A new species of *Psyllaephagus* (Hymenoptera: Encyrtidae) from China

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Abstract: A new species of *Psyllaephagus* Ashmead, *P. linzhiensis* Zou, Li & Zhang **sp. nov.**, is described. *Psyllaephagus femoralis* Borelli and *P. tokgaevi* Myartseva are recorded from China for the first time. New distribution records of *P. chinensis* Zu & Wang are also given. Microphotos of these species are provided.

Key words: Chalcidoidea; taxonomy; key

中国木虱跳小蜂属 *Psyllaephagus*一新种（膜翅目：跳小蜂科）

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摘要：记述木虱跳小蜂属 *Psyllaephagus* Ashmead 1 新种：林芝木虱跳小蜂 *P. linzhiensis* Zou, Li & Zhang **sp. nov.**。同时记述 2 中国新记录种：黄腿木虱跳小蜂 *Psyllaephagus femoralis* Borelli 和托氏木虱跳小蜂 *P. tokgaevi* Myartseva。并提供了这些种类的形态特征图。

关键词：小蜂总科；分类；检索表

Introduction

Jumping plant lice, or psyllids (Psylloidea), comprise a group of plant-sap-feeding insects including many economic pests (Hodkinson 1974; Li 2011). In China, *Cacopsylla chinensis* Yang & Li and *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae), are the major pests of pear and citrus, respectively (Li *et al*. 2003; Hall *et al.* 2013). In family Encyrtidae (Hymenoptera: Chalcidoidea), many species attack nymphs of jumping plant lice, particularly those in genus *Psyllaephagus* Ashmead. *Psyllaephagus* Ashmead, 1900 currently includes approximately 246 recognized species worldwide (Noyes 2019). Sixteen species of *Psyllaephagus* are known from China (Tan & Zhao 1999; Xu *et al*. 2000a, b; Tang *et al*. 2016; Wu *et al.* 2021; Wang *et al.* 2023; Zou *et al.* 2023).

In the present paper, we described a new species: *Psyllaephagus linzhiensis* Zou, Li & Zhang **sp. nov.**, based on specimens collected from Xizang, China. *Psyllaephagus femoralis* Borelli and *P. tokgaevi* Myartseva are reported from China for the first time. New distribution records of *P. chinensis* Zu & Wang are also given.

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Material and methods

Materials in the present study were either reared from psyllid hosts or collected by net sweeping. Both card and slide mounted specimens were prepared following the method described by Noyes (1982). Observation and measurement of specimens were made with a Nikon SMZ-168 stereomicroscope. Microphotographs were taken with a Canon EOS550D digital camera connected to a Leica DM-2500 microscope, and photos of card mounted specimens were produced using a Nikon D7000 digital camera coupled to a Nikon SMZ-1500 stereomicroscope.

Morphological terminology and abbreviations follow those of Zou *et al.* (2023). All materials examined, if not otherwise specified, are housed in the Institute of Zoology, Chinese Academy of Sciences (IZCAS), Beijing, China.

Taxonomy

Key to Chinese species of *Psyllaephagus* (female)

1. All coxae dark brown; rarely apex of fore coxae yellow ····· 2
-. At least fore coxae yellow (rarely basally dark brown) ····· 11
2. All femora marked dark brown ····· 3
-. Only hind femora marked dark brown ····· 5
3. Postmarginal vein nearly absent; F1−F5 longer than broad; clava about as long as F4−F6 combined ····· *P. ogazae* Sugonjaev
-. Postmarginal vein present, about 1/3 of stigmal vein length; F1−F5 transverse; clava about as long as F3−F6 combined ····· 4
4. HW about 2.3× FV; scape totally dark brown; clava about 3× as long as wide ····· *P. linzhiensis* Zou, Li & Zhang **sp. nov.**
-. HW about 3× FV; scape with yellow apex; clava about 2× as long as wide ····· *P. clavus* Zou & Zhang
5. Clava longer than F4−F6 combined ····· 6
-. Clava shorter than F4−F6 combined ····· 7
6. Scape about 5.0× as long as broad; clava about as long as F2−F6 combined ····· *P. tangae* Zou & Zhang
-. Scape about 4.0× as long as broad; clava about as long as F3−F6 combined ····· *P. tokgaevi* Myartseva
7. F1 as long as or slightly longer than pedicel; clava obviously shorter than F4−F6 combined ····· *P. longifuniculus* Xu
-. F1 shorter than pedicel; clava slightly short or as long as F4−F6 combined ····· 6
8. Ovipositor distinctly exserted, the exserted part of ovipositor about 1/4 of metasoma ····· 9
-. Ovipositor not or slightly exserted, the exserted part of ovipositor about 1/5 of metasoma ····· 10
9. Scape about 4.5× as long as broad; F6 quadrate ····· *P. stenopsyllae* Tchikawa
-. Scape about 4.8× as long as broad; F6 about 1.3× as long as broad ····· *P. femoralis* Borelli
10. Scape about 3.2× as long as wide; F6 about 0.8× as long as broad; clava as long as F4−F6 combined ····· *P. obliqus* Zou & Zhang
-. Scape about 3.4× as long as broad; F6 quadrate; clava longer than F4−F6 combined ····· *P. chinensis* Zu & Wang
11. Scape distinctly expanded, less than 3.5× as long as broad ····· 12
-. Scape not or only slightly expanded, more than 4× as long as broad ····· 13
12. Metasoma about 1.25× as long as mesosoma; ovipositor strongly exserted, exserted part of ovipositor

