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Short communication

New fossil booklice from the Cretaceous amber of Myanmar (Psocodea: Troctomorpha: Amphientometae: Manicapsocidae)

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ABSTRACT

Palaeomanicapsocus margoae gen. et sp. nov. and *Palaeomanicapsocus fouadi* gen. et sp. nov. are characterized, described, illustrated, from the Cretaceous Burmese amber. Their phylogenetic position is discussed. These fossil taxa are the first manicapsocid barklice to be described from the Burmese amber.

1. Introduction

Manicapsocidae Mockford, 1967 is a small troctomorphan psocodean family belonging to the Amphientometae group. They comprise eight recent species distributed in four genera (*Manicapsocus* Smithers, 1966; *Epitroctes* Mockford, 1967; *Nothoentomum* Badonnel, 1967; *Phallopsocus* Badonnel, 1967). Smithers (1972: 338) proposed the synonymy of Manicapsocidae with Electrentominae Enderlein, 1911 which was erected later to family level by Lienhard and Smithers (2002). These authors synonymized also the Manicapsocidae Mockford, 1967 with the Electrentomidae, without argument. Mockford et al. (2013) accepted the work of Lienhard and Smithers (2002) and proposed also an expanded concept of Electrentomidae by including the fossil family Paramesopsocidae Azar et al., 2008. However we consider herein each taxonomic grouping apart, because a cladistic phylogenetic analysis is needed prior to taking such important decision for these groups.

The fossil record of the family Manicapsocidae is relatively significant as the known fossil taxa are almost as numerous as recent ones. The earliest record of the family is from the Lower Cretaceous amber of Alava, Spain (*Manicapsocidus enigmaticus* Baz and Ortuno, 2001).

In this paper, we describe two very close manicapsocid species belonging to the same genus, *Palaeomanicapsocus margoae* gen. et sp. nov. and *Palaeomanicapsocus fouadi* gen. et sp. nov. from the Burmese amber. These two species are the first manicapsocid barklice to be described from this material and constitute the second earliest record of the family.

2. Materials and methods

The studied material comes from Hukawng Valley in the northern state of Kachin, Myanmar (locality in Kania et al., 2015). The amber pieces containing the inclusions were cut, shaped, and polished. The specimens were examined with a Nikon SZ10 and a Zeiss Discovery V20 stereomicroscopes, and a Leitz Laborlux-12 compound microscope, all equipped with camera lucida for line drawings and digital cameras. Photographs were taken by

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AmeScope 9000KPB and Zeiss Axio Imager 2. Helicon focus software was used for staking the different photographs. Photomicrographs with green background were taken using a fluorescent light source attached to a Zeiss Axio Imager 2 compound microscope. The type material is deposited in the in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS), Nanjing, China.

The works of Smithers (1972, 1990), are followed herein for the systematics, the wing venation nomenclature and terminology of body. All measurements are based on holotypes. This manuscript has been registered in ZooBank under the number: urn:lsid:zoobank.org:pub:9051122C-4875-47C4-8DFF-A6F06DEB40C5.

3. Systematic palaeontology

Suborder Troctomorpha Roesler, 1944
Family Manicapsocidae Mockford, 1967

Genus *Palaeomanicapsocus* gen. nov.
Type species: *Palaeomanicapsocus margoae* sp. nov.
Other species: *Palaeomanicapsocus fouadi* sp. nov.

This new genus has been registered in ZooBank under the number: urn:lsid:zoobank.org:act:3F56FE98-0D28-49D6-8A78-E9BB56C68FA0.

Diagnosis. Macropterous. Antennae 15-segmented; flagellomeres with secondary annulations; tarsi 3-segmented; distal tarsomere (pretarsi) with identical claws bearing one preapical tooth; forewing with closed pterostigma; M with two branches; M3 absent; presence of two anal veins; A1 and A2 reaching wing margin separately; hindwing with basal section of Rs absent; M simple; hind tarsi elongate, longer than hind tibiae.
Derivatio nominis. After a combination between the Greek Palaeos "παλαιός" (=old, ancient) and *Manicapsocus* the type genus of the family.

Palaeomanicapsocus margoae sp. nov.
(Figs 1–4)

This new species has been registered in ZooBank under the number: urn:lsid:zoobank.org:act:9ED8CDB1-E42F-4BBB-8F66-02E5112F6E02.

