



New data on taxonomy of recent Prophalangopsidae (Orthoptera: Hagloidea)

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Abstract

Keys to subfamilies, genera and species of the Prophalangopsidae are provided. Two new species *Aboiloilomimus guizhouensis* sp. n. and *Aboiloimimus ornatus* sp. n. are described respectively from Guizhou and Sichuan of China. The female of *Prophalangopsis obscura* is found for the first time from Tibet and is given a diagnosis. All type specimens examined in this study are deposited in Shanghai Entomological Museum, CAS.

Key words: Orthoptera, Prophalangopsidae, new species, China

Introduction

The family Prophalangopsidae Handlirsch (1929) in the superfamily Hagloidea is a small group of Orthoptera and consists of 6 subfamilies (five fossil and one recent), at least 25 genera presently (Gorochov 2003). As it contains most fossil species and rare recent species, bearing some primeval characters, the Prophalangopsidae is interesting for studies on the evolutionary processes of Orthoptera and has attracted attentions of taxonomists who have worked on it. One study has proposed that the Prophalangopsidae possibly originated from the Triassic to Early Cretaceous family Haglidae which is the ancestor for two large recent superfamilies: Tettigonioidea and Stenopelmatoidea (Gorochov 1995). We conclude that Hagloidea has its closest affinity with Stenopelmatoidea in the suborder Ensifera of Orthoptera.

The Prophalangopsinae is an earliest subfamily with more rank changes in history. In 1898 Saussure referred it to a “tribu des Tarragiens”. Then, Kirby (1906) treated it as a new subfamily Prophalangopsinae and placed it in the family Phasgonuridae (=Tettigoniidae), but it lacks specific statements. Caudell added the subfamilial characters in 1911. Later, Handlirsch (1925) transferred it to the family Stenopelmatidae. In 1929, Handlirsch upgraded it as a new family Prophalangopsidae and this arrangement was accepted by most entomologists subsequently. But Karny (1937) transferred it to the family Gryllacrididae. Nowadays, the subfamily Prophalangopsinae contains 3 genera: *Prophalangopsis*, *Tarragoilus* and *Aboilomimus*. *Prophalangopsis* was erected by Walker (1870) based on a single species *Tarraga obscura* Walker, 1869 from northeastern India. In the original description, this species was regarded as a gryllid because of its three-segmented tarsi. *Tarragoilus* and *Aboilomimus* were two recent genera erected by Gorochov (2001) based separately on *Tarragoilus diuturnus* Gorochov, (2001) and *Aboilomimus sichuanensis* Gorochov, (2001) from China.

The Cyphoderrinae of the Prophalangopsidae was established by Gorochov in 1988. So far 2 genera, *Cyphoderris* and *Paracyphoderris*, are known in this subfamily. *Cyphoderris* Uhler was erected in 1864 based on a brachypterous species *Cyphoderris monstrosa*. This genus was placed in the group Anostostomata of the Gryllacrididae in 1898 by Scudder. Kirby (1906) first placed it in a tettigoniid subfamily, the Decticinae. Subsequently, Zeuner (1935) moved it to the Prophalangopsinae and Karny (1937) placed it into the

Henicinae of the Gryllacrididae. Gorochov (1988) erected a special subfamily Cyphoderrinae to accommodate it. The other recently described genus is *Paracyphoderris* Storozhenko, (1980), based on *Paracyphoderris erebeus* Storozhenko, 1980.

In this paper two new species *Aboilomimus guizhouensis* **sp. n.** and *Aboilomimus ornatus* **sp. n.** are described, bringing up the total number of present species in the family Prophalangopsidae to five. The female of *Prophalangopsis obscura* was discovered in Tibet, China. All type materials are deposited in the SEM (Shanghai Entomological Museum, CAS, Shanghai, China).

Family Prophalangopsidae Handlirsch, 1929

Prophalangopsidae Handlirsch, 1929: 724; Zeuner, 1934: 460; Zeuner, 1935: 102; Zeuner, 1936: 103; Martynov, 1937: 145; Zeuner, 1940: 29; Gorochov, 1988: 354.

Type genus: *Prophalangopsis* Walker, 1870.

Head, short and rounded as crickets, with long antennae inserted between the eyes, ocelli present. Pronotum semi-cylindrical, with posterior dorsal part much broadened. Fore and mid coxae with spines. Fore tibiae with auditory structure on either side. All tarsi falsely four-segmented (First tarsal segment separated from the second segment by a fine suture only) or four-segmented, their third segment without lateral lobes. Fully winged. The male presenting stridulatory apparatus on tegmina, but without neat mirror.

