

A REDESCRIPTION OF *ZAVRELIA BRAGREMIA* GUO & WANG, 2007 (DIPTERA: CHIRONOMIDAE)

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Abstract

Examination of the holotype of *Zavrelia bragremia* Guo & Wang, 2007, revealed a few mistakes in the original description. Based on the type material and additional adult males from Oriental China, *Z. bragremia* is here redescribed and figured. An updated identification key to the males of *Zavrelia* is given.

Introduction

The genus *Zavrelia* was erected by Kieffer, Thienemann and Bause in Bause (1913) with *Z. pentatoma* as the type species. The genus belongs to the subtribe *Zavreliina* within tribe *Tanytarsini*, subfamily *Chironominae* and was reviewed by Ekrem and Stur (2009). At present, there are eleven valid species: *Z. pentatoma* Kieffer & Bause in Bause, 1913, *Z. simantoneoa* (Sasa, Suzuki & Sakai, 1998), *Z. tusimatijea* (Sasa & Suzuki, 1999), *Z. clinovolsella* Guo & Wang, 2004, *Z. bragremia* Guo & Wang, 2007, *Z. elenae* Zorina, 2008, *Z. pseudopentatoma* Zorina, 2008, *Z. aristata* Ekrem & Stur, 2009, *Z. casasi* Ekrem & Stur, 2009, *Z. hudsoni* Ekrem & Stur, 2009 and *Z. sinica* Ekrem & Stur, 2009 (Ekrem and Stur 2009, Kobayashi 2014). Only four species of the genus *Zavrelia* have previously been recorded in China: *Z. clinovolsella*, *Z. bragremia*, *Z. pentatoma* and *Z. sinica* (Ekrem and Stur 2009). The known immature stages of most *Zavrelia* species occur in streams and rivers; except *Z. pentatoma* which is found in standing waters.

Here, we redescribe *Z. bragremia* based on the holotype and additional recently collected specimens, and give an updated identification key to the adult males of *Zavrelia*.

Material and Methods

Field work was conducted in China to supplement material for *Z. bragremia*. Studied specimens were slide-mounted in Euparal, following the proce-

dures outlined by Sæther (1969). Morphological terminology follows Sæther (1980). Colouration is based on slide-mounted specimens. Measurements are given as ranges followed by the mean, when four or more specimens are measured, followed by the number of specimens measured (n) in parentheses. Digital photographs were taken with a resolution of 300 dpi using a Leica DFC420 camera mounted on a Leica DM6000 B compound microscope using bright field setting and the software Leica Application Suite 4.8. The holotype is deposited in the College of Life Sciences, Nankai University, Tianjin, China (BDN); several examined specimens are deposited in the NTNU University Museum (NTNU-VM).

Zavrelia bragremia Guo & Wang, 2007

(Figs 1–10)

Zavrelia bragremia Guo & Wang, 2007: 318, figs 1–3. Holotype ♂ (BDN: 5486), China, Sichuan Province, Emeishan City, 29.60°N, 103.48°E, 17.v.1986, XH Wang.

Additional examined specimens. 8♂♂ (BDN: G5A49, G5A53–56, G5A69; NTNU-VM: G5A4, G5A7), China, Zhejiang Province, Jinhua City, Pan'an County, Dapanshan National Nature Reserve, Huaxi Village, near a stream, 28.792°N, 120.525°E, 800 m a.s.l., 17–21.vii.2012, light trap, XL Lin.

Diagnosis

The adult male of *Zavrelia bragremia* can be distinguished from known species of *Zavrelia* by the following combination of characters: wing length 0.88–1.04 mm; AR 0.91–1.08; frontal tubercle minute; LR₁ about 2.09; laterosternite without seta; anal point with small spinulae between the anal crests at base, but without microtrichia; setiger of superior volsella without conspicuous constriction in apical 1/3.

Description

Adult male (n = 5, unless otherwise stated). Total length 1.24–1.34, 1.29 mm. Wing length 0.88–1.04, 0.95 mm. Total length/wing length 1.31–1.52, 1.38.