about 1/3 of metasoma ····· *P. guangxiensis* Zu

-. Metasoma and mesosoma are almost the same in length; ovipositor slightly exserted, exserted part of ovipositor about 1/4 of metasoma ····· *P. latiscapus* Xu

13. Metasoma nearly 2.0× as long as mesosoma; ovipositor obviously exserted, exserted part of ovipositor about 1/3 of metasoma ····· *P. longiventris* Trjapitzin

-. Metasoma slightly longer or shorter than mesosoma; ovipositor, if exserted, the exserted part of ovipositor less than 1/3 of metasoma ····· 14

14. The exserted part of ovipositor about 1/4 of metasoma; tegula yellow; mid coxae yellow, but apical 1/3 dark brown ····· *P. caillardiae* Sugonjaev

-. The exserted part of ovipositor no more than 1/5 of metasoma; apical 1/3 of tegula dark brown; mid coxae dark brown ····· 15

15. All funicular segments longer than broad; hind femora yellow ····· *P. densiciliatus* Tan & Zhao

-. At least one segment of funicle not longer than broad; hind femora dark brown ····· 16

16. All funicular segments transverse; clava as long as F2−F6 combined ····· *P. colposceniae* Trjapitzin

-. At least one funicular segment quadrate or longer than broad ····· 17

17. F1 and F6 quadrate, F2−F5 transverse; basal 1/3 of hind tibia dark brown ····· *P. taiwanus* Xu

-. F2−F4 longer than broad; hind tibia yellow ····· 18

18. F1−F5 longer than broad, F6 quadrate; OL about 4.5× as long as GL ····· *P. arenarius* Trjapitzin

-. F1 and F5 quadrate, F2−F4 longer than broad, F6 broader than long; OL about 5.5× as long as GL ····· *P. elaeagni* Trjapitzin

1. ***Psyllaephagus chinensis* Zu & Wang, 2023** (Figs 1, 2)

Psyllaephagus chinensis Zu & Wang, 2023: 244. Holotype ♀ (TJAU. Tianjin Agricultural University, Tianjin, China), China.

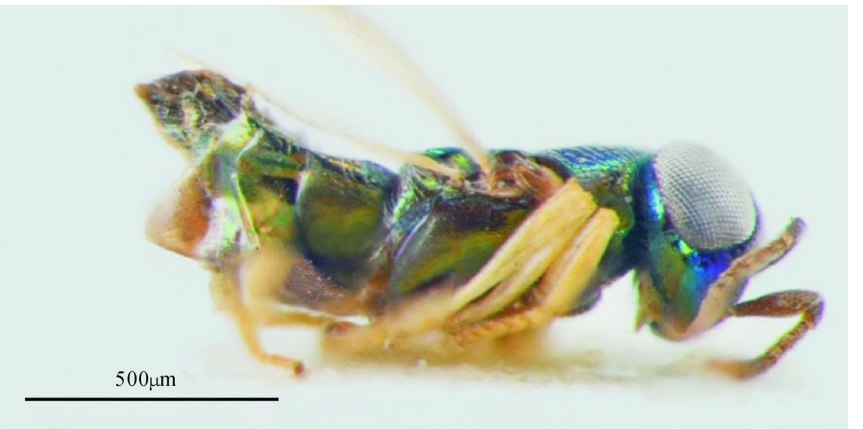

Figure 1. *Psyllaephagus chinensis* Zu & Wang, 2023. ♀. Body, lateral view.