Key to the subfamilies of Recent Prophalangopsidae

- 1(2) All tarsi apparently, but falsely, four-segmented, the first tarsal segment separated from the second segment by a fine suture only; Pronotum with disk rounded posteriorly.....Prophalangopsinae
2(1) All tarsi four-segmented, the first tarsal segment very distinctly and articulately separated from the second segment; Pronotum with disk truncate posteriorly Cyphoderrinae

Subfamily Prophalangopsinae Kirby, 1906

Tarragiens Saussure, 1898: 239; Prophalangopsinae Kirby, 1906: 290; Caudell, 1911: 6; Zeuner, 1935: 104; Martynov, 1937: 145; Karny, 1937: 211; Zeuner, 1940: 31; Gorochov, 1988: 354.

Type-genus: *Prophalangopsis* Walker, 1871

Ocelli present. Pronotum with hind margin rounded. Fore and mid coxae with spine. Fore tibiae with a distinct tympanum on either side, all tarsi falsely four-segmented, the first tarsal segment separated from the second segment by a fine suture only, with pulvilli slight traces. Tegmina always present and furnished with very large stridulating area within the male.

The living subfamily Prophalangopsinae is represented today by 3 genera and 5 species from northeastern India and China only. *Prophalangopsis obscura* (Walker, 1871) (India and China); *Aboilomimus sichuanensis* Gorochov, 2001; (China: Sichuan); *Aboilomimus guizhouensis* **sp. n.** (China: Guizhou); *Aboilomimus ornatus* **sp. n.** (China: Sichuan); *Tarragoilus diuturnus* Gorochov, 2001 (China: Sichuan).

Key to genera of the subfamily Prophalangopsinae

- 1(2) Lateral lobes of pronotum much longer than deep, without humeral notches; fore femora shorter than pronotum, the first tarsal segment shorter than the fourth tarsal segment; tegmina pad-like in female ...*Tarragoilus* Gorochov, 2001

- 2(1) Lateral lobes of pronotum as long as deep, with distinct humeral notches; fore femora longer than pronotum, the first tarsal segment longer than the fourth tarsal segment; tegmina fully developed in female
- 3(4) Pronotum with metazona hardly longer than prozona; Costa of tegmina indistinct, dorsal area narrower than half width of tegmen *Aboilomimus* Gorochoy, 2001
- 4(3) Pronotum with metazona distinctly longer than prozona; Costa of tegmina distinct, dorsal area broader than half width of tegmen *Prophalangopsis* Walker, 1871

Genus *Prophalangopsis* Walker, 1870

- Tarraga* Walker, 1869. Cat. Derm. Salt. Brit. Mus., 1: 100
Prophalangopsis Walker, 1870. Cat. Derm. Salt. Brit. Mus., 5, suppl.: 116
Tarraga Saussure, 1898. Rev. Suisse Zool., 5: 241.
Prophalangopsis Kirby, 1906. Syn. Cat. Orth. Brit. Mus., 2: 290
Prophalangopsis Caudell, 1911. Gen. Ins. Fasc., 120: 6.
Prophalangopsis Handlirsch, 1925. Handbuch Ent., 3: 456.
Prophalangopsis Handlirsch, 1929. handb. Zool., 4: 724.
Prophalangopsis Karny, 1929. Lingnaan Sci. Journ., 7: 747.
Prophalangopsis Karny, 1931. Trans. R. Soc. S. Afr., 19: 103.
Prophalangopsis Karny, 1934. Nature, London 134: 460
Prophalangopsis Zeuner, 1935. Stylops, Journ. Taxon. Ent., 4: 104
Prophalangopsis Zeuner, 1936. Proc. R. Ent. Soc. London (A)11 (1–2): 11–22.
Prophalangopsis Karny, 1937. Gen. Ins. Fasc., 206: 211.
Prophalangopsis Shorov, 1968. Trans. Inst. Paleo. USSR Acad. Sci., 118: 64
Type species: *Tarraga obscura* Walker, 1869.

Large size, robust. Fastigium of vertex sloping strongly to frons, little broader than first antennal segment, without median sulcus. Eyes oval, prominent. Ocelli present. Antennae inserted between the eyes, the dorsal margins of the sockets not below the ventral margins of eyes. Pronotum with metazona distinctly longer than prozona, with hind margin rounded, surface punctured, shiny; lateral lobes as long as deep, with distinct humeral notches. Prosternum armed with a pair of weak lobes; mesosternal lobes triangular, metasternal lobes rounded. Fore and mid coxae with spines. Femora with ventral spinules, hind femora with weak feather-like sculpture on external surface; fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs except at apex, hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Tegmina with narrowly rounded apex?C distinct, Rs arising in the middle of R, single or forked, male stridulating area very large. Wings shorter than tegmina. 7th and 8th tergites of male with hind lobes, 10th abdominal tergite and epiproct fused with each other. Paraprocts with long hooks. Cerci short and solid, subgenital plate with styles. Ovipositor reduced, upper valva with segmented appendages.

