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## A review of Chinese tribe Achilini (Hemiptera: Fulgoromorpha: Achilidae), with descriptions of *Paracatonidia webbeda* gen. & sp. nov.

JIAN-KUN LONG<sup>1</sup>, LIN YANG<sup>1</sup> & XIANG-SHENG CHEN<sup>1,2,3</sup>

<sup>1</sup>Institute of Entomology, Guizhou University; Special Key Laboratory for Development and Utilization of Insect Resources of Guizhou, Guizhou University, Guiyang, Guizhou, P. R. China, 550025

<sup>2</sup>College of Animal Sciences, Guizhou University, Guiyang, Guizhou, P. R. China, 550025

<sup>3</sup>Corresponding author. E-mail: [chenxs3218@163.com](mailto:chenxs3218@163.com)

### Abstract

Planthoppers of the tribe Achilini (Hemiptera: Fulgoromorpha: Achilidae) from China, are reviewed. A key to the three genera of Chinese Achilini is given. A new genus and species of the tribe from southwestern China: *Paracatonidia webbeda* gen. & sp. nov., is described. A new genus and species record for China, *Cixidia kasparyani* Anufriev, is also given.

**Key words:** Achilid, distribution, Fulgoroidea, new taxa, planthopper

### Introduction

The tribe Achilini of the Achilidae was established by Fennah (1950) with a total of eight genera: *Achilus* Kirby, 1818, *Aneipo* Kirkaldy, 1906, *Booneta* Distant, 1907, *Bunduica* Jacobi, 1909, *Catonidia* Uhler, 1896, *Faventilla* Metcalf, 1948, *Flatachilus* Fennah, 1950 and *Nelidia* Stål, 1862. Later, Emeljanov (1992) provided a key to subtribes of Achilini and moved some genera of the Myconini (*Cixidia* Fieber, 1866 and *Epiptera* Metcalf, 1922) and the entire tribe Elidipterini (ten genera in Fennah, 1950) into Achilini. Emeljanov (2005) subsequently described or redescribed a further six genera in the tribe: *Ouwea* Distant, 1907, *Parabunda* Emeljanov, 2005, *Dipsiathus* Emeljanov, 2005, *Epiona* Emeljanov, 2005, *Anabunda* Emeljanov, 2005, *Rhinochloris* Emeljanov, 2005. Guglielmino *et al.* (2010) recently described another new genus *Olmiana* Guglielmino, Bückle & Emeljanov, 2010 from Argentina.

Currently the tribes Achilini, Myconini, Plectoderini and Rhotalini are represented in China. Among these, the Chinese Achilini consisted of only one genus *Catonidia* Uhler, 1896 represented by ten species (Long & Chen, 2012; Chen *et al.*, 1989). In this paper a new genus and species of the tribe Achilini from southwestern China is described and illustrated. Also illustrated is *Cixidia kasparyani* Anufriev, 1983, a new record for China. A key to all three genera of Chinese Achilini is also given.

### Material and methods

The morphological terminology and measurements used in this study follow Chen *et al.* (1989) and Yang & Chang (2000). The methods follow Long, Yang & Chen (2015). Specimens examined are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

### Key to genera of Chinese Achilini

1. Forewing with two to three irregular apical cross veins, anterior and posterior margins subparallel distad the apex of clavus (Fig. 21); inner side of base of genital styles without a finger-like process (Fig. 26); sheath underdeveloped, slender and narrowing apically (Fig. 27). . . . . *Cixidia* Fieber

- Forewing with one regular apical cross vein, anterior and posterior margins not parallel distad the apex of clavus (Figs 6, 30); inner side of base of genital styles with a finger-like process (Figs 11, 32); sheath extremely well developed, broad, twisted and membranous (Figs 12, 33) . . . . . 2
- 2. Disc of vertex barely depressed (Fig. 3); tegula with a distinct longitudinal carina (Fig. 3); medioventral process of pygofer divided into two branches (Fig. 10); phallobasal conjunctival processes with apex broadly webbed like a duck foot (Figs 12-13) . . . . . *Paracatonidia* **gen. nov.**
- Disc of vertex distinctly depressed (Fig. 29); tegula without longitudinal carina (Fig. 29); medioventral process of pygofer not branched (Fig. 31); phallobasal conjunctival processes with apex not like a duck foot (Fig. 33) . . . . . *Catonidia* Uhler

