



## RECORDS AND DESCRIPTIONS OF SOME NEMOURIDE SPECIES (ORDER: PLECOPTERA) FROM LEIGONG MOUNTAIN, GUIZHOU PROVINCE, CHINA

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### ABSTRACT

Three new species of Nemouridae, *Amphinemura leigong* Wang & Du, *Indonemura trilingispina* Du & Wang, and *Nemoura oculata* Wang & Du are described and illustrated from male specimens collected on Leigong Mountain in southeast Guizhou Province, China. New records from this area are also given for *Amphinemura cordiformis* Li & Yang, *Nemoura guangdongensis* Li & Yang and a *Nemoura* species being described elsewhere.

**Keywords:** New species, Plecoptera, Nemouridae, Guizhou province, China

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### INTRODUCTION

In comparison to Perlidae, much less is known of Chinese Nemouridae due to their small size, rather early emergence, and their general absence from light traps. Ninety species of Nemouridae are currently known from China due to the early work of Wu (1938, 1949, 1962, 1973) and more recent efforts of Zhu & Yang (2002, 2003), Li et al. (2005), Yang et al. (2005a), Yang et al. (2005b) and Li & Yang (2005, 2006). Unfortunately only 15 types of species from older descriptions are still available; types of 40 species are lost or destroyed and the descriptions and illustrations of Wu (1938, 1949, 1962, 1973) are not adequate for species determinations (Zhu et al. 2002). In addition to this work, Zhou Pei, a student of Nemouridae with Du Yuzhou, recognized 13 new nemourid species in her master's thesis in 2004, and these are still unpublished.

Material in our paper originates from Leigong

Mountain National Natural Reserve located in the southeast of Guizhou Province, part of the Central China region of the Oriental Realm. In the present paper we describe three new species of *Amphinemura*, *Indonemoura*, and *Nemoura* and provide records of previously described species of Nemouridae. Holotypes and other materials are deposited in the Insect Collection of Yangzhou University.

#### *Amphinemura cordiformis* Li & Yang

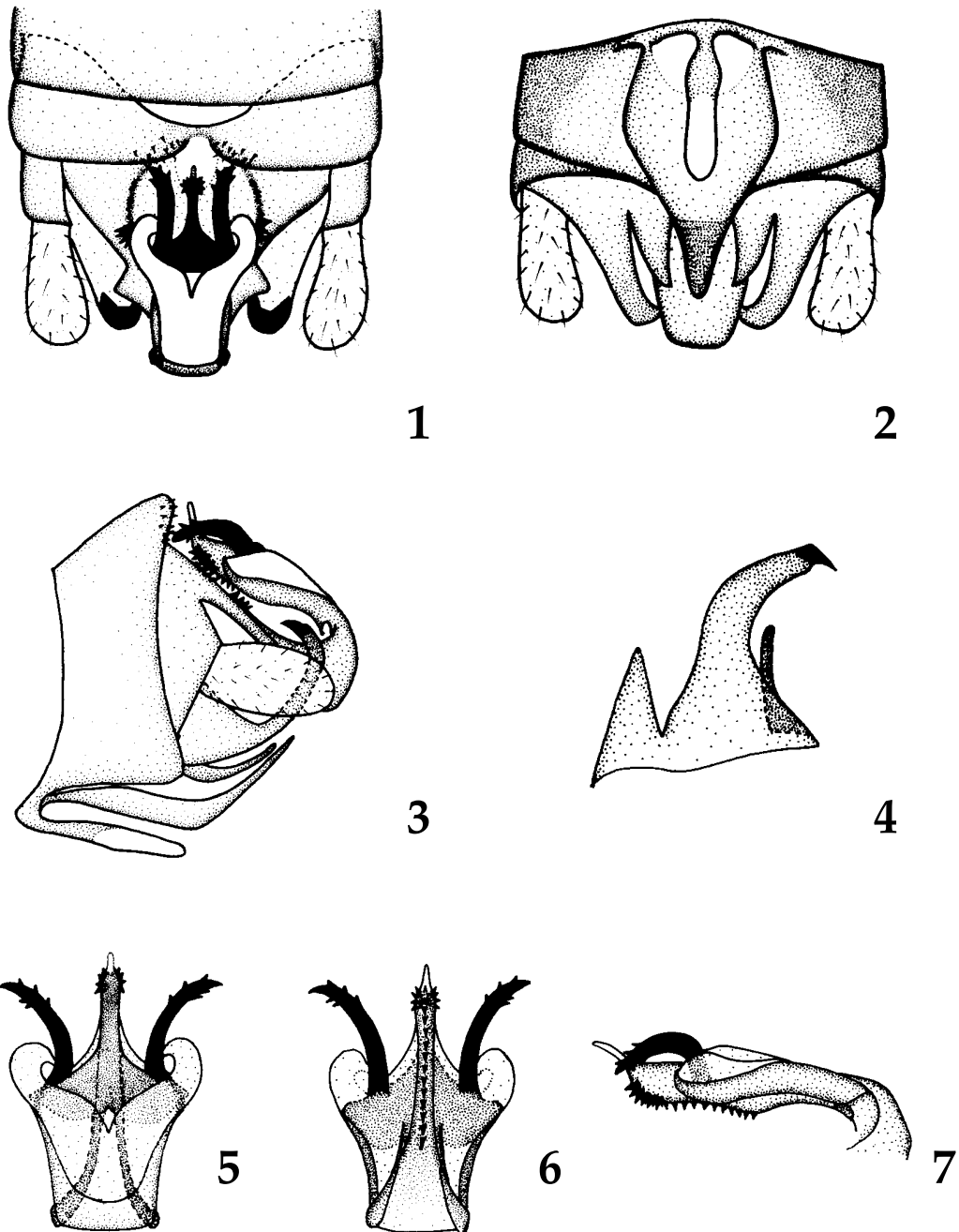
*Amphinemura cordiformis* Li & Yang, 2006. Zootaxa, 1154: 41-48.