Description. A detailed description was provided by Wang *et al*. (2023). The material studied here exhibits some variation in scape, which (Fig. 2A) is about 3.33× as long as broad.

Specimens examined. China, 9♀9♂, Anhui, Xuzhou, 19-VII-2018, ex. *Cacopsylla chinensis*, coll. Zifang QIN; 5♀2♂ Guangdong, Zhongshan, 10-IX-2020, ex. *Cacopsylla chinensis*, coll. Tongyi LIU; 5♀1♂, Hebei, Shijiazhuang, 20-VII-1990, ex. *Cacopsylla chinensis*, coll. Daluan LI; 5♀, Beijing, Changping, 22-VIII-1991, coll. Fasheng LI; 4♀2♂, Yunnan,

Lijiang, 10-IX-2020, coll. Qingsong ZHOU; 11♀14♂, Xinjiang, Xinyuan, 18-VI-2021, coll. Zhujun CAO; 13♀4♂, Inner Mongolia, Baotou, 22-IX-2024, coll. Boyu ZOU.

Host. *Cacopsylla chinensis* (Hemiptera: Psyllidae).

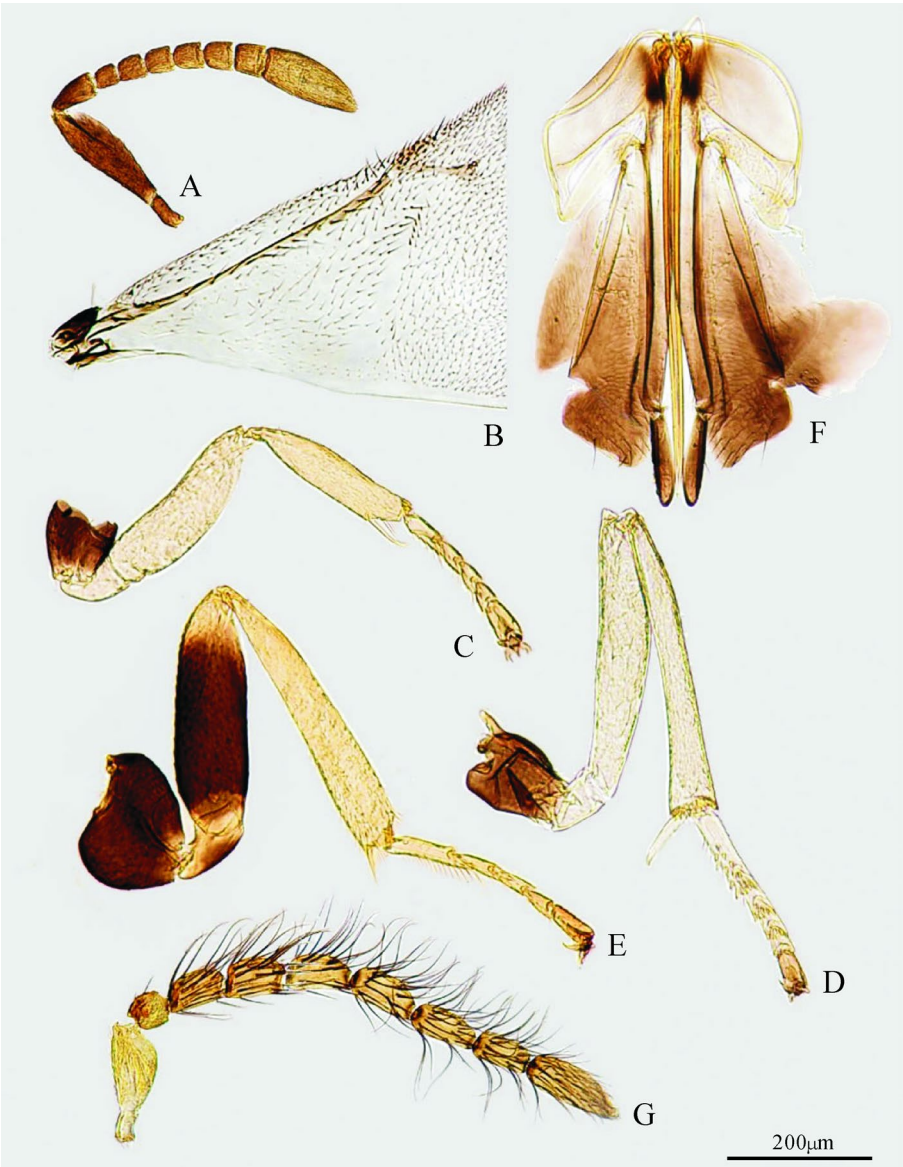

Figure 2. *Psyllaephagus chinensis* Zu & Wang, 2023. A. Antenna ♀; B. Basal part of fore wing ♀; C. Fore leg ♀;
D. Mid leg ♀; E. Hind leg ♀; F. Ovipositor ♀; G. Antenna ♂.

Diagnosis. Female, length excluding ovipositor about 1.3−2.0 mm, with metallic green sheen; all coxae and hind femora (except apices) dark brown (Figs 2C, 2D); scape distinctly broadened, about 3.3× as long as broad (Fig. 2A); all funicular segments longer than wide;

clava strongly obliquely truncate apically, about as long as F4−F6 combined; ovipositor often visible and slightly exserted; OL about 1.51× as long as MT.

Remarks. The specimens studied here agree well with the original description of *P. chinensis* Zu & Wang, 2023, except for the variation mentioned above. We compared the morphological characteristics of various geographical populations of *P. chinensis* Zu & Wang and found that the only observed difference was in the scape length-width ratio, which we regard as intraspecific variation.