**Genus *Paracatonidia* gen. nov.**

(Figs 1–13)

**Type species.** *Paracatonidia webbeda* **sp. nov.**, here designated.

**Description.** Width of head with eyes less than two-thirds width of pronotum. Vertex with disc slightly depressed, median carina protuberant, obsolete apically, anterior margin carinate, subtruncate, lateral margins carinate and straight, diverging basad, posterior margin broadly concave (Fig. 3). Frons slightly convex in lateral view (Fig. 5), upper margin roundly concave, median carina percurrent, lateral margin carinate, sinuately diverging to below level of antennae then gradually incurved to suture (Fig. 4). Clypeus with median and lateral carinae distinct (Fig. 4). Rostrum slightly exceeding base of post-trochanter, with length of subapical segment equal to apical segment. Antenna subglobose, not sunk in a depression (Fig. 5). Ocelli separated from eyes (Fig. 5). Eyes excavate beneath (Fig. 5), not overlapping pronotum in dorsal view (Fig. 3). Pronotum with length in midline as long as length behind eyes, anterior margin of disc roundly convex, posterior margin subangulately excavate about 115 degrees; median carina distinct, lateral carinae diverging posteriorly, not reaching hind margin; lateral lobe with a longitudinal carina between eye and tegula (Fig. 3). Tegula with a longitudinal carina in middle (Fig. 3). Mesonotum with three carinae more or less obsolete (Fig. 3). Forewing with costal margin slightly convex; apical margin roundly convex; posterior margin angulately excavate (155 degrees) at apex of clavus; vein Sc+R forking slightly basad of Cu<sub>1</sub>, forking; vein Sc with several branches, directed towards anterior margin; veins R and M with two and five apical branches, respectively; vein Cu<sub>1</sub> forking slightly distad of Sc+R fork, equal to level of union of claval veins, with Cu<sub>1b</sub> two-branched; clavus terminating at middle of forewing (Fig. 6). Hindwing with two, two and three branches of veins R, M and Cu<sub>1</sub>, respectively; vein A<sub>2</sub> with blind branches (Fig. 7). Post-tibiae with one lateral spine.