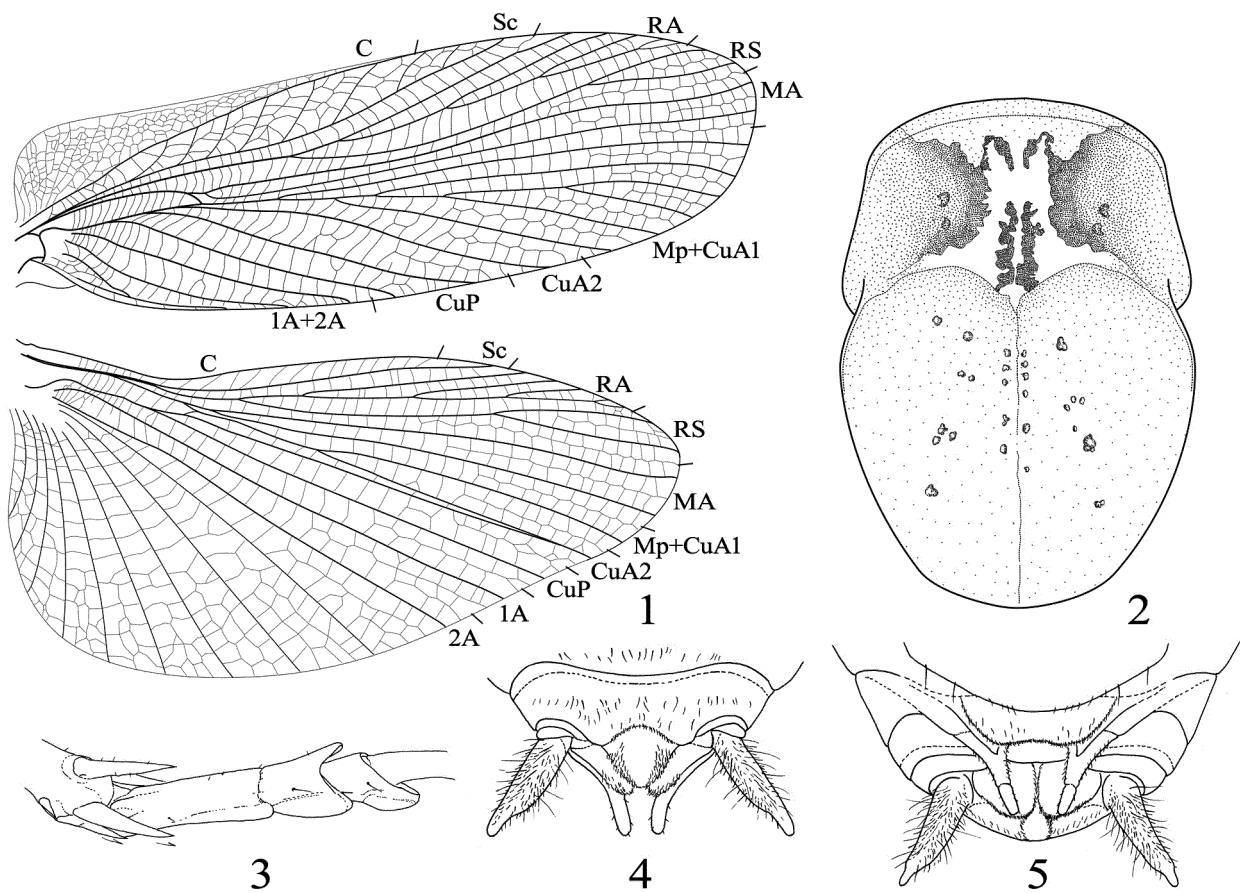
Prophalangopsis obscura (Walker, 1869)

(Figs. 1–5, plate 1–A)

- Tarraga obscura* Walker, 1869. Cat. Derm. Salt. Brit. Mus., 1: 100
Prophalangopsis obscura Walker, 1870. Cat. Derm. Salt. Brit. Mus., 5, suppl.: 116
Tarraga obscura Saussure, 1898. Rev. Suisse Zool., 5: 244.
Prophalangopsis obscura Caudell, 1911. Gen. Ins. Fasc., 120: 6.
Prophalangopsis obscura Karny, 1929. Lingnaan Sci. Journ., 7: 747.
Prophalangopsis obscura Zeuner, 1935. Stylops, Journ. Taxon. Ent., 4: 104
Prophalangopsis obscura Hubbel, 1936. Univ. Florida Pub. Biol. Sci. Ser., 2(1): 25
Prophalangopsis obscura Karny, 1937. Gen. Ins. Fasc., 206: 213.
Prophalangopsis obscura Zeuner, 1939. Fossil Orth. Ens., 156.
Prophalangopsis obscura Gorochoy, 1986. Trudy Zool. Inst. Akad. Nauk SSSR, 143: 96.
Prophalangopsis obscura Otte, 1997. Orth. Spec. File., 7: 315.