Distribution. China (Tianjin, Anhui, Beijing, Guangdong, Hebei, Inner Mongolia, Yunnan, Xinjiang).

2. ***Psyllaephagus femoralis*** **Borelli, 1920** (Figs 3, 4), new record to China

Psyllaephagus femoralis Borelli, 1920: 32. Holotype ♀, Italy.

Psyllaephagus femoralis Borelli: Ferrière, 1961: 46; Trjapitzin, 1989: 258.

Figure 3. *Psyllaephagus femoralis* Borelli, 1920. ♀. Body, dorsal view.

Description. A detailed description was provided by Ferrière (1961). The specimens studied here agree well with the original description of *P. femoralis* Borelli, 1920. We also noticed the slight variation of coloration on hind femora (See Trjapitzin (1989)).

Specimens examined. 28♀3♂, **China**, Xinjiang, Habahe, 11-VI-2023, ex. *Colposcenia* sp. on *Tamarix ramosissima*, coll. Boyu ZOU.

Host. *Trioza syzygii* (Hemiptera: Triozidae); *Colposcenia* sp. (Hemiptera: Aphalaridae) (new host record).

Diagnosis. Female, body length about 1.4 mm−2.0 mm; body generally black, with metallic green-blue sheen; all coxae and basal 3/4 of hind femora dark brown, the rest legs yellow (Figs 4D−F); basal 1/3 or so of tegula yellow, the rest dark brown (Fig. 3); ocellus forms a right triangle; sculpture on scutellum deeper than that on mesoscutum; all funicle segments longer than wide; ovipositor obviously exserted, the exserted part of ovipositor about 1/5 of metasoma; OL about 1.9× MT.

Distribution. China (Xinjiang); Italy; France.

