Biuletyn Sekcji Dipterologicznej Polskiego Towarzystwa Entomologicznego
DIPTERON
Bulletin of the Dipterological Section of the Polish Entomological Society
ISSN 1895–4464
Tom 33: 26-33
Akceptacja: 8.12.2017
Wrocław 15 XII 2017

A new species of the subfamily Buchonomyiinae (Diptera: Chironomidae) from Cretaceous Burmese amber

Nowy gatunek podrodziny Buchonomyiinae (Diptera: Chironomidae) z kredowego bursztynu birmańskiego

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ABSTRACT. *Furcobuchonomyia pankowskii* **sp. nov.**, a non-biting midge of the small subfamily Buchonomyiinae is described from Upper Cretaceous Burmese amber (early Cenomanian, ~100 Ma; Noije Bum, Myanmar). This is the sixth known Buchonomyiinae species, the third fossil representative of this subfamily, and the second described and named Chironomidae species from Burmese amber. A peculiar structure of the male genital apparatus, bearing a trifid gonostylus, justifies inclusion of this new species into the recently established, originally monotypic genus *Furcobuchonomyia* BARANOV, GÓRAL *et* ROSS, 2017, the diagnosis of which is amended.

KEY WORDS: Chironomidae, Buchonomyiinae, Cretaceous, Burmese amber, Myanmar

DOI: 10.5281/zenodo.1116576

http://zoobank.org:pub:AF270A47-115A-4F8A-9CAA-BB23BD6A4AF1

INTRODUCTION

Chironomidae, with nearly 7,500 specific and 550 generic names is one of the most diverse dipteran families (PAPE *et al.* 2011), though the species richness within 12 chironomid

subfamilies is much unequal. Buchonomyiinae is a small extant subfamily, a systematic status and phylogeny of which, due to its rarity, have been discussed in the course of subsequent records, also those based on fossils (FITTKAU 1955, BRUNDIN & SÆTHER 1978, MURRAY & ASHE 1985, ANDERSEN & SÆTHER 1995, SÆTHER 2000, SEREDSZUS & WICHARD 2002, MARZIALI *et al.* 2004, CRANSTON *et al.* 2012, BARANOV *et al.* 2017). By now the subfamily was known from five species in two genera: *Buchonomyia* FITTKAU with *B. thienemanni* FITTKAU (Palaearctic), *B. burmanica* BRUNDIN *et* SÆTHER (Oriental region), *B. brundini* ANDERSEN *et* SÆTHER (Neotropics) and *B. succinea* SEREDSZUS *et* WICHARD (Baltic amber), and the monotypic *Furcobuchonomyia* BARANOV, GÓRAL *et* ROSS. The latter genus was established on the basis of a peculiar species, *F. saetheri*, found in Burmese amber (BARANOV *et al.* 2017), the resin dated back to the beginning of the Upper Cretaceous (early Cenomanian) or perhaps even earlier, according to current results and a proposed informal term referred to this amber age as „mid-Cretaceous" (ZHANG *et al.* 2018).

Although only two fossil representatives of the Buchonomyiinae were described from Burmese amber so far, including the only named Chironomidae/Buchonomyiinae species, a much higher diversity of these dipterans is expected to be revealed in Cretaceous resins from Myanmar (*cf.* GRIMALDI *et al.* 2002; BARANOV, pers. comm.). Trying to inspire describing further unknown taxa, we present the sixth Buchonomyiinae species, and thus the third fossil member of this subfamily.

MATERIAL AND METHODS

The amber chunk was cut, ground and polished manually. The infrared spectrum was collected for identification of the amber origin (Fig. 1). Measurements of the specimen and techniques of producing illustrations/photographs follow ZAKRZEWSKA *et al.* (2016); the morphological terminology and abbreviations follow SÆTHER (1980). The type specimen described in this manuscript becomes the property of the Museum of Amber Inclusions, Department of Invertebrate Zoology and Parasitology, University of Gdańsk, Poland (MAIG).