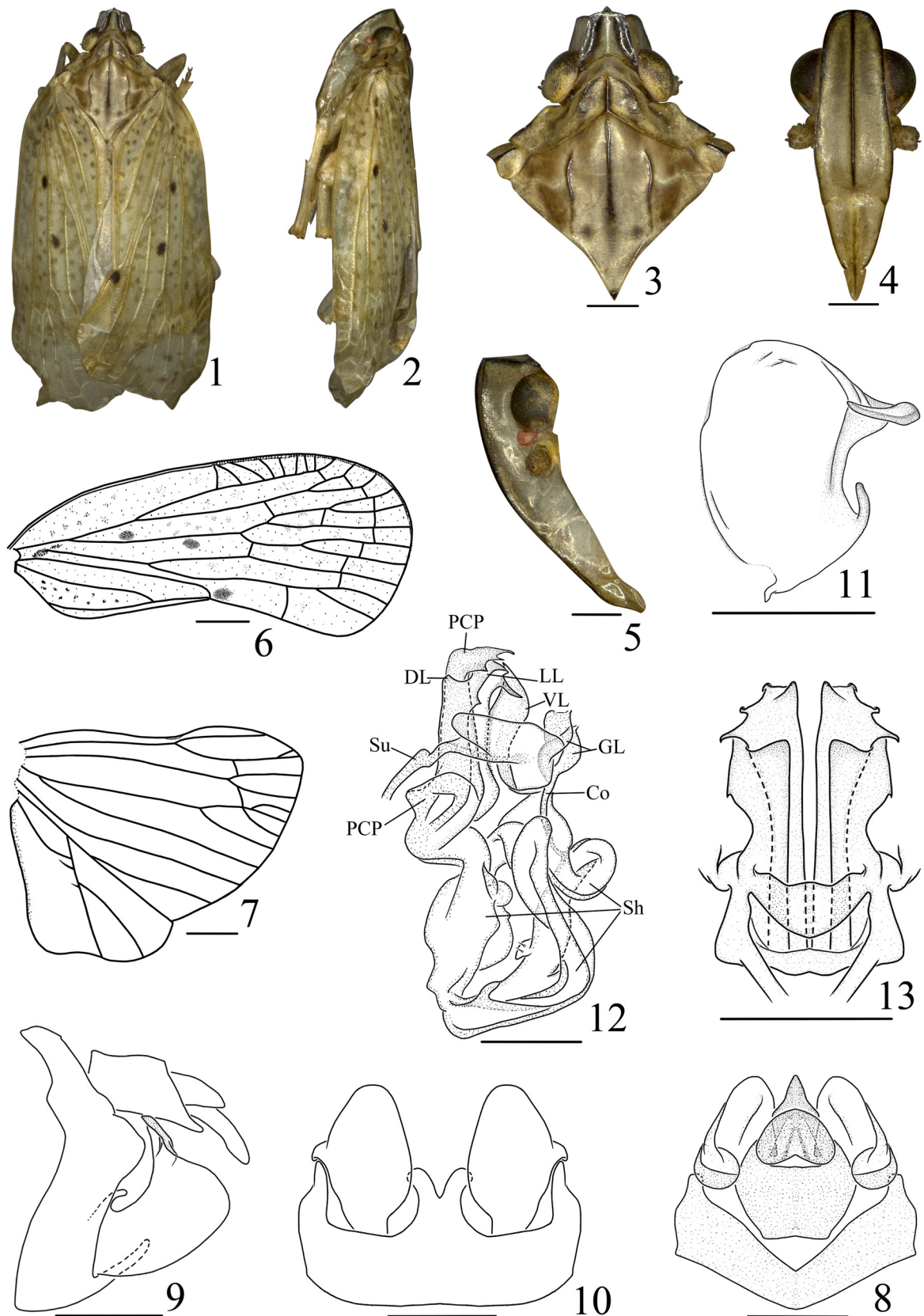
**Male genitalia.** Anal style distinctly exceeding apical margin of anal segment (Fig. 8). Pygofer in lateral view with dorsal margin distinctly shorter than ventral margin (Fig. 9), medioventral process divided into two branches (Fig. 10). Genital style with a stout, ear-like process and a finger-like process rising from apical third and near base of dorsal margin, respectively (Fig. 11). Aedeagus with phallobase sheath-shaped, two dorsal, two lateral and one ventral lobe with anterior portions connected together, protruding anteriorly into body cavity (Figs 12–13). Suspensoria suspended phallobase with dorsolateral portions of pygofer. Genital lamina sclerotized (Fig. 12). Phallobasal conjunctival processes exceeding apical margin of phallobase, with apex broadly webbed like a duck foot (Figs 12–13). Sheath extremely developed, broad, twisted and membranous (Fig. 12). Connective relatively stout and short (Fig. 12).

**Etymology.** The genus name, which is masculine, is a combination of “para-” (similar to) and “*Catonidia*” (name of the related genus), and indicates the new genus is similar to the genus *Catonidia* Uhler.