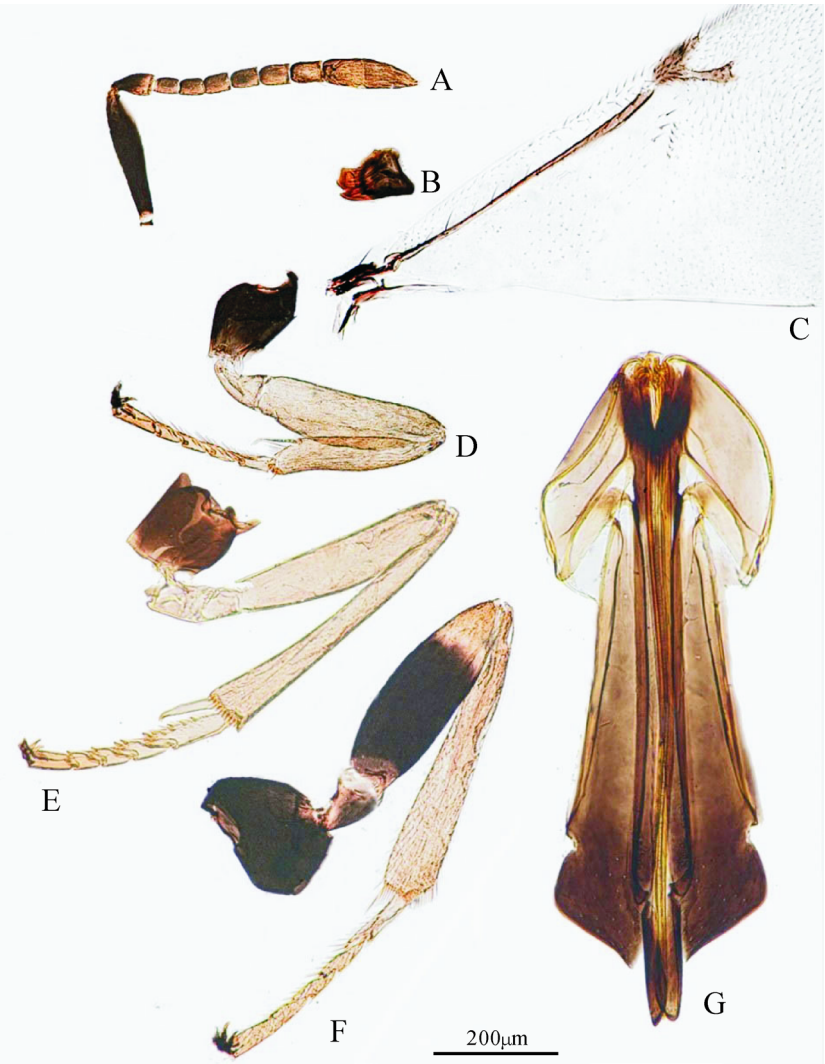

Figure 4. *Psyllaephagus femoralis*, Borelli, 1920. ♀. A. Antenna; B. Mandible; C. Basal part of fore wing; D. Fore leg; E. Mid leg; F. Hind leg; G. Ovipositor.

3. ***Psyllaephagus tokgaevi* Myartseva, 1979** (Figs 5, 6), new record to China

Psyllaephagus tokgaevi Myartseva, 1979: 27. Holotype ♀ (ZISP. Zoological Institute, St. Petersburg, Russia), Turkmenistan.

Psyllaephagus tokgaevi Myartseva: Myartseva, 1984: 297; Trjapitzin, 1989: 259.

Description. A detailed description was provided by Myartseva (1979). The specimens studied here agree well with the original description of *P. tokgaevi* Myartseva, 1979.

Host. *Colposcenia kiritschenkoi* (Hemiptera: Aphalaridae).

Specimens examined. 11♀, **China**, Shanxi, Shanyin, 02-X-2002, coll. Yanzhou ZHANG.

Diagnosis. Female, body length about 1.1−1.3 mm, generally black, with metallic green-blue sheen; all coxae, basal 3/4 of hind femora and base 1/3 of hind tibiae dark brown,

the rest of legs yellow; basal 1/2 or so of tegula yellow, the rest dark brown; ocellus forms a obtuse triangle, angle about 100º; all funicle segments quadrate, sometimes F2 and F3 slightly longer than wide, F4 slightly smaller than F3 in size (Fig. 6A); ovipositor obviously exserted, the exserted part of ovipositor about 1/8 of metasoma.

Distribution. China (Shanxi); Georgia; Kazakhstan; Turkmenistan.

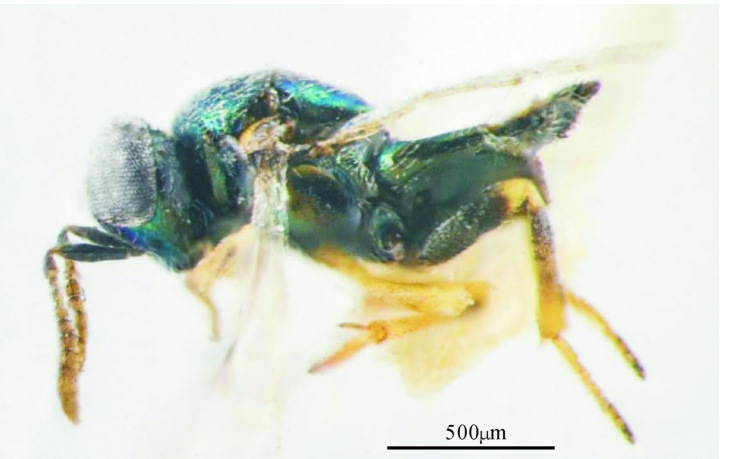

Figure 5. *Psyllaephagus tokgaevi* Myartseva, 1979. ♀. Body, lateral view.

