.X.24, leg. GUO Jiang-li; Paratype 5 ♀♀, same data as holotype.

**Description.** Male. Fore tibiae armed 4, 4(1, 1), mid tibiae with 3 inner and 3 outer spines, hind tibiae with 20–22 teeth on inner and outer margin of dorsal surface, and with 3 pairs of apical spurs. Tegmina distinctly surpassed hind margin of pronotum. 10<sup>th</sup> abdominal tergite with hind margin produced. Cerci short and robust (Figs.

56–58), inner surface of basal half excavated, with weak upper lobe, apical third near triangular, strongly incurved. Subgenital plate slightly longer than wide, with long apical lobe and truncate apex, with paired styli.

Female. Subgenital plate nearly triangular and apex notched, lateral margin straight and with a short keel (Fig. 59). Ovipositor is shorter than hind femora, ventral valve with apical hook.

**Coloration.** Body yellowish brown. Dorsal surface of head with 4 black longitudinal lines, antennae with few and scattered dark rings, dorsal surface of pronotum with a wide pale brown longitudinal band and 2 black lateral stripes, the stripes not reaching hind margin, abdomen with black lateral and ventral surface.

**Measurements.** (in mm)

	Body	Pronotum	Tegmina	Hind femora	Ovipositor
♂	7.3	4.0	1.2	7.2	/
♀	8.7~9.5	3.9~4.1	1.4	6.8	5.2~5.5

**Discussion.** This new species is similar to *Phlugiolopsis yaeyamensis* Yamasaki, 1986, differs in male cerci with apex strongly incurved and triangular (Fig. 56); subgenital plate of female with hind margin nearly triangular and apex notched, lateral margin straight and with a short keel (Fig. 59).

**Etymology.** The specific name is derived from Latin ventralis, referring to the black ventral surface of abdomen.

**Distribution.** China (Yunnan).

***Phlugiolopsis yaeyamensis* Yamasaki, 1986**

(Figs.60–63)

*Phlugiolopsis yaeyamensis* Yamasaki, 1986: 354; Kano, 1999: 6.

**Distribution.** Japan (Yaeyama group).

**Acknowledgement**

We gratefully acknowledge Ms. JIN Xing-bao for providing material borrowed from Bishop Museum (Hawaii, U.S.A.). BI Wen-Xuan provided specimens collected from Tibet, and Dr. TANG Liang in SHNU presented collections from Yunnan. This work was supported by the Shanghai Rising-Star Program (No. 10QH1400700), the Scientific Research Innovation Foundation of East China Normal University.

**References**

- Beier, M. (1966) Tettigoniidae: Subfam. Meconematinae, Mecopodinae, Phyllophorinae. In: Beier, M. (ed.), *Orthopterorum Catalogus. Pars 9*. Uitgeverij Dr. W. Junk, 's-Gravenhage: pp. 281–287.
- Bey-Bienko, G.Y. (1955) Observations on faunistic and systematics of the Superfamily Tettigonioidea (Orthoptera) from China. *Zoologiski Zhurnal, Moscow*, 34, 1250–1271.
- Bey-Bienko, G.Y. (1957) Results of Chinese-Soviet Zoological-Botanical expeditions to South-Western China 1955–1956. *Entomologicheskije Obozrenije, Moscow*, 36, 401–417.
- Gorochoy, A.V. (1993) A contribution to the knowledge of the tribe Meconematini (Orthoptera: Tettigoniidae). *Zoosystematica Rossica*, 2(1), 63–92.
- Harz, K. (1969) *The Orthoptera of Europe. I*. Dr. W. Junk N.V. The Hague. pp. 178–179.
- Heller, K.-G. (1988) Bioakustik der europäischen Laubheuschrecken. *Ökologie in Forschung und Anwendung*, 1, 74.
- Jin, X.B. & Xia, K.L. (1994) An index-catalogue of Chinese Tettigonioidea (Orthopteroidea: Grylloptera). *Journal of Orthoptera Research*, 3, 15–41.
- Kano, T. (1999) Japanese brachypterous Meconematinae (Orthoptera: Tettigoniidae). *Tettigonia*, 1(2), 1–81.
- Liu, X.W. & Jin, X.B. (1994) List of Chinese Stenopelmatoidea and Tettigonioidea (Grylloptera). *Contributions from Shanghai Institute of Entomology*, 11, 99–118.