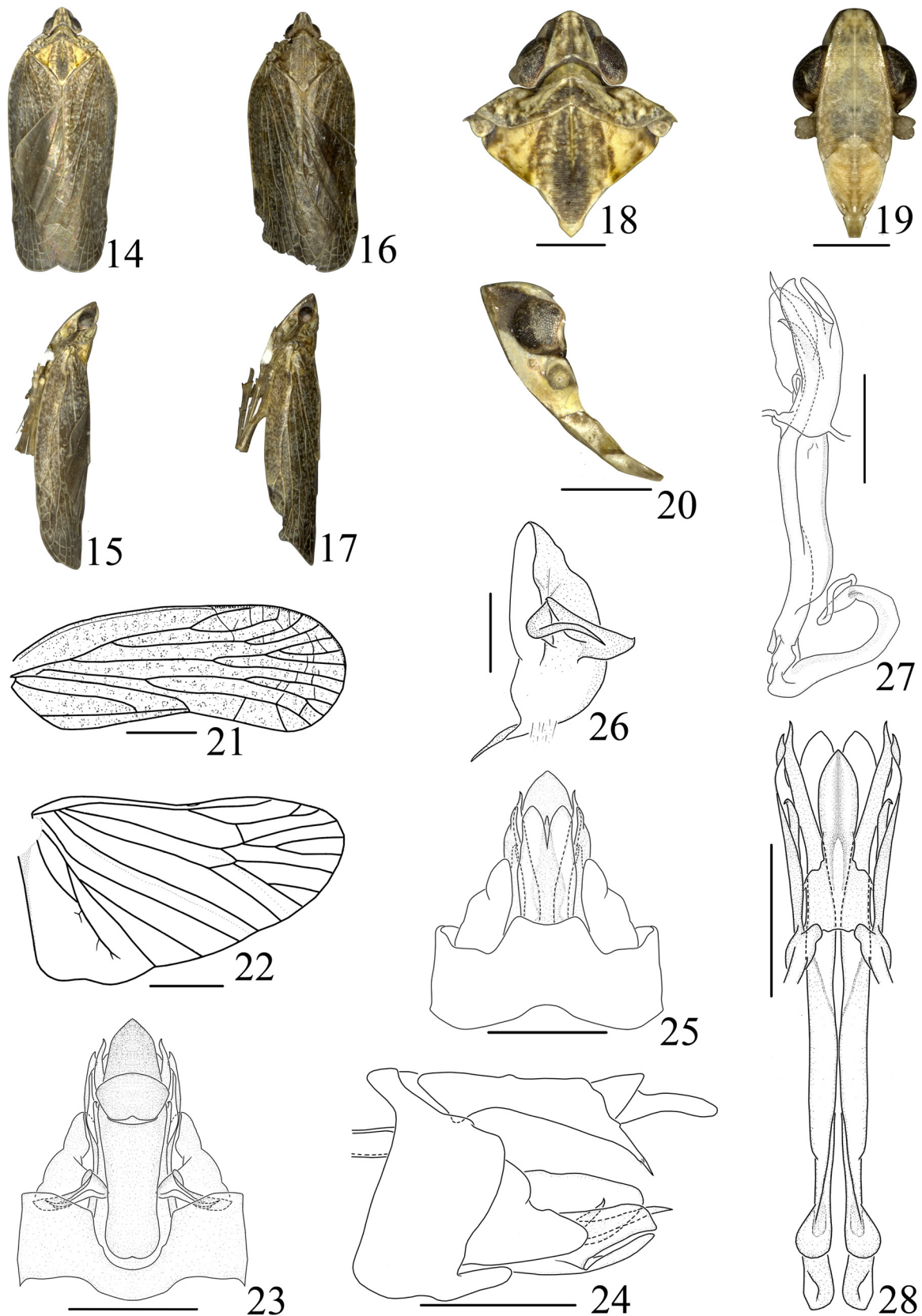
**Host plant.** Unknown.