**Material examined.** 11 ♂, China: Guizhou Province, Leigong Mountain, Lianhuaping, 17-18 September 2005, Wang Zhi-Jie.

**Distribution.** Guizhou Province (Leigong Mountain, Dashahe), China.

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Figs. 1-7. *Amphinemura leigong* sp. n. 1. Male terminalia, dorsal; 2. Male terminalia, ventral; 3. Male terminalia, lateral; 4. Male paraproct; 5. Male epiproct, dorsal (treated in KOH); 6. Male epiproct, ventral (treated in KOH); 7. Male epiproct, lateral.

*Amphinemura leigong* sp. n.

Wang & Du (Figs. 1-7)

**Material examined.** Holotype ♂, China: Guizhou Province, Leigong Mountain, Lianhuaping, 1450-1620 m, 17-18 September 2005, Wang Zhi-Jie. Paratypes: 5 ♂, same data as holotype.

**Adult habitus.** Head and antennae dark brown, head slightly wider than pronotum. Wings hyaline and brown, veins dark brown. Legs brown.

**Male.** Forewing length 6.5-7.0 mm; hindwing length 5.2-6.0 mm. Tergum 9 weakly sclerotized, slightly raised in front, deeply constricted medially behind, with narrow indentation at middle of hind margin and bearing two clusters of tiny black spines at each side of indentation (Figs. 1, 3). Tergum 10 with large median unsclerotized concavity bearing several tiny black spines along lateral margins, and several stronger spines distally. Hypoproct trapezoidal, tapering to a narrow apex which extends over inner lobes of paraprocts; vesicle long and slender, reaching over half of hypoproct (Fig. 2). Paraprocts divided into 3 lobes; inner lobe triangular, slightly sclerotized; median lobe broad at base, tapering in distal 2/3 and ending with a black, strongly sclerotized, inwardly directed and acute tip; outer lobe small, slender, distinctly sclerotized, reaching about midlength of median lobe (Fig. 4). Epiproct dorsal sclerite mainly membranous with slightly sclerotized lateral arms; ventral sclerite sclerotized with wide base forming a long and narrow sclerotized median process bearing a row of tiny black ventral spines (Figs. 5-7). Median process ends in a tubular structure slightly raised upward. Upper part of ventral sclerite strongly sclerotized, triangular at base with two narrow, black lateral prongs. Prongs oriented parallel, slightly curved inward with several small distal denticles. In mating specimens and those treated with KOH, the prongs are divergent as shown in Figs. 5-6.

**Female.** Unknown.

**Distribution.** Guizhou Province (Leigong Mountain), China.

**Remarks.** *Amphinemura leigong* belongs to a group of species which share a trifurcate epiproct. This group includes *A. cestroidea* Li & Yang, from Sichuan, *A. chui* (Wu) and *A. elongata* Li, Yang & Sivec, from Zhejiang, *A. fleurdelia* (Wu) from Fujian, and *A.*

*guangdongensis* Yang, Li & Zhu and *A. nanlingensis* Yang, Li & Sivec, from Guangdong. The apparent sister species, *A. nanlingensis*, differs in shape, armature and orientation of the lateral prongs of the epiproct. Specifically, the prongs of *A. nanlingensis* lack denticles at their distal end, whereas other species differ in shape of paraprocts. Detailed studies in the future should reveal the relationship of *A. leigong* to the species from Guangdong.