Figure 6. *Psyllaephagus tokgaevi* Myartseva, 1979. ♀. A. Antenna; B. Basal part of fore wing.

4. ***Psyllaephagus linzhiensis* Zou, Li and Zhang sp. nov.** (Figs 7, 8)

Description. Female (Holotype). Length 1.2 mm (excluding ovipositor); Body generally black, with metallic green-blue sheen; face, vertex and mesonotum with purple sheen; mesopleuron and metasoma with metallic green sheen; basal 1/2 or so of tegula yellow, the rest dark brown; antenna dark brown; all coxa and femora dark brown, mid tibia dark brown at subbase, fore and hind tibia dark brown over basal 0.7 (Figs 8C−E); wings hyaline, venation brown.

Head. Head with thimble-like punctate sculpture, HL about 2.8× HW and about 2.3× FV; ocellar angle about 100°; posterior ocellus closer to inner eye margin than to occipital margin;

POL about 3.9× the diameter of posterior ocellus; OCL about 1.1× the diameter of posterior ocellus; OOL about 0.7× the diameter of posterior ocellus; mandible with two teeth and a truncation; scape about 4.8× as long as broad; pedicel about 1.8× as long as broad; funicle with F1 and F6 transverse; clava about 3.1× as long as broad, 3-segmented, slightly truncated apex. Relative measurements: HW 30, HH 28, HL 13.6, FV 13, POL 12, OOL 1.5, OCL 2.5, SL 13.4, SW 2.9, PL 8.1, PW 4.5.

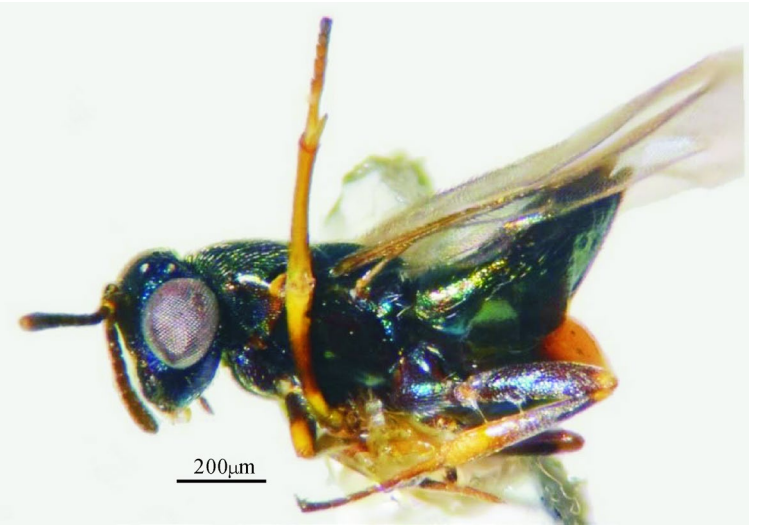

Figure 7. *Psyllaephagus linzhiensis* Zou, Li & Zhang **sp. nov.**, ♀. Body, lateral view.

Mesosoma. Slightly convex; mesoscutum and scutellum covered with fine, scale-like sculpture; MSW about 1.5× MSL; STL about 1.2× STW; fore wing about 2.1× as long as wide; marginal vein punctiform, and about 1.1× as long as wide; stigmal vein about 7.5× as long as wide; linea calva interrupted by two lines of setae posteriorly; basal cell with a naked area at base; mid tibial spur about 0.78× as long as corresponding basitarsus. Relative measurements: FWL 79, FWW 38, MV 2.1, PMV 2.3, STV 7.2.

Metasoma. Metasoma about 1.4× as long as mesosoma; hypopygium reaching about 1/2 of metasoma; ovipositor slightly exserted, and the exserted part of ovipositor about 1/10 of metasoma; OL about 5.0× as long as GL and about 1.4× as long as MT. Relative measurements: OL 36, GL 7.2.

Male. Unknown.

Holotype. ♀ [on slide, Code 24E23A], **China**, Xizang, Linzhi (Nyingchi), 20-VIII-2012, ex. psyllid on *Tamarix* sp., coll. Qingtao WU (deposited in IZCAS). **Paratypes.** 18♀, same data as holotype.