Colouration. Head capsule and mouthparts light brown, antenna and eyes dark brown to black. Thorax ground colour brown with dark brown stripes anteriorly on scutum, laterally under parapsidal suture, postnotum and on preepisternum, scutellum paler; legs and abdomen brown.

Head (Figs 1–2). Antenna (Fig. 1) with 10 flagellomeres, ultimate flagellomere 260–295, 278 μm long. AR 0.91–1.08, 0.98. Frontal tubercles minute, 3–4, 3 μm long, 3–4, 3 μm wide at base. Eye (Fig. 2) hairy, reniform, without dorsomedial extension. Temporal setae 5–6, 5. Clypeus with 8–10, 9 setae. Tentorium 88–98, 93 μm long, 8–15, 12 μm wide. Palpomere lengths (in μm): 20–27, 23; 25–30, 27; 65–75, 68; 78–83, 81; 110–120,

115. Third palpomere with one sensillum clavatum distally.

Thorax chaetotaxy (Fig. 3). Acrostichals 6 (n = 4); dorsocentrals 5–6, 6; humerals 0; prealars 1–2, 1; scutellars 4; haltere with 3–6, 4 setae.

Wing (Fig. 4). VR 1.21–1.35, 1.28. Brachiolum with one seta, Sc bare, R with 17–25, 20 setae, R_1 with 16–20, 17 setae, R_{4+5} with 15–20, 17 setae, M_{1+2} with 40–53, 47 setae, M_{3+4} with 14–18, 16 setae, false vein with 78–86, 81 setae, Cu with 14–17, 16 setae, Cu_1 with 10–12, 11 setae, PCu with 36–43, 40 setae, An with 17–18, 18 setae, remaining veins bare. Cell r_{4+5} with c. 190–210, 201 setae, m with 3–8, 5 setae, m_{1+2} with c. 180–200, 190 setae, m_{3+4} with 62–80, 71 setae, cu+an with 85–100, 91 setae, remaining cells bare. Anal lobe strongly reduced.

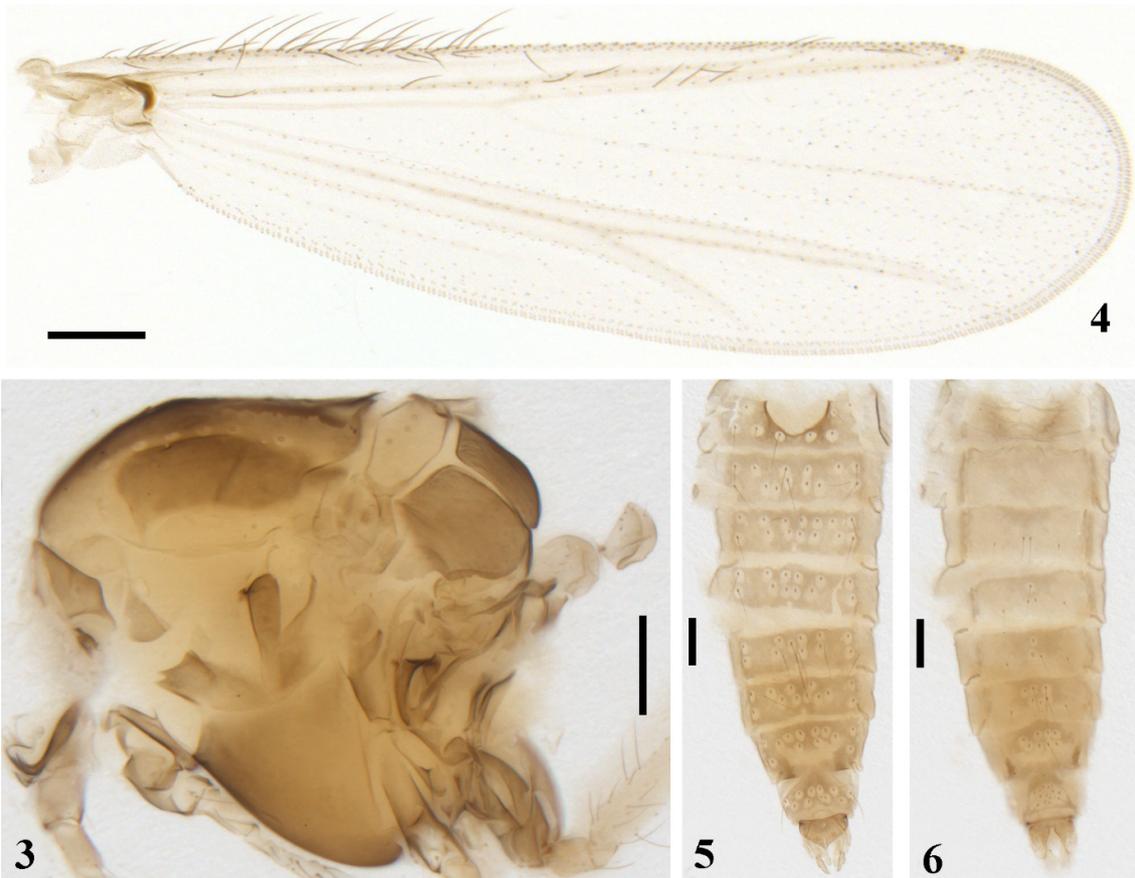
Legs. Fore leg bearing single tibial spur, 10–18, 14 μm long. Combs of mid tibia 13–18, 15 μm wide with 13–15, 14 μm long spur, and 11–13, 12 μm