**Etymology.** The name, a noun in apposition, refers to Leigong Mountain, the type locality.

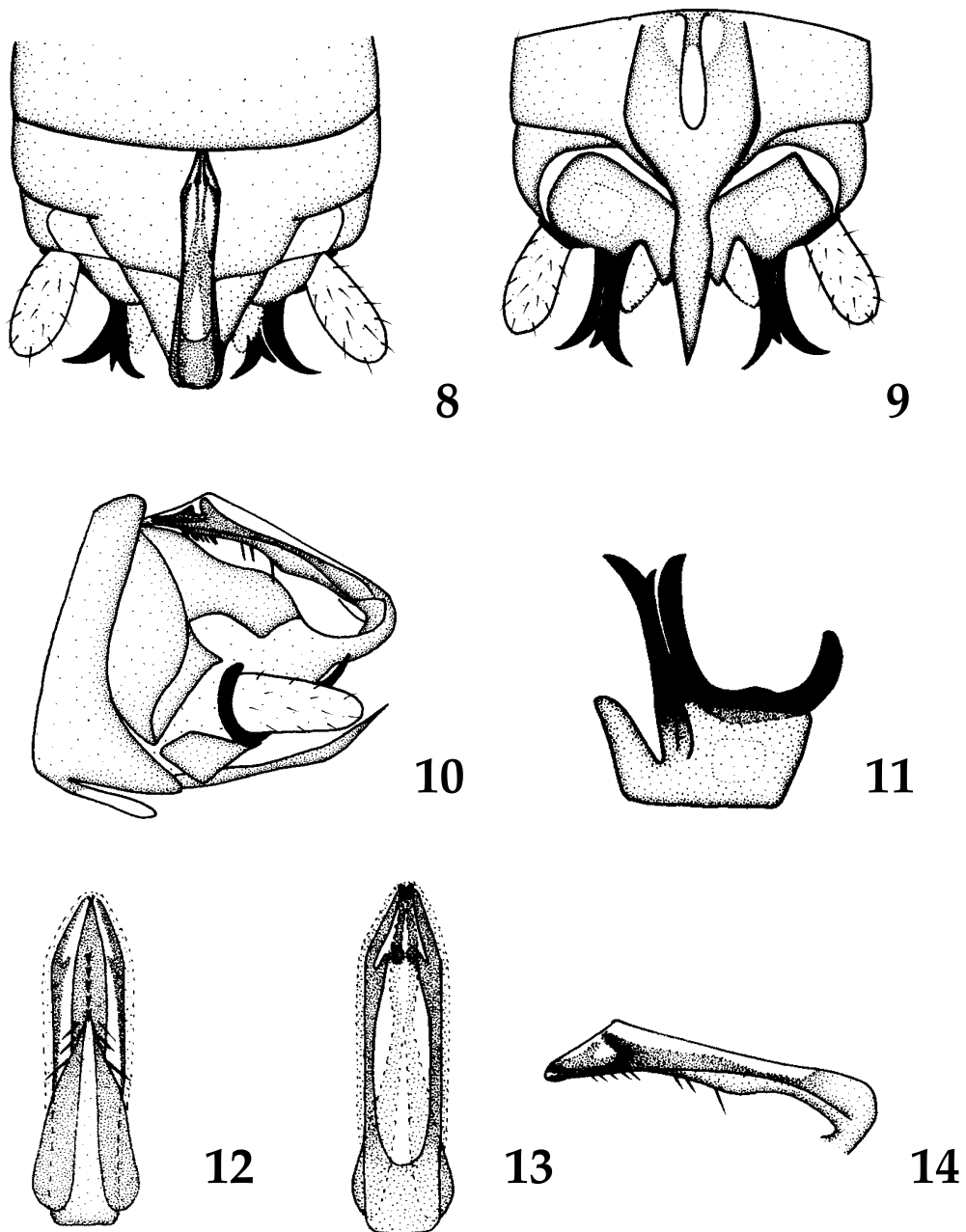
*Indonemoura trilongispina* sp.n.

Du & Wang (Figs. 8-14)

**Material examined.** Holotype ♂, China: Guizhou Province, Leigong Mountain, Xiaodan River, 685 m, 15-17 September 2005, Wang Zhi-Jie. Paratypes 3 ♂, Maolan, Guizhou province, 22 October, 1996, Leg. Li Zi-Zhong.

**Adult habitus.** Head and antennae black, head wider than pronotum; pronotum small, dark brown and nearly rectangular. Wings hyaline, brown, veins dark brown. Legs brown.