Walker (1869) described *P. obscura* based on a single male specimen collected from northeastern India. Since then, no additional material has been discovered. In this study, we report two female specimens collected from Motuo, Tibet. In general appearance, they resemble the male of *P. obscura*. We believe they are females of the elusive of *P. obscura*. They are described below.

Diagnosis. Female. Large size, robust. Fore femora without ventral spinules, fore tibiae with 1 external spur and 2 internal spurs on dorsal surface, ventral surface armed with 5 pairs of spurs. Mid femora with about 3–4 external ventral spinules, mid tibiae with 3 pairs dorsal spurs and 5 pairs of ventral spurs. Hind femora with about 7–8 ventral spinules on each side, hind tibiae armed with 6 external dorsal spines and 9 internal dorsal spines, with 3 apical spurs on each side. Venation of fore tegmina as in fig.1. Ra of tegmina with 4–5 branches near apex, Rs arising before the middle, forked; MP+CuA with 7 branches. Ra of hind wings with 4–5 branches, Rs arising before the middle, forked. Epiproct rounded and apparently fused to tenth abdominal tergite, paraprocts produced somewhat posteriorly. Cerci short and solid, conical. Subgenital plate short, transverse. Ovipositor reduced, upper valva with segmented appendages.



FIGURES 1–5. *Prophalangopsis obscura* (Walker, 1869). 1. Tegmina and wing of female ; 2. Pronotum of female, dorsal view; 3. Hind tarsus, lateral view; 4. End of female abdomen, dorsal view; 5. End of female abdomen, ventral view.

Coloration of body brown varied with yellowish white. Occiput with 5 irregular light lines , prozona of pronotum light testaceous and translucent, with two rows of blackish median spots and each bearing a large black marking. All femora obliquely striated with blackish brown on external face. Tegmina pale brown, with yellowish veins. Wings translucent.

Measurements (mm). Length of body Female: 34.0, length of pronotum, 10.0, length of tegmina, 45.0, length of hind femora, 20.0.

Material studied. 2 females: Aniqiao, alt.1100m, Motuo County, Xizang (Tibet), 16–18.VIII.2005, leg. Tang –Liang.

Distribution. China (Xizang) and India .

Genus *Aboilomimus* Gorochov, 2001

Aboilomimus Gorochov, 2001. Journ. Orth. Res., 10 (2): 360.

Type species: *Aboilomimus sichuanensis* Gorochov, 2001

Medium size, slender. Fastigium of vertex sloping strongly to frons, little broader than first antennal segment, without median sulcus. Eyes oval, prominent. Ocelli present. Antennae inserted between the eyes, the dorsal margins of the sockets not below the ventral margins of eyes. Pronotum with metazona distinctly shorter than prozona, with hind margin rounded, surface almost smooth or with wrinkles; lateral lobes as long as deep, with distinct humeral notches. Prosternum armed with a pair of weak lobes; mesosternal lobes triangular, metasternal lobes rounded. Fore and mid coxae with spines. Femora with ventral spinules, hind femora with weak feather-like sculpture on external surface; fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs except at apex, hind tibiae with three apical spurs on each side. Both pairs of wings fully developed. Tegmina with truncate apex, C indistinct, Rs arising in the middle of R, single or forked, male stridulating area very large. Wings shorter than tegmina. Tergites of male without any hind lobes, 10th abdominal tergite and epiproct fused with each other. Cerci short and solid, subgenital plate with styles. Ovipositor reduced, upper valva with segmented appendages.

Key to species of the genus *Aboilomimus*

- 1 (4) Occiput entirely blackish; pronotum blackish with whitish narrow edges.
- 2(3) Ra of tegmina with 3 branches near apex, Rs forked; area between CuA2 and CuP rather narrow; dorsal surface of 10th abdominal tergite of male with two longitudinal carinae and transverse wrinkles at each side; subgenital plate of male triangularly notched at apex *A. guizhouensis* sp.n.
- 3 (2) Ra and Rs of tegmina single, area between CuA2 and CuP distinctly widened; dorsal surface of 10th abdominal tergite almost smooth; subgenital plate of male shallowly emarginated at hind margin . *A. sichuanensis* Gorochov, 2001
- 4(1) Occiput blackish with 5 irregular longitudinal light stripes; pronotum pitch black, with a testaceous band along the middle in prozona *A. ornatus* sp. n.