Host. An unidentified psyllid on *Tamarix* sp.

Etymology. The specific epithet refers to the locality of the holotype collected.

Diagnosis. Female, body length about 1.2 mm−1.6 mm. All coxae and femora dark brown; tibiae marked with dark brown (Figs 8C−E); all funicular segments transverse; clava about as long as F3−F6 combined (Fig. 8A); sculpture on scutellum deeper than that on mesoscutum; ovipositor often slightly exserted; OL about 1.4× as long as MT.

Remarks. This new species is similar to *P. clavus* Zou & Zhang (2023) in appearance, but can be separated from *P. clavus* by a combination of the following characters: HW about 2.3× FV (in *P. clavus*, HW about 3× FV); scape totally dark brown (in *P. clavus*, the apex of scape yellow); clava about 3× as long as wide (in *P. clavus*, clava about 2.0× as long as wide); OL about 1.4× as long as MT (in *P. clavus*, OL about 1.5× as long as MT).

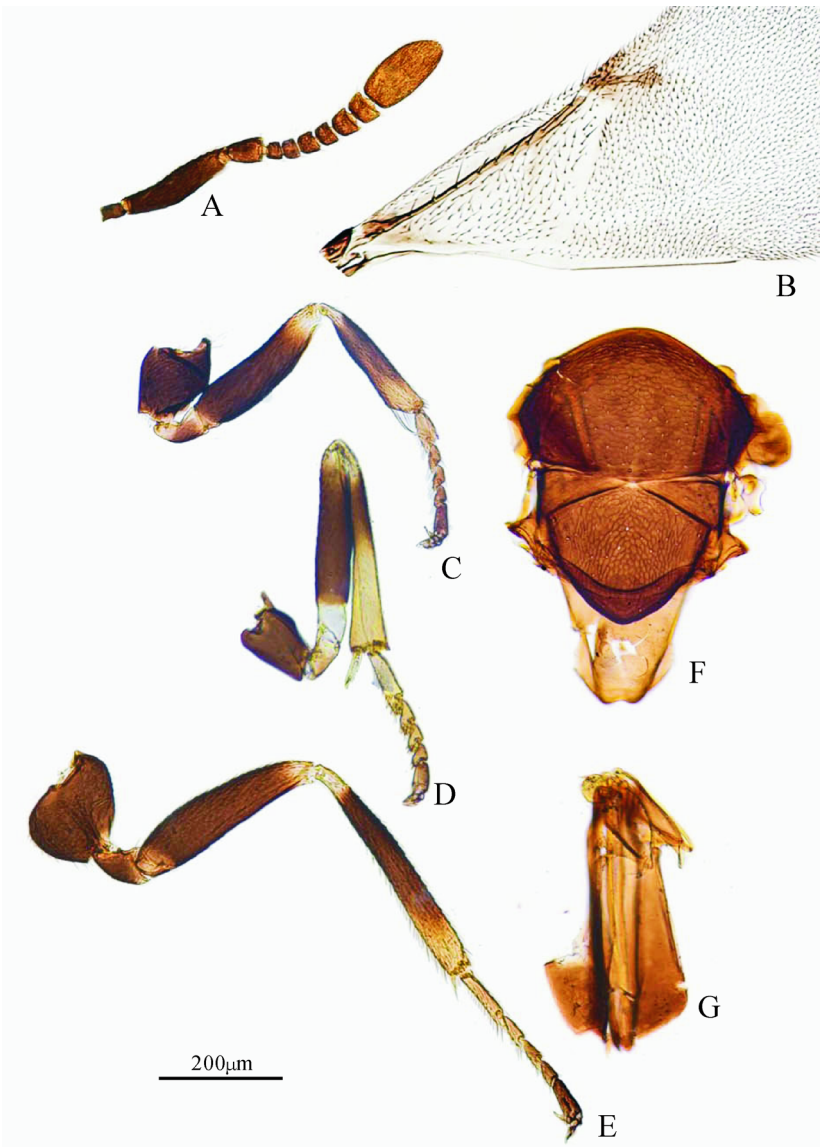

Figure 8. *Psyllaephagus linzhiensis* Zou, Li & Zhang **sp. nov.**, holotype, ♀. A. Antenna; B. Basal part of fore wing; C. Fore leg; D. Mid leg; E. Hind leg; F. Mesosoma; G. Ovipositor.

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