**Distribution.** Oriental region (southwestern China).

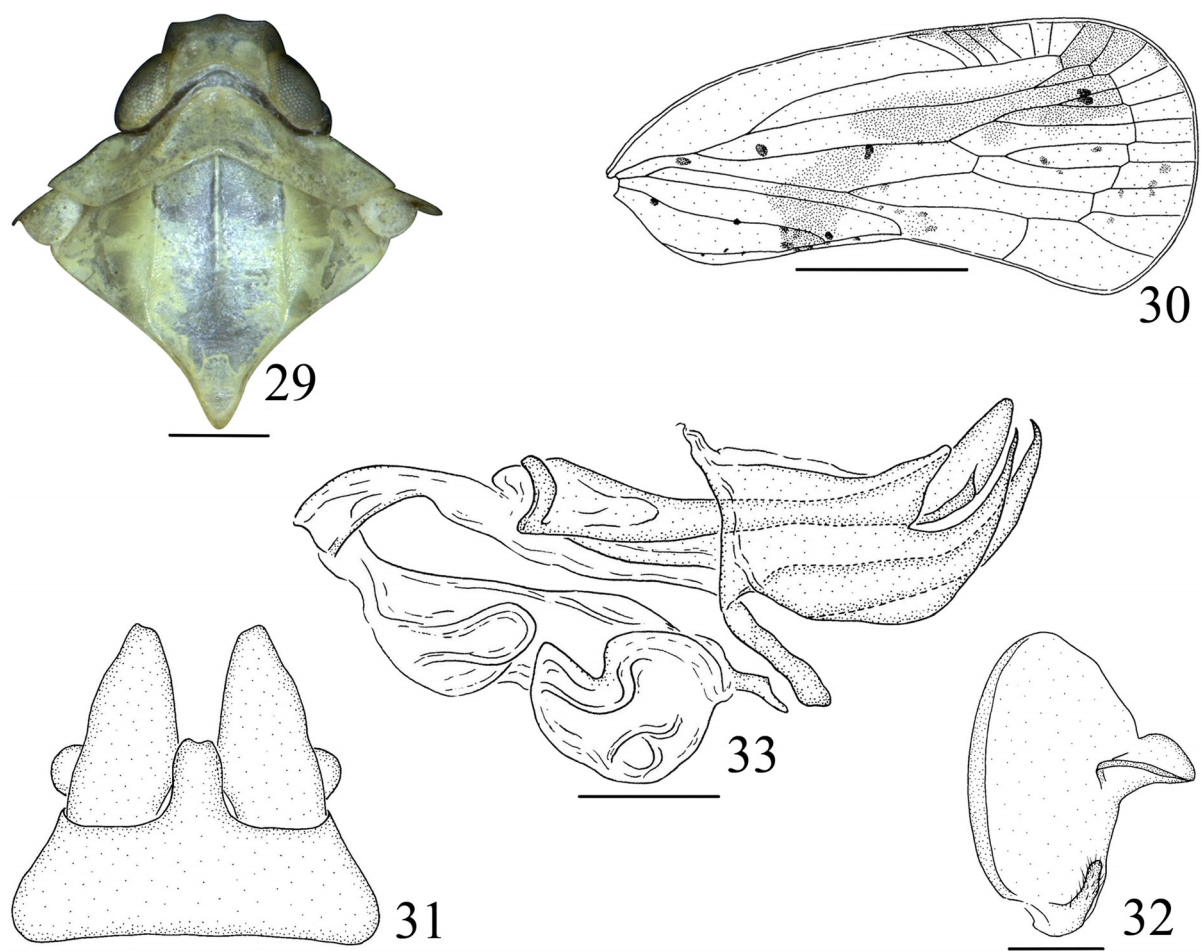
**Diagnosis.** The genus is readily distinguished from other known genera in the tribe Achilini by the tegula having a longitudinal carina in middle (Fig. 3), the medioventral process of the pygofer having two branches (Fig. 10), the phallobasal conjunctival process with apex broadly webbed duck-foot like (Figs 12–13), and the sheath extremely developed, broad, twisted and membranous (Fig. 12).



**FIGURES 1–13.** *Paracatonidia webbeda* sp. nov. 1–2. Habitus (♂, dorsal and lateral views); 3. Head and thorax, dorsal view; 4. Face; 5. Head, lateral view; 6. Forewing; 7. Hindwing; 8. Male genitalia, dorsal view; 9. Male genitalia, lateral view; 10. Pygofer and genital style, ventral view; 11. Left genital style, inner surface; 12. Aedeagus, left lateral view; 13. Aedeagus, dorsal view. Co: connective, DL: dorsal lobe, GL: genital lamina, LL: lateral lobe, PCP: phallobasal conjunctival processes, Sh: sheath, Su: suspensoria, VL: ventral lobe. Scale bars: = 0.5 mm (Figs 3–5, 8–13); 1 mm (Figs 6–7).