Table 1. Lengths (in μm) and proportions of legs for *Zavrelia bragremia* Guo & Wang, adult male.

| | fe | ti | ta ₁ | ta ₂ | ta ₃ | ta ₄ |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| p ₁ | 309–490, 435 | 220–250, 235 | 460 (n = 1) | 240 (n = 1) | 190 (n = 1) | 150 (n = 1) |
| p ₂ | 410–480, 458 | 320–360, 340 | 220–240, 225 | 85–100, 90 | 50–70, 57 | 30–50, 45 |
| p ₃ | 470–560, 512 | 360–400, 388 | 240–300, 270 | 145–170, 150 | 120–150, 136 | 70–90, 80 |
| | ta ₅ | LR | BV | SV | BR | |
| p ₁ | 70 (n = 1) | 2.09 (n = 1) | 1.65 (n = 1) | 1.33 (n = 1) | 3.76 (n = 1) | |
| p ₂ | 25–43, 34 | 0.64–0.70, 0.67 | 4.13–5.18, 4.52 | 3.24–3.70, 3.51 | 2.67–5.40, 3.92 | |
| p ₃ | 50 (n = 4) | 0.66–0.72, 0.69 | 2.77–2.83, 2.79 | 3.25–3.46, 3.32 | 3.86–5.33, 4.45 | |



Figures 1–2. *Zavrelia bragremia* Guo & Wang, 2007, male. 1, head and antenna, scale = 100 μm ; 2, eye, scale = 50 μm .



Figures 3–6. *Zavrelia bragemia* Guo & Wang, 2007, male. 3, thorax; 4, wing; 5, abdomen, dorsal view; 6, abdomen, ventral view. Scales = 100 μ m.

wide with 10–13, 12 μ m long spur; combs of hind tibia 15–20, 17 μ m wide with 15–20, 18 μ m long spur, 15–18, 17 μ m wide with 10–15, 13 μ m long spur. Sensilla chaetica on basitarsus of mid leg absent. Lengths (in μ m) and proportions of legs as in Table 1.

Abdomen (Figs 5–6). Setation see Figs 5–6.

