



Molecular phylogeny of *Metanoeina* net-winged beetles identifies *Ochinoeius*, a new genus from China and Laos (Coleoptera: Lycidae)

VACLAV KUBECEK, TIMOTHY C. BRAY & LADISLAV BOCAK¹

Laboratory of Molecular Systematics, Department of Zoology, Faculty of Science, Palacky University, 17. listopadu 50, 771 46 Olomouc, Czech Republic. E-mails: vaclav.kubecek@upol.cz, ladislav.bocak@upol.cz

¹Corresponding author

Abstract

The molecular hypothesis on relationships of *Metanoeina* lineages is presented and results are compared with morphology. A new genus *Ochinoeius* is proposed for four East Palearctic and Oriental species. *Ochinoeius* is recovered as a sister lineage to *Matsudanoeius* Sklenarova *et al.*, 2014 and differs from related genera in morphology of genitalia and incomplete secondary elytral costae. We show, that the structure of elytral costae, although highly homoplastic across *Metriorrhynchini*, can be used for identification of *Ochinoeius*. The geographic distribution of *Metanoeina* is limited to the eastern parts of the Palearctic and Oriental regions. The reconstruction of ancestral ranges identifies continental Eastern Asia as the centre of generic diversity of *Metanoeina* and suggests the dispersal from continental Asia to the southern part of the Oriental region, i.e. to the Sundaland and Philippines. Among *Metanoeina* lineages, only *Metanoeius* Waterhouse, 1878 contains higher number of species. The following four species are described: *Ochinoeius huaphanensis* sp. nov., *O. hainanensis* sp. nov., *O. habashanensis* sp. nov., and *O. xunyanbaensis* sp. nov..

Key words: Elateroidea, mtDNA, molecular phylogeny, new genus, new species, key

Introduction

DNA sequence data provide an independent source of information on relationships enabling the construction of a phylogeny-based classification (Vogler & Monaghan 2006). Using the DNA data, we aim to define principal lineages in *Metanoeina* (Lycidae: *Metriorrhynchini*) and to compare the results with morphology. The diversity of the Oriental and East Palearctic fauna of net-winged beetles remains poorly studied and their classification had been based on the typological concepts of genera as proposed by Waterhouse (1878, 1879) and later summarized by Kleine (1933). The genera of *Metriorrhynchini* until recently were defined based using the structure of pronotal carinae, the number of longitudinal costae in elytra or morphology of antennae and several hundreds of species have been described from Old World tropics (Kleine 1933). Although the unexpected morphological diversity of genitalia was noted earlier (Bocak 2002), only recently the molecular phylogeny of *Metriorrhynchini* seriously questioned monophyly of several genera and the utility of some external characters for higher classification. Sklenarova *et al.* (2014) redefined subtribes of *Metriorrhynchini* and the limits of the genera *Cautires* Waterhouse, 1878 and *Xylobanus* Waterhouse, 1878. Consequently, the subtribe *Metanoeina* was defined on the basis of male and female genitalia, larval morphology and DNA data. Surprisingly, only a few species known from Japan, China, Laos and Borneo were identified in the previous dataset as lineages related to *Metanoeius* Waterhouse, 1878. This prompted the investigation of recently collected material available for DNA extraction for additional species of *Metanoeina*. Here, we integrate morphology with the expanded molecular phylogeny to delimit the natural lineages and species. The net-winged beetles are unpalatable and therefore they often resemble syntopically occurring species (Bocak & Yagi 2010). Consequently, the body-size, shape, and colouration are similar in numerous unrelated species. The general similarity of the members of mimetic complexes is probably a result of the highly homoplastic evolution of similar patterns of elytral costae, which might have a strengthening function in the soft-bodied lineages. Molecular data support delineation of the natural lineages even when their morphological

Ochinoeus xunyanbaensis sp. nov.

(Figs. 6, 14, 20, 29–30)

Type material. Holotype, male, CHINA, Shaanxi, Xunyanba; May 2000; leg. V. Marshal. Paratype: male, same locality data.

Differential diagnosis. *O. xunyanbaensis* resembles *O. hainanensis*. These species differ mainly in elytral coloration, when *O. xunyanbaensis* has entire elytra brown while primary elytral costae of *O. hainanensis* are yellow to brown and secondary and transverse costae are dark brown. *O. xunyanbaensis* has well visible pronotal fronto-lateral carinae while in *O. hainanensis* the carinae are very weak. The phallus of *O. xunyanbaensis* is robust, almost parallel-sided, slender apically, those of *O. hainanensis* has widely rounded apical part (Figs. 29–32).

Description. Male. Body ~ 9 mm long, elongate, 4.4–4.8 times longer than width at humeri; entire body dark brown, only elytra lighter brown; whole body covered with short, dense pubescence. Head with hemispherically prominent eyes, interocular distance 1.00–1.08 times larger than maximum eye diameter. Antennomeres 3–10 flabellate (Fig. 14), apical antennomere slender, parallel-sided. Pronotum flat, trapezoidal, 1.3–1.5 times wider at base than long at midline, with strong middle and frontal carinae, postero-lateral carinae weaker (Fig. 6). Elytra slender, widened backward, 3.8–4.0 times longer than their combined width at humeri, with four strong primary costae and five irregularly developed secondary costae (Fig. 20). Phallus only slightly widened apically, almost parallel-sided, with gradually slenderer apical part; internal sac with inconspicuous sclerotized and pigmented structures (Figs. 29–30).

Measurements. BL 9.1–9.2 mm, EL 7.6–8.0 mm, WH 1.9–2.1 mm, PL 1.1 mm, PW 1.4–1.6 mm, Ediam 0.54–0.58 mm, Edist 0.58 mm.

Distribution. China, Shaanxi province, Qinling mts.

Etymology. The specific epithet is derived from the local name Xunyanba in the Qinling mts.

A key to males of *Ochinoeus*

1. Entire elytra ochreous (Fig. 3) 2
- Elytra brown (Fig. 4) 3
2. Frontal distance between eyes approximately equal to eye diameter, scutellum brown, with yellow apices (Fig. 12), phallus club-shaped with obtuse apical part and short thorns in internal sac (Figs. 27–28) *O. huaphanensis* sp. nov.
- Frontal distance between eyes 1.2 larger than eye diameter, entire scutellum dark brown, phallus slender in lateral view, widened apically, with slender, distinctively curved apical part (Figs. 25–26) *O. habashanensis* sp. nov.
3. Entire elytra brown (Fig. 20), pronotal fronto-lateral carinae well developed (Fig. 6), phallus almost parallel-sided, thorns of internal sac inconspicuous, apex of phallus gradually slenderer, pointed (Figs. 29–30) *O. xunyanbaensis* sp. nov.
- Elytral primary costae yellow to brown, bottom of elytral cells and secondary and transverse costae dark brown (Fig. 21), pronotal fronto-lateral carinae inconspicuous (Fig. 7), phallus widest in apical third, widely rounded apically (Figs. 31–32) *O. hainanensis* sp. nov.

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