A new synonym species with description of a new species of *Rhopalopsole* from China (Plecoptera: Leuctridae)

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Abstract
Recently, we reviewed the specimens belonging to *Rhopalopsole* we have collected and compared them with the holotype and paratypes of *Rhopalopsole vespertilio* Chen & Du, 2017. We found that *R. vespertilio* should be synonymized with *R. xui* Yang, Li & Zhu, 2004. Additionally, a new species of the genus *Rhopalopsole*, *R. nanlinga* sp. nov. from Guangdong Province of southwestern China, is described and illustrated. The new species is compared to the *Rhopalopsole vietnamica* west group.

Keywords: New synonym, new species, Rhopalopsole, Plecoptera, Leuctridae, China

Introduction
*Rhopalopsole* Klapálek, 1912 is a species-rich genus in the family Leuctridae, with more than 80 valid species known from the Oriental and eastern Palaearctic regions (Klapálek 1912; Okamoto 1922; Wu 1949, 1973; Jewett 1958, 1975; Illies 1966; Kawai 1967, 1968, 1969; Harper 1977; Zwick 1977; Du 1999, 2020; Harrison & Stark 2008; Stark & Sivec 2008; Stark et al. 2012; Yang et al. 2015; DeWalt et al. 2021). Currently, more than 50 species of this genus have been recorded from China, with recent contributions made by Yang & Yang (1991a, 1991b, 1993, 1994, 1995), Yang et al. (2004, 2006, 2009), Sivec et al. (1997, 2008), Li & Yang (2010, 2011, 2012), Li et al. (2010, 2011, 2017), Qian & Du (2011, 2012a, 2012b, 2013, 2017), Qian et al. (2014), Chen & Du (2017), and Mo et al. (2018). There are ten species of the *Rhopalopsole vietnamica* west group listed by DeWalt et al. (2021) including six recorded from China: *R. brevidigitata* Qian & Du, 2017, *R. furcospina* (Wu, 1973), *R. hainana* Li & Yang, 2010, *R. sinensis* Yang & Yang, 1993, *R. yajunae* Li & Yang, 2010, *R. yunnana* Sivec & Harper, 2008. Males of this group are generally characterized by tergum 9 that always possesses a small field of knobs on the mid part of its hind margin, tergum 10 of most species possesses a central plate with strongly sclerotized lateral bars, cerci upturned, terminating in a sharp spine (Sivec et al. 2008). Herein, a new synonym is established: *R. vespertilio* is synonymized with *R. xui*. Additionally, a new species of the *Rhopalopsole vietnamica* west group, *R. nanlinga* sp. nov. from Guangdong province of southwestern China is described and illustrated.

Material and methods
The specimens were collected by hand picking and preserved in 75% ethanol. Morphological details were examined with a Leica M205A microscope. Color illustrations were taken with a KEYENCE VHX-5000. All specimens used in this study are deposited in the Insect Collection of Yangzhou University (ICYZU), Jiangsu Province, China. The morphological terminology follows that of Sivec et al. (2008).
Taxonomy

Family Leuctridae Klapálek 1905
Genus Rhopalopsole Klapálek, 1912

Species Rhopalopsole xui Yang, Li & Zhu, 2004 (Figs 1–3)

Rhopalopsole xui Yang, Li & Zhu, 2004: Yang, Li & Zhu, 2004, Entomological News, 115: 280; Harrison & Stark, 2008, Illiesia, 4: 79; Li & Yang, 2012, Zootaxa, 3582: 26; Yang, Li & Zhu, 2015, Fauna Sinica Insecta, 58: 142. Rhopalopsole vespertilio Chen & Du, 2017: Chen & Du, 2017, Zootaxa, 4319: 185-193; Chen, 2020, Zootaxa, 4767: 579-586.

Material examined

Rhopalopsole vespertilio syn. nov.: (Holotype) ♂, China, Jiangsu Province, Liyang City, Wawushan Forest Farm, 65 m, 31°39.52′ N, 119°17.65′ E, 2016-III-30, leg. Chen Zhi-Teng & Huo Qing-Bo (ICYZU); (Paratypes) 3♂, 4♀♀, same data as holotype (ICYZU);

Rhopalopsole xui: 6♂, 8♀♀, China, Zhejiang Province, Hangzhou, Six Harmanies Pagoda, 1999-IV-2, leg. Du Yu-Zhou (ICYZU).

Figure 1. Rhopalopsole xui Yang, Li & Zhu, 2004. Collected from Zhejiang Province, Six Harmanies Pagoda. (a) Male head and pronotum, dorsal view; (b) Male terminalia, lateral view; (c) Male terminalia, dorsal view; (d) Male terminalia, ventral view.
Type locality
China, Guangdong Province, Ruyuan, Nanling National Natural Reserve.