- Liu, X.W. & Zhang, W.N. (2001) Orthoptera: Tettigoniodea, Rhabdophoroidea and Gryllacridoidea. *In*: Wu, H and Pan, C. W. (ed.), *Insects of Tianmushan National Nature Reserve*. Science Press, Beijing, pp. 90–102.
- Liu, X.W., Zhou, M. & Bi, W.X. (2008) Four new species of the genus *Acosmetura* from China (Orthoptera, Tettigoniodea, Meconematidae). *Acta Zootaxonomica Sinica*, 33(4), 761–767.
- Otte, D. (1997) *Orthoptera Species File 7. Tettigoniodea*. The Orthopterist's Society at The Academy of Natural Sciences of Philadelphia, pp. 88–94.
- Shi, F.M. & Chang, Y.L. (2005) Phaneropteridae, Pseudophyllidae, Meconematidae, Mecopodidae and Conocephalidae. *In*: Jin, D.C. & Li, Z.Z. (ed.), *Insects from Xishui Landscape*. Guizhou Science and Technology Publishing House, Guiyang, 116–131.
- Shi, F.M. & Chang, Y.L. (2006) Pseudophyllidae, Phaneropteridae, Mecopodidae, Meconematidae, Conocephalidae and Tettigoniidae. *In*: Jin, D.C. & Li, Z.Z. (ed.), *Insects from Chishui Spinulose Tree Fern Landscape*. Guizhou Science and Technology Publishing House, Guiyang, pp. 97–110.
- Shi, F.M., Chang, Y.L. & Mao, S.L. (2007) Pseudophyllidae, Phaneropteridae, Mecopodidae, Tettigoniidae, Conocephalidae and Meconematidae. *In*: Li, Z.Z., Yang, M.F. & Jin, D.C. (ed.), *Insects from Leigongshan landscape*. Guizhou Peoples Publishing House, Guiyang, pp. 110–120.
- Shi, F.M. & Du, X.C. (2006) Pseudophyllidae, Phaneropteridae, Mecopodidae, Meconematidae, Conocephalidae and Tettigoniidae. *In*: Li, Z.Z. & Jin, D.C. (ed.), *Insects from Fanjingshan Landscape*. Guizhou Science and Technology Publishing House, Guiyang, pp. 115–129.
- Shi, F.M. & Ou, X.H. (2005) A review of the genus *Phlugiolopsis* with description of a new species from China (Orthoptera: Meconematidae). *Acta Zootaxonomica Sinica*, 30(2): 358–362.
- Shi, F.M. & Wang, J.F. (2005) Orthoptera, Tettigoniodea. *In*: Yang, M.F. & Jin, D.C. (ed.), *Insects from Dashahe Nature Reserve of Guizhou*. Guizhou Peoples Publishing House, Guiyang, 64–74.
- Shi, F.M. & Zheng, Z.M. (1994) Two new species of Tettigoniodea (Orthoptera) from China. *Journal of Shanxi Normal University (Natural Science Edition)*, 22(4), 64–66.
- Tinkham, E.R. (1943) New species and records of Chinese Tettigoniidae from the Heude Museum, Shanghai. *Notes D'Entomologie Chinoise*, 10, 33–66.
- Tinkham, E.R. (1944) Twelve new species of Chinese leaf-katydids of the genus *Xiphidiopsis*. *Proceedings of United States National Museum*, 94, 505–527.
- Tinkham, E.R. (1956) Four new Chinese species of *Xiphidiopsis* (Tettigoniidae: Meconematinae). *Transactions of the American Entomological Society*, 82, 3–5.
- Xia, K.L. & Liu, X.W. (1992) Orthoptera, Tettigoniodea and Grylloidea. *In*: Huang, F.S. (ed.), *Insects of Wuling Mountains Area, Southwestern China*. Science Press, Beijing, pp. 87–113.
- Yamasaki, T. (1986) Discovery of *Phlugiolopsis* (Orthoptera: Tettigoniidae: Meconematinae) in the Ryukyu Islands. *Kontyu, Tokyo*, 54(2), 353–358.