Holotype. Female, NIGP164501 (Figs 1A–C). Other material: allotype (male), NIGP164885; paratypes, NIGP164885 (probably male), NIGP164887 (female), NIGP164888 (female), NIGP164889 (unknown sex). All type specimens are deposited in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS), Nanjing, China. Syninclusions of the holotype: 5 Diptera (a female Psychodidae, 3 Ceratopogonidae (1 male and 2 females), a female Simuliidae) and an unidentified dipteran fragment.
Locality and horizon. Lowermost Cenomanian, Tanai Village, Hukawng Valley, northern Myanmar.
Etymology. In honor of Mrs Margo Hakim, mother of one of us (MH).
Diagnosis. As for the genus; with maxillary palp 2 (mx2) longer than maxillary palp 4 (mx4); and with forewing with fork of R into R2+3 and R4+5 almost at the same level of (or very slightly basad to) fork of M into M1 and M2.
Description. Winged female (Figs 1A–C). Head without a frontal suture; antennae 15-segmented (13 flagellomeres), secondary annulated (Fig. 2A), 2.088 mm long, flagellomeres length respectively (in mm) I: 0.163, II: 0.196, III: 0.276, IV: 0.162, V: 0.211, VI: 0.225, VII: 0.139, VIII: 0.153, IX: 0.144, X: 0.113, XI: 0.098, XII: 0.104, XIII: 0.106; compound eyes well developed, round, 0.272 mm large; 3 ocelli disposed in triangle between compound eyes; maxillary palps four-segmented (Fig. 2B), 0.733 mm long, no special sensilla on mx2, mx4 shorter than mx2, palpomeres length respectively (in mm) I: 0.077, II: 0.258, III: 0.199, IV: 0.199; labial palps two-segmented; lacinia present.

Thorax 0.697 mm long. Forewing (2.761 mm long, 0.892 mm wide) (Figs 3A, 3B), hyaline, glabrous, without flattened scales; apex nearly rounded; pterostigma closed basally, elongate, not sclerotized, 0.485 mm long, 0.149 mm wide; Sc with distal segment curved, reaching R at 0.649 mm from wing base; Sc' present, reaching wing margin 1.694 mm from wing base; R1 reaching costal margin 2.119 mm from wing base; Rs separating from R 1.119 mm from wing base; a very short crossvein joining Rs and M (0.022 mm long); Rs bifurcating into R2+3 and R4+5 at 1.925 mm from wing base; R2+3 curved reaching wing margin 2.455 mm; R4+5 curved reaching wing margin at 2.701 mm; fork of M into M1 and M2 at 1.940 mm from wing base; M1 and M2 reaching wing margin respectively at 2.746 and 2.581 mm; Cu1 bifurcating into Cu1a and Cu1b at 1.492 mm from wing base forming areola postica; Cu1a and Cu1b reaching wing margin respectively at 2.224 and 1.448 mm; areola postica free, elongate, 0.791 mm long, 0.179 mm wide; Cu2 straight sigmoid, joining anal vein A1 at posterior margin of the wing in a nodulus at 1.116 mm apically; A2 present and reaching wing margin at 0.423 mm from wing base. Hindwing transparent and smaller than the forewing (Figs 3C, 3D), 2.000 mm long, 0.589 mm broad; apex rounded; Sc very small; R1 developed and joining wing margin at 1.246 mm from wing base; basal section of Rs absent, Rs bifurcated into R2+3 and R4+5 at 1.522 mm apically; R2+3 and R4+5 reaching wing margin respectively at 1.776 and 1.985 mm; M unbranched, reaching wing margin at 1.761 mm from wing base; Cu1 and Cu2 reaching wing margin respectively at 1.246 and 0.735 mm from wing base; anal vein sigmoid, reaching wing margin.

Legs with tarsi three-segmented with identical pretarsal claws bearing one preapical tooth (Fig. 2C).

Abdomen 1.424 mm long; female terminalia (Figs 4A–D) with a subgenital plate simple with lateral borders membranous, restricted basally; T-shaped sclerite present. Male terminalia (based on allotype NIGP164885) with hypandrium slightly bilobed apically (Figs 4E, 4F)

Palaeomanicapsocus fouadi sp. nov.
(Figs 5–8)

This new species has been registered in ZooBank under the number: urn:lsid:zoobank.org:act:56A6950C-560F-4F52-8E80-4E02952B13E3.

Holotype. Male, NIGP164502 (Figs 5A–C). Other material: allotype (female) (Figs 1D, 1E), NIGP164881 paratypes, NIGP164882 (male), NIGP164883 (male) and NIGP164881 (male). Both male paratypes NIGP164883 and NIGP164881 are in the same piece of amber. All type material is deposited in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS), Nanjing, China, synclusion of holotype: an unidentified female paraneopteran.
Locality and horizon. Lowermost Cenomanian, Tanai Village, Hukawng Valley, northern Myanmar.
Etymology. In honor of Mr Fouad Hakim, father of one of us (MH).
Diagnosis. As for the genus; maxillary palp 2 (mx2) almost the same length as maxillary palp 4 (mx4); forewing with fork of R into R2+3 and R4+5 clearly basad to fork of M into M1 and M2.
Description. Winged male (Figs 5A–C). Head poorly preserved; antennae 15-segmented (13 flagellomeres), secondary annulated