Hypopygium (Figs 7–10). Laterosternite IX without seta. Anal tergite 56–68, 62 μ m long, with 3–7, 5 median setae, 16–20, 18 apical setae. Anal point well developed, 17–20, 19 μ m long, with 17–30, 23 small spinules scattered between anal crests at base, apex rounded; no microtrichia free area around base of anal point. Transverse sternapodeme 30–41, 37 μ m long, without oral projections. Phallapodeme 45–75, 59 μ m long. Superior volsella broadly digitiform with pointed apex, bearing two anteromedian and 3–5, 4 dorsal setae; microtrichia apparently absent. Median volsella (Fig. 10) short, knob-shaped, with 3–4, 4 medially directed simple and subulate lamellae. Inferior volsella slightly curved, 45–55, 51 μ m long, bearing 6–9, 7 setae in distal part. Gonocoxite 65–73, 70 μ m long. Gonostylus 38–45, 41 μ m long, curved

inwards, broadest at middle, tapering to narrowly rounded apex. HR 1.55–1.83, 1.67, HV 2.62–3.35, 3.03.

Immature stages and adult females. Unknown.

Identification key to adult males of *Zavrelia*

1. Anal point densely covered with strong spines *Z. pentatoma*
 – Anal point bare, with microtrichia or short spinules only 2
2. Setiger of superior volsella with conspicuous constriction in apical 1/3 3
 – Setiger of superior volsella without conspicuous constriction in apical 1/3 5
3. Setiger of superior volsella with pointed apex ..
 *Z. clinovolsella*
 – Setiger of superior volsella with somewhat rectangular apex 4
4. Anal point with only few microtrichia in between crests; distinct microtrichia-free areas on anal tergite around base of anal point *Z. sinica*

– Anal point with numerous microtrichia in between crests; microtrichia present all around base of anal point *Z. pseudopentatoma*

5. Anal point with small spinules in between crests 6

– Anal point bare, or with microtrichia in between crests at most 7

6. AR 1.23; wing length about 1.50 mm; LR₁ about 1.45; laterosternite with one seta; anal point with small spinules scattered between entire length of anal crests *Z. tusimatjea*

– AR 0.91–1.08; wing length 0.88–1.04 mm; LR₁

about 2.09; laterosternite without seta; anal point with small spinules scattered between anal crests at anal point base only *Z. bragremia*

7. Anal point bare 8

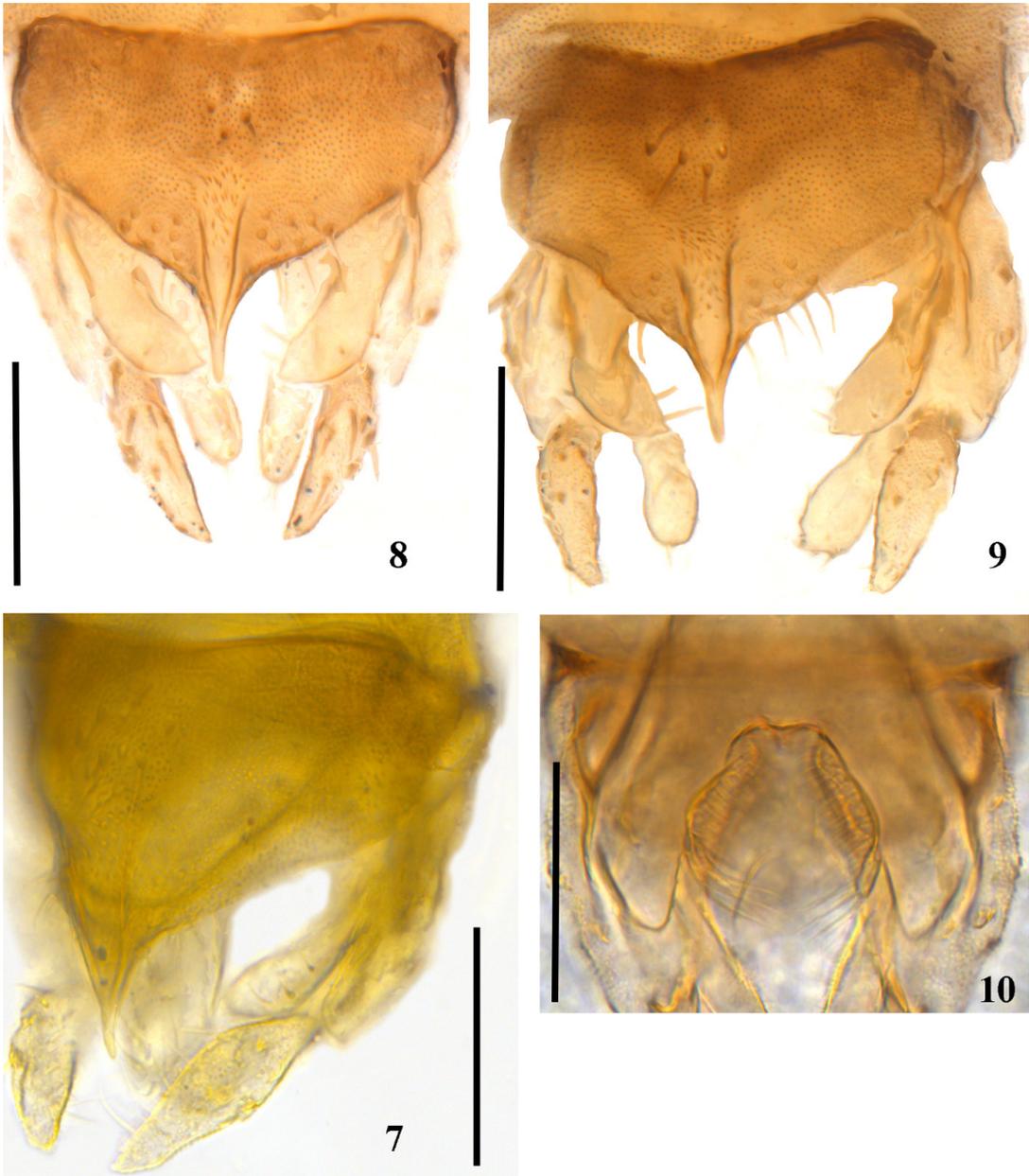
– Anal point with microtrichia in between crests . 9