**Male.** Forewing length 6.1 mm; hindwing length 5.2 mm. Tergum 9 unmodified. Hypoproct exceptionally long, slightly constricted medially with narrow, pointed tip reaching end of abdomen; vesicle slender (Fig. 9). Paraprocts trilobed; inner lobe small, triangular and poorly sclerotized; median lobe membranous subapically (Figs. 9, 11). Sclerotized portion with a wide rectangular base unsclerotized in the middle, and a long sclerotized bar extending parallel to inner lobe and bearing a subapical spine and slightly inwardly directed acute apex; outer lobe mostly sclerotized, elongate, lying parallel to distal part of median lobe, and recurved dorsally alongside cerci. Epiproct long and narrow, apex extended over tergum 9 and covered with a layer of membrane; dorsal sclerite sclerotized and consisting of two ridges raised in lateral view (Figs. 8, 10, 12-14); narrow, thin lateral arms divided into sclerotized bars which extend to base of epiproct; bars armed with a row of tiny black ventral spines along the keel and three longer spines distally on each bar. Ventral sclerite bearing a pair of knob like subapical structures.



Figs. 8-14. *Indonemoura trilogispina* sp. n. 8. Male terminalia, dorsal; 9. Male terminalia, ventral; 10. Male terminalia, lateral; 11. Male paraproct; 12. Male epiproct, dorsal; 13. Male epiproct, ventral; 14. Male epiproct, lateral.

**Female.** Unknown.

**Distribution.** Guizhou Province (Leigong Mountain), China.

**Remarks.** Although Baumann (1975) did not list any Chinese species in genus *Indonemoura*, we believe several nemourid species of Wu might belong to this genus. Unfortunately, none of these species are represented by type material (Zhu et al. 2002).

**Etymology.** The name refers to the three pairs of long spines on the ventral sclerite of the epiproct.

### *Nemoura guangdongensis* Li & Yang

*Nemoura guangdongensis* Li & Yang, 2006. *Zootaxa*, 1137: 53-61.

**Material examined.** 1 ♂, China: Guizhou Province, Leigong Mountain, Lianhuaping, 1450-1620 m, 17-18 September 2005, Wang Zhi-Jie.

**Distribution.** Guizhou Province (Leigong Mountain) and Guangdong Province, China.

### *Nemoura* sp.

*Nemoura* sp. n. Du & Zhou, in Zhou et al., *Entomol. News*. In press.

**Material examined.** 1 ♂, China, Guizhou Province, Leigong Mountain, Lianhuaping, 1450-1620 m, 15-16 September 2005, Xiao Chun-Xia.

**Distribution.** Guizhou Province (Leigong Mountain), Zhejiang Province, China.

### *Nemoura oculata* sp.n. Wang & Du (Figs. 15-21)

**Material examined.** Holotype ♂, China: Guizhou Province, Leigong Mountain, Lianhuaping, 1450-1620 m, 17-18 September 2005, Wang Zhi-Jie.

**Adult habitus.** Head brown, wider than pronotum. Antennae pale brown, pronotum pale brown, wider than long, angles bluntly rounded. Wings hyaline, light brown with brown veins. Legs pale brown, hind femora with pale band at distal third; apex of tibiae and last tarsal segment dark.

**Male.** Forewing length 7.9 mm; hindwing length 7.2 mm. Abdomen pale on anterior segments and darker on distal segments. Tergum 9 slightly raised medially, weakly sclerotized with middle of distal

margin extended outward forming a triangular projection (Fig. 15); projection armed with several strong, longer spines laterally and extending partly over base of tergum 10. Tergum 10 sclerotized, dark brown and bearing a small medial indentation near posterior margin of tergum 9. Apical part of hypoproct curved inward at posterior margin of sternum 9 (Fig. 16); vesicle slender reaching over half of hypoproct. Paraprocts bilobed (Fig. 18); inner lobe sclerotized, slender, shorter than half of outer lobe; outer lobe slightly sclerotized with wide base tapering in apical 2/3 and ending with a black, acute hook which curves toward inner lobe (Figs. 15-18). Quadrangular sclerotized portion curved ventrally at midlength of outer lobe. Epiproct calabash shaped in dorsal aspect, constricted medially, with large basal cushion and slightly sclerotized lateral arms (Figs. 19-21). Ventral sclerite forms two oblong sclerotized circles which extend toward tip; ventral sclerite sclerotized forming a long and narrow keel with two lines of black spines on the keel. Dorsum of cerci sclerotized with a strong, apical spine.