***Aboilomimus guizhouensis* sp. n.**

(Figs. 6–9; Plate 1–B)

Description. Male. Medium size, slender. Metazona of pronotum almost smooth. Fore femora without ventral spinules, fore tibiae with 1 external spur and 2 internal spurs on dorsal surface, ventral surface armed with 5 pairs of spurs. Mid femora with about 0–2 external ventral spinules, mid tibiae with 3 pairs dorsal spurs and 5 pairs of ventral spurs. Hind femora with about 7–9 ventral spinules on each side, hind tibiae armed with 6 external dorsal spines and 9 internal dorsal spines, with 3 apical spurs on each side. Venation of tegmina and hind wings as in fig.6. Ra of tegmina with 3 branches near apex, Rs forked, MA bifurcate near base, MP+CuA1 with 4 branches, CuA2 with 3 branches. Ra of hind wings with 3 branches, Rs single and arising in the middle (R and Rs of tegmina single, MP+ CuA1 with 3 branches, CuA2 bifurcated. Ra of hind wings single, Rs arising behind the middle in *A. sichuanensis*). Tenth abdominal tergite and epiproct fused with each

other (Fig. 7), sulcate above, dorsal surface with two longitudinal carinae and transverse wrinkles at each side (dorsal surface of 10th abdominal tergite almost smooth in *A. sichuanensis*). Paraprocts closely wrapped the median lobe, with hooks curved upward. Cerci short and solid, conical. Subgenital plate triangularly notched at apex (shallowly emarginated at hind margin in *A. sichuanensis*), and with long styli (Fig. 9).

Coloration of body blackish brown, shining. Occiput and palpi maxillary yellowish brown, pronotum black with yellow margins, tegmina and wings brown with rather variable large yellow spots, spines of hind tibiae with darkened apex.

Female. Unknown.

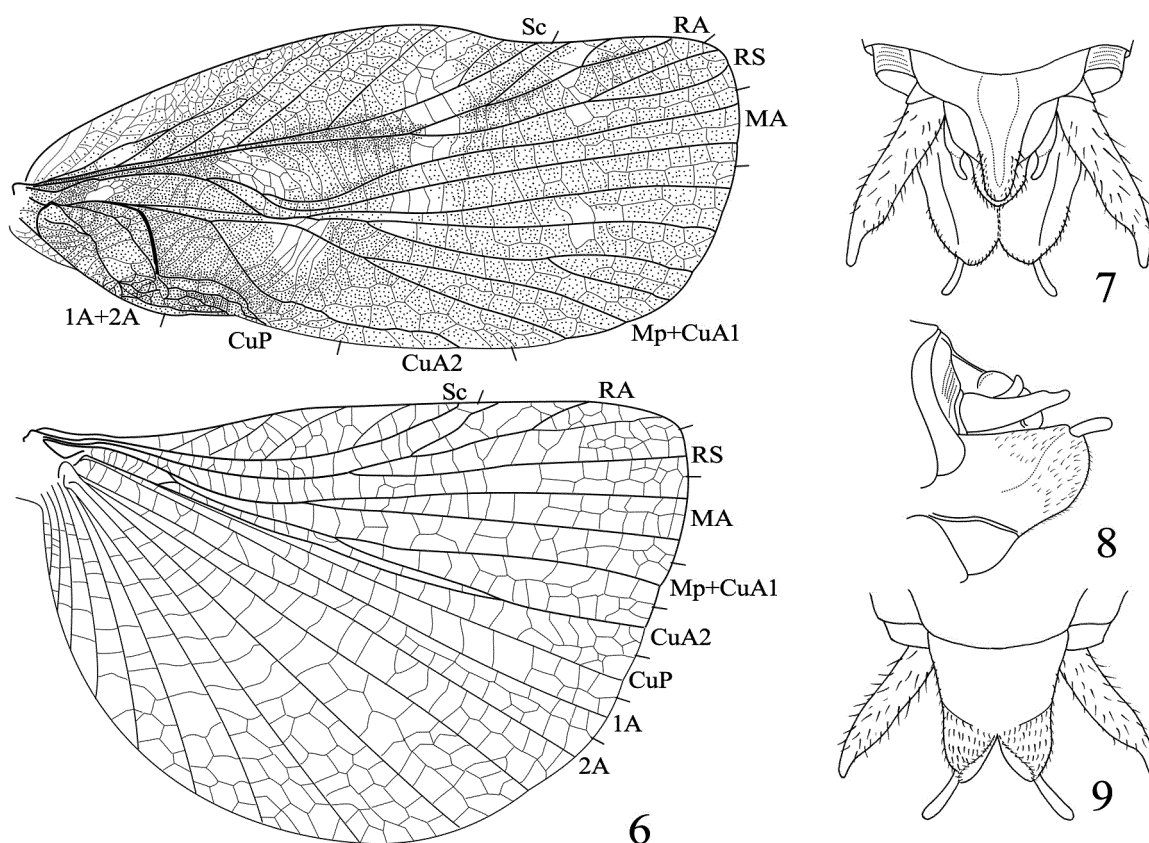
Measurements (mm). Male, Length of body, 21.0, length of pronotum, 7.0, length of tegmina, 25.0, length of hind femora, 20.0.