8. AR 1.00–1.18; LR₁ 1.36–1.46; superior volsella with pointed apex *Z. elenae*

– AR 0.45; LR₁ 1.96; superior volsella with rounded apex *Z. simantoneoa*

9. Wing length c. 1.40 mm; AR c. 0.75.. *Z. hudsoni*

– Wing length c. 1.00 mm; AR c. 0.90... *Z. aristata*



Figures 7–10. *Zavrelia bragremia* Guo & Wang, 2007, male. 7, holotype hypopygium, dorsal view; 8, hypopygium (BDN: G5A69), dorsal view; 9, hypopygium (BDN: G5A53), dorsal view; 10, median volsellae. Scales = 50 µm.

Discussion

Zavrelia bragremia was described based on a single specimen from Sichuan, China by Guo and Wang (2007). By reexamining the holotype, we found that some diagnostic characters in the original description require emendation. For instance, the anal tergite bears three to seven median setae; the anal point does not have two spines (an artifact resulting from slide preparation might have been interpreted as spines, Fig. 7); the anal point has scattered spinules between anal crests at anal point base only. The only complete recently collected specimen of *Z. bragremia* from Oriental China has also a higher LR_1 value (2.09) – the highest within all known *Zavrelia*. This was previously unknown since the fore tarsi are missing in the holotype.

Due to slide preparation methods and a distinct variability of *Zavrelia* species, it is extremely difficult to observe and define key characters to accurately separate species on the basis of their morphology. An intraspecific variability of the type species *Zavrelia pentatoma* was detected by Gilka (2008). On the other hand, some morphological variable characters of *Z. pentatoma* have been found as diagnostic in other species like the presence of an obvious constriction in the apical 1/3 of the setiger of the superior volsella (see identification key). Cryptic species, particularly within some of the more widely distributed *Zavrelia* are thus expected to be revealed. A complete DNA barcode reference library of *Zavrelia* would be beneficial to explore the species boundaries within this genus, since DNA barcoding (Hebert et al. 2003a, b) has proven effective in biodiversity assessments and taxonomic revisions (e.g. Anderson et al. 2013, Lin et al. 2017). At present (August 2017), however, there is only one species, *Zavrelia pentatoma*, with DNA barcodes in the Barcode of Life Data Systems (BOLD, <http://www.boldsystems.org/>).

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