**Female.** Unknown.

**Distribution.** Guizhou Province (Leigong Mountain), China.

**Remarks.** Genus *Nemoura* is one of the largest genera among Nemouridae with more than 100 described species, 24 of which are recorded for China (Li & Yang 2006). Comparison of our specimens with types available in the Institute of Zoology, Chinese Academy of Sciences, shows *N. oculata* is distinct. The new species is similar to *N. basispina* Li & Yang in epiproct shape but differs in shape of paraprocts, in tergum 10, and in shape and armature of tergum 9.

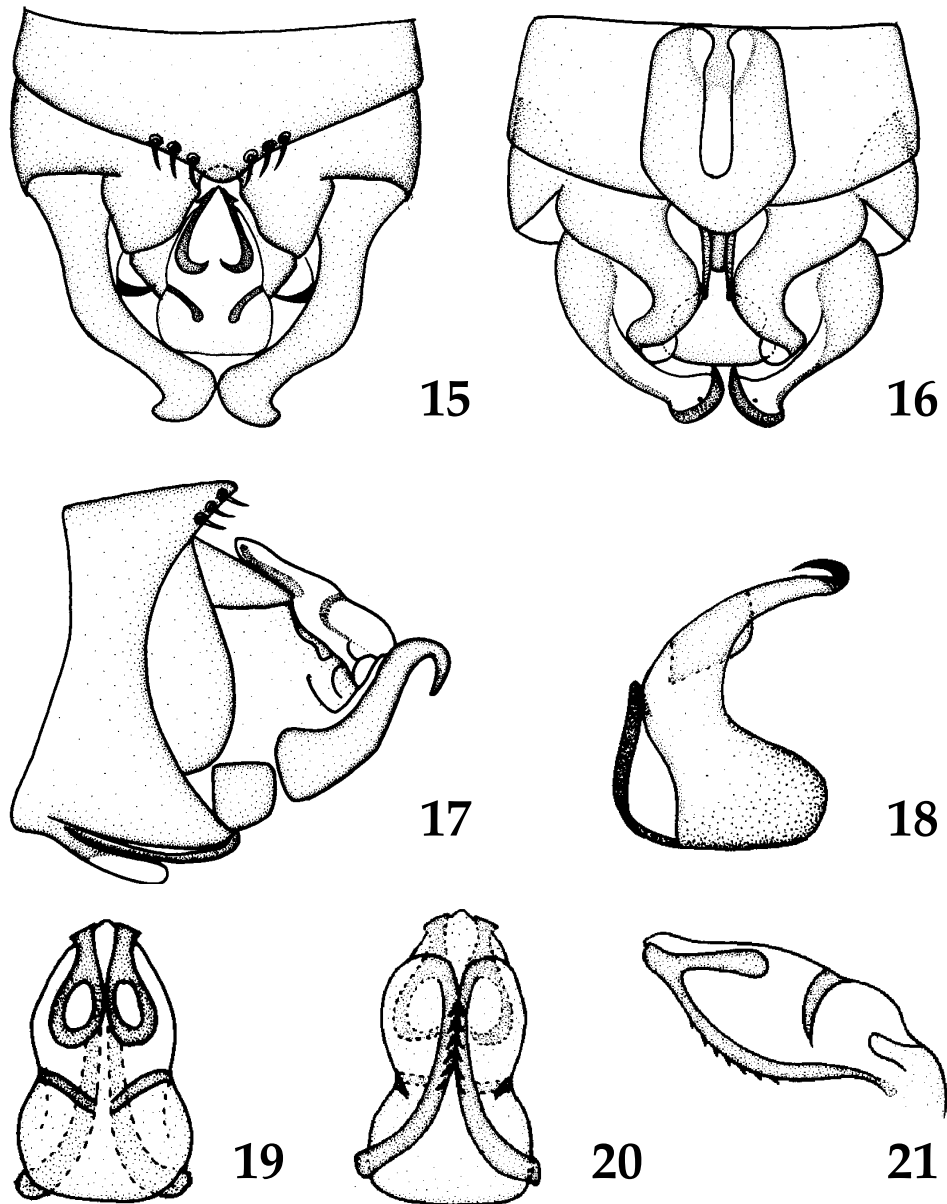
**Etymology.** The name refers to the characteristic shape of the ventral epiproct sclerite.

### ACKNOWLEDGMENTS

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Figs.15-21. *Nemoura oculata*, sp. n. 15. Male terminalia, dorsal; 16. Male terminalia, ventral; 17. Male terminalia, lateral; 18. Male paraproct; 19. Male epiproct, dorsal; 20. Male epiproct, ventral; 21. Male epiproct, lateral.

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