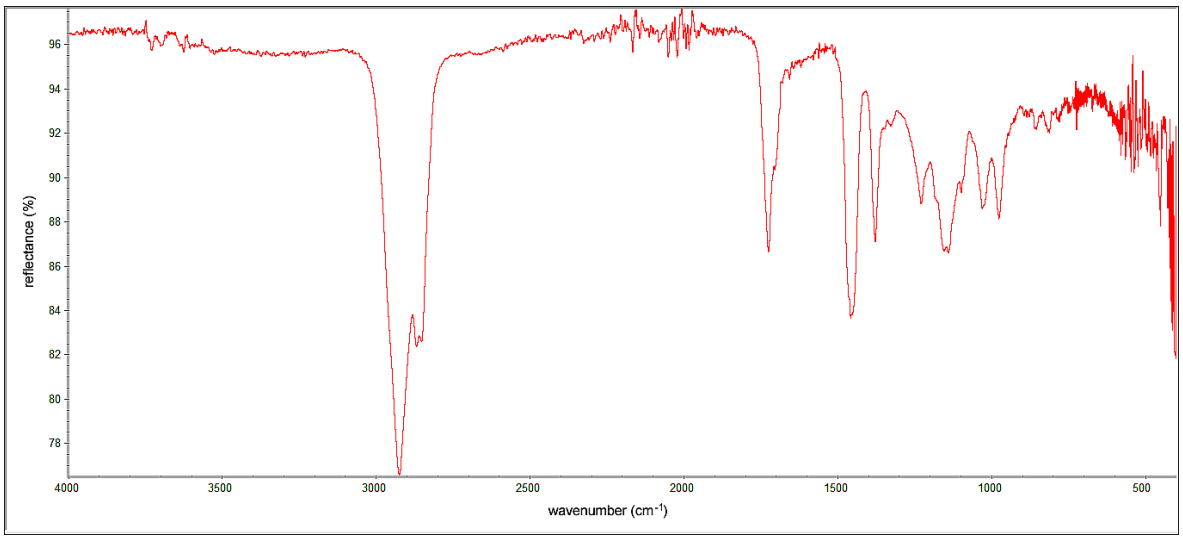

Fig. 1. The infrared spectrum (no. 8713 MAIG) obtained for identification of the examined amber's origin.

SYSTEMATIC PALAEONTOLOGY

Family: Chironomidae NEWMAN, 1834

Subfamily: Buchonomyiinae BRUNDIN *et* SÆTHER, 1978

Genus: *Furcobuchonomyia* BARANOV, GÓRAL *et* ROSS, 2017

Diagnosis. Gonostylus trifid - split into two lobes, with dorsal lobe divided into two branches. Postnotum bare.

Furcobuchonomyia pankowskii sp. nov.

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Type material. Holotype: adult male (tarsi of right mid and both hind legs missing or incomplete) preserved in 9 x 7 x 4 mm piece of Burmese amber mined in the dry season between October 2016 and February 2017 in Aung Bar Amber Mine near Noije Bum hill, Hukawng Valley, Kachin State, Myanmar (no. 5949 MAIG; IR spectrum no. 8713 MAIG; Figs 1, 2A, B).

Derivatio nominis. The specific epithet is a patronym commemorating the family name of the amber inclusion donators. It should be treated as a noun in genitive singular.

Diagnosis. Gonostylus ~175 μm long; ventral lobe narrowly subtriangular, broadest in proximal section, tapering towards distal part, with apex armed with beak-like structure; dorsal lobe deeply divided into two similarly long branches (~150-160 μm): ventral branch knife-shaped, with thorn-like median process; dorsal branch narrow, arcuate, with apex curved and directed anteromedially; basal trunk short (~20 μm). Inferior volsella rod-like.

Description. Adult male (n = 1, holotype).
Total length ~2.0 mm. Wing length ~1.2 mm. Total length/wing length ratio ~1.65.
Head (Fig. 2C). Eyes bare, broadly separated by frons, with short wedge-like dorsomedian extension. AR 0.47. Ultimate flagellomere 60 μm long, penultimate flagellomere 195 μm long. Pedicel covered with minute dense setae. Setae of head capsule present but impossible to count due to obscured frontal view. Clypeals numerous, at least 20. Length of palpomeres 3–5 (μm): 82, 95, 164.
Thorax chaetotaxy. Ac at least 25; Dc at least 55 on each side, multiserial; Scts at least 20; Pa 5 on each side. Postnotum bare.
Wing. Poorly preserved (folded); some observable diagnostic characters similar to those found in *Furcobuchonomyia saetheri*, with several exceptions, as follows: distance between MCu and RM appears to be shorter, VR_{Cu} ~0.7; all examinable parts of wing membrane incl. basal part, costal-radial-medial area and anal lobe covered with microtrichia. Squama with *ca.* 10 setae. Scale-like setae present on costa (Fig. 2D).