Distribution
China (Zhejiang, Guangdong, Jiangsu).

Diagnosis
Male (Figures 1 and 2). The three elements of central plates of tergum 10 are broadly fused, plates covered with macrotrichia (Figure 1(c)). Subanal lobes typical of the group. Cerci without a spine. Other characteristics were shown in Figure 1, and described in Yang et al. (2004).

Female (Figure 3). Subgenital plate produced into a rounded sclerotized plate medially with a semicircular notch (Figure 3(b)).

Remarks
Yang et al. (2004) did not describe the female of R. xui, and we firstly describe the female of R. xui, we found that R. xui and R. vespertilio share exactly the same subgenital plate (Figure 3; Fig. 11 in Chen & Du 2017). We checked the holotype and paratypes of R. vespertilio from

Figure 2. Rhopalopus vespertilio Chen & Du, 2017, syn. nov. One of the paratypes collected from Jiangsu Province, Liyang City, Wawushan Forest Farm. (a) Male head and pronotum, dorsal view; (b) Male terminalia, lateral view; (c) Male terminalia, dorsal view; (d) Male terminalia, ventral view (Wawushan Forest Farm). [A newly emerged one].

192 Y. Yu-Ben and D. Yu-Zhou
Jiangsu Province. We found a different type of central plate of tergum 10 in the paratypes of *R. vespertilio* (Figure 2(c)), and the central plate of tergum 10 not so sharp as the holotype of *R. xui* (Figure 1(c)), additionally, *R. vespertilio* and *R. xui* share the same characteristics of tergum 9, lateral projections, epiproct, subanal lobes (Figures 1 and 2). We therefore define *R. vespertilio* as a synonym of *R. xui*.

**Family Leuctridae Klapálek 1905**  
**Genus Rhopalopsole Klapálek, 1912**

Species *Rhopalopsole nanlinga* Yang & Du, sp. nov. (Figs. 4–5)

**Type materials**

*Holotype.* 1♂; China, Guangdong Province, Nanling National Nature Reserve, 24°54' 41" N, 113°2' 45" E, 2020-V-23, No record of the collector (ICYZU).

*Paratypes.* China, 5♂♂, same data as holotype (ICYZU).

**Description**

**Adult habitus (Figure 4).** Body length 4.5–5.5 mm. Forewings length 7.0–7.3 mm, hindwings length 5.8–6.2 mm (N = 6). Head dark brown, wider than pronotum; ocelli pale brown. Pronotum brown, quadrate, longer than wide, all angles rounded and with several black irregular stripes. Legs brown.

**Male** (Figures 4 and 5). Tergum 9 mostly sclerotized, somewhat less so on median area with an upturned curved ridge on hind margin, behind which is a small field of cuticular knobs. Sternum 9 basally with flabelliform vesicle bearing dense hairs, apically with a triangular subgenital plate. Tergum 10 bearing a large central plate covered with macrotrichia and lateral bars strongly sclerotized. Transverse plates thin with apically strongly sclerotized. Lateral projections parallel-sided, ending in a small and sharp point. Epiproct thick at base, hook-like, not tapering appreciably along its course, ending in a round point covered with short macrotrichia. Subanal lobes of medium size, flat and plate-like, expanding posteriorly, with ventral furrows, ending in a point. Cercus hairy and upcurved, with a small spine (Figures 4 and 5).

**Female.** Unknown.

**Nymph.** Unknown.
Figure 4. *Rhopalopsole nanlinga* Yang & Du, *sp. nov.* Collected from Guangdong Province, Nanling National Nature Reserve. (a) Male head and pronotum, dorsal view; (b) Male terminalia, lateral view; (c) Male terminalia, dorsal view; (d) Male terminalia, ventral view.

Figure 5. *Rhopalopsole nanlinga* Yang & Du, *sp. nov.* (a) Male terminalia, dorsal view; (b) Male terminalia, ventral view; (c) Lateral processes of tergum 10.
**Etymology**

This new species is named after the collection place.

**Remarks**

*R. nanlinga* is a member of the *R. vietnamica* west group as proposed by Sivec et al. (2008), with tergum 9 that shows an upturned curved ridge on hind margin, tergum 10 possesses a central plate with lateral bars strongly sclerotized, epiproct simple and thick, subanal lobes and cerci typical of this group (Figure 4). Males of this group are also generally characterized by lateral projections of tergum 10 typically ending in a forked process (Sivec et al. 2008). The new species share the typical subanal lobes, cerci, epiproct, the tergum 9 possesses some kind of ornamentation the central plate of tergum 10 with lateral bars strongly sclerotized of *R. vietnamica* west group, however, the lateral projections of tergum 10 of the new species are unique into this group, ending in a small and sharp point, but not ending in a forked process (Figures 4 and 5).

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**Disclosure statement**

No potential conflict of interest was reported by the author(s).

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