**FIGURES 14–28.** *Cixidia kasparyani* Anufriev, 1983. 14–15. Habitus (♂, dorsal and lateral views); 16–17. Habitus (♀, dorsal and lateral views); 18. Head and thorax, dorsal view; 19. Face; 20. Head, lateral view; 21. Forewing; 22. Hindwing; 23. Male genitalia, dorsal view; 24. Male genitalia, lateral view; 25. Male genitalia, ventral view; 26. Left genital style, dorsal view; 27. Aedeagus, left lateral view; 28. Aedeagus, dorsal view. Scale bars: = 0.2 mm (Fig. 26); 0.5 mm (Figs 18–20, 23–25, 27–28); 1 mm (Figs 21–22).



**FIGURES 29–33.** *Catonidia wuyishanana* Wang & Huang, 1990. 29. Head and thorax, dorsal view; 30. Forewing; 31. Male genitalia, ventral view; 32. Left genital style, inner surface; 33. Aedeagus, left lateral view. (30–33 reproduced from Chen & He, 2009)

***Paracatonidia webbeda* sp. nov.**

(Figs 1–13)

**Measurements.** Body length (from apex of vertex to tip of forewing): male 10.3–10.8 mm (n = 5); forewing length: male 8.5–8.8 mm (n = 5).

**Coloration.** Yellowish brown. Vertex dark brown, a broad longitudinal stripe along midline, narrowing anteriorly, grey white (Figs 1, 3). Frons and clypeus brown with three carinae dark brown (Fig. 4). Rostrum and antennae brown. Genae grey white to grey brown (Figs 2, 5). Eyes generally reddish brown, ocellus pale red (Figs 2, 5). Pronotum brown with all carinae dark brown (Figs 1, 3). Mesonotum brown with three carinae, two spots on disc and posterior apex of disc dark brown (Figs 1, 3). Tegula brown with median longitudinal carina dark brown (Figs 1, 3). Forewing brown with numerous, small, differently sized and diluted markings and three big dark markings (Figs 1–2, 6). Hindwing pale brown, veins brown. Legs and abdomen yellowish brown.

**Head and thorax.** Ratio width of vertex at posterior margin to its length in midline 1.4 (Fig. 3). Ratio length of frons in midline to its maximum width 2.2, ratio maximum width to width at apex 2.3 (Fig. 4). Ratio length of postclypeus in midline to length of frons 0.4 (Fig. 4). Apical and subapical segments of rostrum equal. Ratio length of pronotum in midline to length of vertex 0.9. Mesonotum in midline 4.4 times longer than pronotum, 2.3 times longer than pronotum and vertex combined; with median carina with anterior apex and posterior third obsolete; with lateral carinae with anterior quarter obsolete (Fig. 4). Forewing with ratio of length to maximum width 2.2, vein Sc nine-branched. Hindwing with ratio of length to maximum width 1.2, vein A<sub>2</sub> with 2 blind branches (Fig. 7). Post-tibiae with a lateral spine in basal two-fifths, spinal formula 8–9–10.

**Male genitalia.** Anal segment in dorsal view (Fig. 8) subround, with basal margin subtruncate, slightly

excavate in midline, epiproct heart-shaped with apical margin exceeding apical margin of anal segment, anal style with subapex suddenly narrowing apically, distinctly exceeding apical margin of epiproct. Pygofer in lateral view (Fig. 9) with posterior margin broadly convex above the middle, medioventral process (Fig. 10) with apical half divided into two branches, each with apical margin convex, directed laterally. Genital style subelliptic with apical margin almost rounded (Fig. 11). Aedeagus with phallobase bilaterally symmetrical, dorsal lobe short with apex bluntly angular; lateral lobe in lateral view (Fig. 12) with ventral margin with a short sharp process, thence with apex ventrally extending, near apical margin with a long sharp process, directed ventrally; ventral lobe single, narrowing apically, acute at apex, directed dorsad. Suspensoria in lateral view (Fig. 12) with broadly flaky portion connecting with genital lamina. Each phallobasal conjunctival process with apex broadly webbed like a duck foot (three toes), directed ventrally (Figs 12–13).