Holotype Male, Guizhou Chishui National Reserve in Spinulose tree fern, 10.VIII.1992, leg. Du Yu-Zhou (SEM).

Etymology. This new species' name refers to the type locality.

Discussion. In its size and general appearance this new species is similar to *A. sichuanensis* Gorochov, 2001. It distinguished by the venation of tegmina, the male 10th abdominal tergite and its subgenital plate.

Distribution. China (Guizhou).



FIGURES 6–9. *Aboilomimus guizhouensis* sp. n. 6. Tegmina and wing of male ; 7. End of male abdomen, dorsal view; 8. End of male abdomen, lateral view; 9. End of male abdomen, ventral view.

***Aboilomimus sichuanensis* Gorochov**
(Plate 1–D)

Aboilomimus sichuanensis Gorochov, 2001. Journ. Orth. Res., 10 (2): 361–366.

Diagnosis. Male. Almost entirely black. Pronotum with whitish narrow edges, all femora with small slight spots on upper part. Ra and Rs of tegmina single, area between CuA2 and CuP distinctly widened; dorsal surface of 10th abdominal tergite almost smooth; subgenital plate of male shallowly emarginated at hind margin.

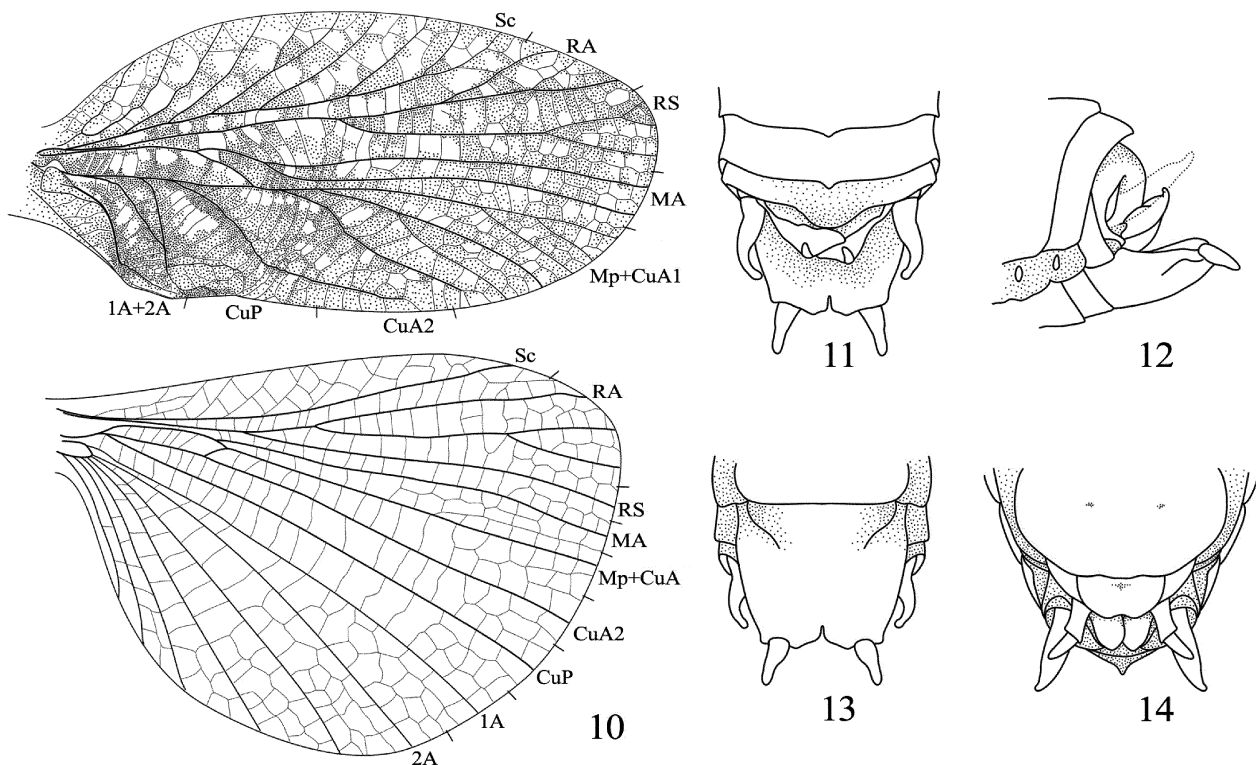
Material studied. Holotype male; paratype, 1 male, Yingxiu, alt. 900m, Wenchuan County, Sichuan Province, 14.IX.1983, leg. Wang Rui-Qi.

Distribution. China (Sichuan).