**Type material.** Holotype: ♂, CHINA, **Yunnan:** Jingdong, Dajie (24°20'N, 101°01'E), sweeping, 21 August 2009, B. Zhang. Paratypes, **Yunnan:** 1 ♂, same data as holotype; 2 ♂♂, Zhenyuan, Mengda (24°02'N, 100°48'E), sweeping, 24 August 2009, B. Zhang; 1 ♂, Xishuangbanna National Natural Reserve, Menglun (21°55'N, 101°15'E), sweeping, 28–29 July 2012, Z.-M. Chang.

**Etymology.** The species name refers to the phallic appendage having an apex which is broadly webbed like a duck foot.

**Host plant.** Unknown.

**Distribution.** China (Yunnan).

### Genus *Cixidia* Fieber, 1866

*Cixidia* Fieber, 1866: 499; *Epiptera* Metcalf, 1922: synonymized by Fennah, 1950: 20; *Neomenocria* Fennah, 1950: synonymized by Fennah, 1950: 23; Emeljanov, 1993: 24.

**Type species:** *Cixidia confinis* Zetterstedt, 1840.

**Host plant.** Few species recorded on *Quercus* sp. and *Pinus* sp.

**Distribution.** Nearctic, Oriental and Palaearctic regions.

**Note.** New genus record for China.

### *Cixidia kasparyani* Anufriev, 1983

(Figs 14–28)

*Cixidia* (*Epiptera*) *kasparyani* Anufriev, 1983: 141; Anufriev & Emeljanov, 1988: 479.

**Material Examined.** CHINA, **Hubei:** 1 ♂, 1 ♀, Xiaowutaishan National Natural Reserve (39°53'N, 114°51'E), sweeping, 12 August 2011, M. Jiao.

**Host plant.** Unknown.

**Distribution.** China (Hebei); Russia.

**Note.** New species a record for China.

### Discussion

On the basis of the tribal definition of Emeljanov (1992), the stigmal region of the forewing characteristically has numerous crossveins and the hindwing has the peculiar characteristic of anastomosis between the first and second anal veins, we attribute *Paracatonidia* **gen. nov.** to the tribe Achilini. Furthermore, on the basis of the key to subtribes of Achilini (Emeljanov, 1992), we consider that Chinese Achilini contain two subtribes of Achilina Stål. (*Catonidia* and *Paracatonidia* **gen. nov.**) and Cixidiina Emeljanov (*Cixidia*).

The peculiar characteristic of the sheath (well developed, broad, twisted and membranous) in the family Achilidae, was only previously found in *Catonidia* amongst the Achilini (Yang & Chang, 2000; Chen & He, 2009; Long & Chen, 2012). Here, *Paracatonidia* **gen. nov.** also has the same structure represented in the male genitalia, but the new genus differs from *Catonidia* in that the medioventral process of the pygofer has two branches (it is not branched in *Catonidia*), and the phallobasal conjunctival process has an apex which is broadly webbed like a duck foot (it is rod-like in *Catonidia*).

The members of Achilini are found in seven zoogeographic regions of the world. Among them, the fauna in the Australian region has been studied more prominently (Moir & Fletcher, 2006). Here we increase the Chinese Achilini to two subtribes, three genera, and twelve species. Most of these species are distributed in the southern mountain and forest region (Oriental region), but this could simply represent more intensive collecting in these regions. The remaining two species, *Cixidia kasparyani* and *Catonidia tibetensis*, are found in Hubei and Tibet (Palaeartic region), respectively.

Hosts for Achilini have been recorded in only a few genera. *Anabunda* was recorded on a pine tree, banana palm, and the tropical tree *Argyrodendron actinophyllum* (Moir & Fletcher, 2006). *Olmiana* was recorded on unidentified mushrooms within a large forest of *Nothofagus* (Guglielmino *et al.*, 2010). *Catonidia* was recorded on fruit trees such as peach, *Prunus persica*; olive, *Olea europaea*; loquat, *Eriobotrya japonica*; and orange, *Citrus aurantium* (Chen & He, 2009). *Cixidia* was recorded on plants of *Quercus* sp. and *Pinus* sp. (D'Urso & Guglielmino, 1995; Ossiannilsson, 1978). However, ecological records for most of them, including the two species in this paper, have never been documented.

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