***Aboilomimus ornatus* sp. nov.**

(Figs. 10–14, plate 1–C)

Description. Male. Medium size, slender. Metazona of pronotum considerably rugose. Fore femora without ventral spinules, fore tibiae with 1 external spur and 2 internal spurs on dorsal surface, ventral surface armed with 5 pairs of spurs. Mid femora without ventral spinules, mid tibiae with 3–4 pairs dorsal spurs and 5 pairs of ventral spurs. Hind femora with about 5–9 ventral spinules on each side, hind tibiae armed with 6 external dorsal spines and 6 internal dorsal spines, with 3 apical spurs on each side. Tegmina well developed, C indistinct, Ra with 3 branches near apex, Rs with 3 branches, Ma bifurcated near base, Mp+CuA1 with 5 branches, CuA2 bifurcated. Ra of hind wings single, Rs arising in the middle and with 3 branches. All abdominal tergites with a prominent median keel. Tenth abdominal tergite and epiproct fused with each other (Fig. 11), Paraprocts with hooks curved upward. Cerci short and solid, conical. Subgenital plate triangularly notched at apex and with long styli (Fig. 13).



FIGURES 10–14. *Aboilomimus ornatus* sp. nov. 10. Tegmina and wing of male; 11. End of male abdomen, dorsal view; 12. End of male abdomen, lateral view; 13. End of male abdomen, ventral view; 14. End of female abdomen, ventral view.

Female. Venation of elytra and hind wing as male, but between Mp+CuA1 and CuP of elytra with 4 branches and without stridulatory mechanism. Seventh abdominal tergite produced in middle of hind margin

into a triangular process (Fig. 14). Subgenital plate short, with truncate hind margin. Ovipositor reduced, upper valva with segmented appendages.

Coloration of body yellowish brown varied with some black and light tones. Occiput blackish with 5 irregular longitudinal light stripes, pronotum pitch black, with a distinct testaceous band along the middle in prozona. Legs light with knees darkened. Tegmina shiny, blackish with green costal area. Appendages of valva whitish.

Measurements (mm). Length of body: Male; 18.0, Female, 20.0; length of pronotum: Male, 7.5; Female, 8.0; length of tegmina: Male, 22.0, Female, 17.0; length of hind femora: Male, 16.0, Female, 17.0.

Holotype Male: Heixuangou, alt. 2000m, Labahe Reserve, Tianquan county, Sichuan Province, 27.VII.2007, leg. Liu Xian-Wei et al.; Paratypes: 2 females, same data as in holotype.

Etymology. The name refers to the ornate coloration of the species in life.

Discussion. This new species resembles *A. sichuanensis* Gorochov and *Aboilomimus guizhouensis* sp. n., but differs from the latter in: (1) occiput blackish with 5 irregular light stripes; (2) pronotum dark black, with a distinct testaceous band along the middle in prozona; (3) metazona of pronotum considerably rugose.

Distribution. China (Sichuan).

Genus *Tarragoilus* Gorochov, 2001

Tarragoilus Gorochov, 2001 Zoosys. Rossica, 9 (2): 313.

Type species: *Tarragoilus diuturnus* Gorochov, 2001.

Medium size, slender. Fastigium of vertex sloping strongly to frons, little broader than first antennal segment, without median sulcus. Eyes oval, prominent. Ocelli present. Antennae inserted between the eyes, the dorsal margins of the sockets not below the ventral margins of eyes. Pronotum with metazona at least equal to prozona, with hind margin rounded, surface almost smooth, shiny; lateral lobes much longer than deep, without humeral notches. Prosternum armed with a pair of weak lobes; mesosternal lobes triangular, metasternal lobes rounded. Fore and mid coxae with spines. Fore femora shorter than pronotum fore tibiae with open tympanum on each side. Fore and mid tibiae with dorsal spurs except at apex, hind tibiae with three apical spurs on each side. Both pairs of wings fully developed in male, tegmina with rounded apex, C indistinct, Rs arising behind the middle of R, stridulating area very large. Wings shorter than tegmina. The 7th and 8th abdominal tergites of male with hind lobes, 10th abdominal tergite and epiproct separated with each other. Cerci short and solid, subgenital plate with styles. Ovipositor reduced, upper valva with segmented appendages.

***Tarragoilus diuturnus* Gorochov, 2001**

(Plate 1–E)

Tarragoilus diuturnus Gorochov, 2001 Zoosys. Rossica, 9 (2): 313–315.

Diagnosis. Male. Dark to blackish brown. Lateral lobes of pronotum much longer than deep, without humeral notches. Fore femora shorter than pronotum, the first tarsal segment shorter than the fourth tarsal segment. Tegmen for extending to abdominal apex, practically round; hind wing short, narrower than tegmen.

Material studied. 5 adult males, 2 male nymphs, 1 female nymphs, Gongyihai, alt. 2060m, Lizinging Reserve, Shimian County, Sichuan Province, 24.VII.2007, leg. Liu Xian-Wei et al.

Distribution. China (Sichuan).

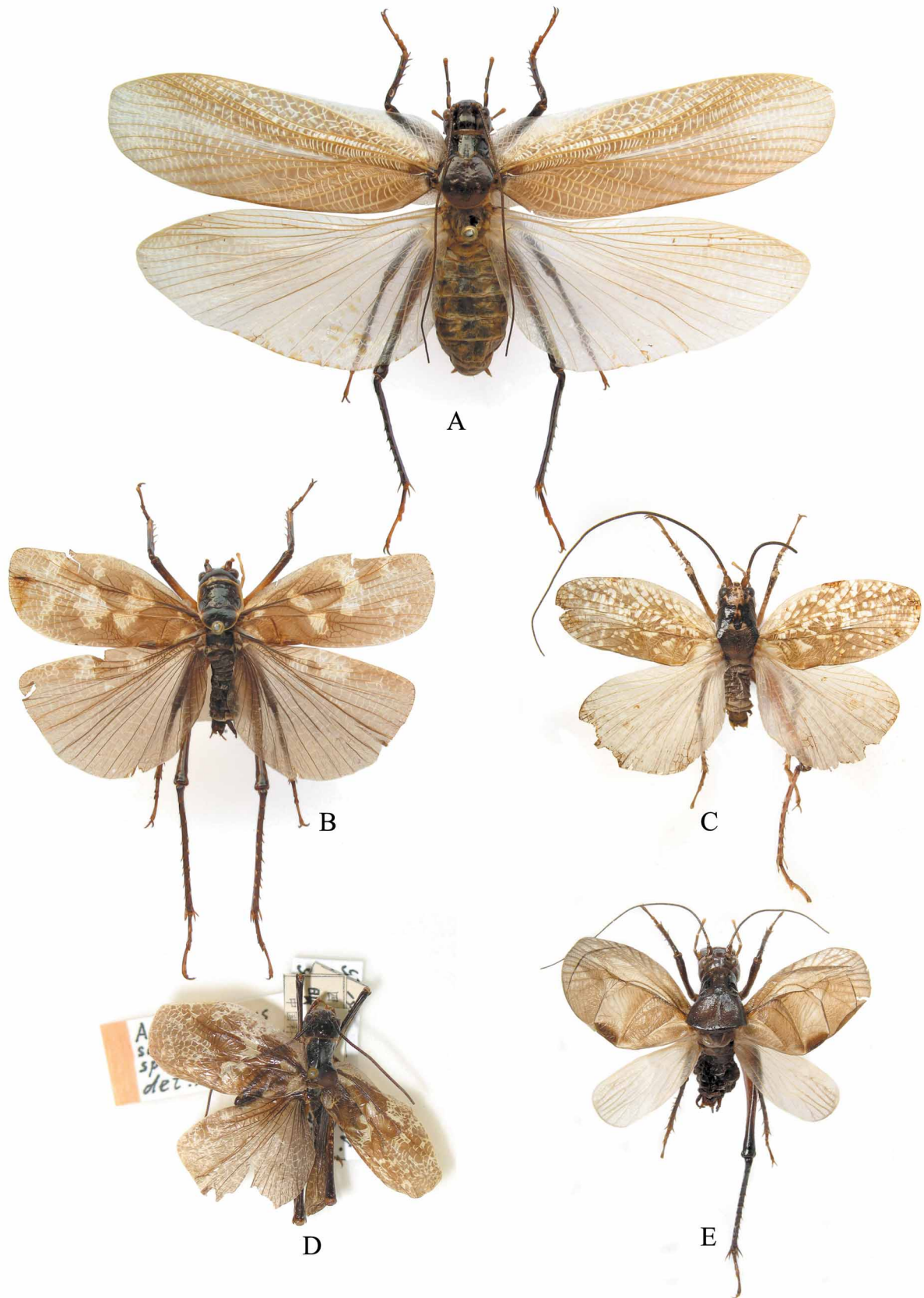


PLATE 1. Figs. A–E Recent **Prophalangopsinae** from China. A. *Prophalangopsis obscura*, female of normal color, dorsal view; B. *Aboilomimus guizhouensi*, male of normal color, dorsal view; C. *Aboilomimus ornatus*, male of normal color, dorsal view; D. *Aboilomimus sichuanensis*; male of normal color, dorsal view; E. *Tarragoilus diuturnus* male of normal color, dorsal view.

Tarragoilus sp.

Represented by a single male specimen (nymph). Resembles *T. diuturnus* Gorochov, 2001, but with the head with whitish vertex.

Material studied. 1 male (nymph), Qinlingliang, alt. 2000m, Houzhenzi County, Shaanxi Province, 13.V.2008, leg. Huang-Hao.

Distribution. China (Shaanxi).

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