Legs. Fore leg tibia without spur. Mid leg tibia with short spur (~35 μm long), hind leg tibia with long sinuous spur (~65 μm long), as shown in Fig. 2E, F. Pseudospurs present on all tarsomeres of fore leg and mid leg (hind leg tarsi missing or incomplete). Pulvilli absent, claws simple. For length of leg segments and leg ratios see Table 1.

Table 1. Lengths of leg segments (μm) and leg ratios of male *Furcobuchonomyia pankowskii* sp. nov.

	fe	**ti**	**ta$_1$**	**ta$_2$**	**ta$_3$**	**ta$_4$**	**ta$_5$**	**LR**	**BV**	**SV**
p$_1$	605	605	335	210	150	115	90	0.55	2.73	3.61
p$_2$	655	685	355	165	140	100	95	0.52	3.39	3.77
p$_3$	615	695	-	-	-	-	-	-	-	-

Hypopygium (Fig. 3). Tergite IX broad, roundish, covering gonocoxites in dorsal view (Fig. 3A). Aedeagus well pigmented, together with inferior volsella attached to stout gonocoxite (Fig. 3C-E). Gonocoxite oval, ~185 μm long. Gonostylus ~175 μm long, deeply split into lobes - ventral and dorsal. Ventral lobe ~150 μm long, narrowly subtriangular, broadest in proximal section bearing 3-4 stout setae on median margin, tapering towards distal part, with apex slightly swollen, armed with beak-like structure rounded apically and strong seta posteriorly directed (Fig. 3B, D, F). Dorsal lobe deeply divided into two similarly long branches: ventral/central branch ~150 μm long, slender, knife-shaped, with distinct thorn-like process near base on median margin; dorsal branch ~160 μm long, narrow and arcuate, with apex curved and directed anteromedially; basal trunk short, ~20 μm (Fig. 3C, D, E). Inferior volsella ~100 μm long, rod-like, with 3 minute apical setae. HR ~1.05, HV ~1.15.

Remarks. The adult male of the presently described new species combines several peculiar characters, and due to the extraordinarily structured gonostylus it was placed in the recently erected genus *Furcobuchonomyia*. The original generic diagnosis of *Furcobuchonomyia* was based on male characters of the single species, *F. saetheri*, defined as different/opposed to those known from other Buchonomyiinae, i.e. *Buchonomyia* species (BARANOV *et al.* 2017). Assuming that the trifid gonostylus, split into two lobes, with the dorsal lobe additionally divided into two branches is a prior apomorphy for *Furcobuchonomyia*, then a character supporting this generic concept and found in both presently known species is also the bare postnotum (vs. setose postnotum in *Buchonomyia*). However, a shape and length of the lobes/branches of the gonostylus in the two known *Furcobuchonomyia* species, as well as an arrangement of their setae/processes are species-specific. The volsella of the gonocoxite is sickle-shaped in *F. saetheri*, but is rode-like in *F. pankowskii* and in *Buchonomyia* species, thus cannot be used as diagnostic at the generic level. A relatively long distance between MCu and RM, with the VR_{Cu} ratio low (0.51) are the characters diagnostic for *F. saetheri* rather than for both *Furcobuchonomyia* species, as the VR_{Cu} in *F. pankowskii* is similar to that of *Buchonomyia thienemanni* and may even be higher than that of *B. brundini* (*cf.* FITTKAU

1955, ANDERSEN & SÆTHER 1995). The wing chaetotaxy and the characters of legs (shape/length and arrangement of tibial spurs and pseudospurs), used in the original definition of *Furcobuchonomyia*, were also found as species-specific, thus are not included in the presently amended generic diagnosis that consequently is confined to a couple of characters.

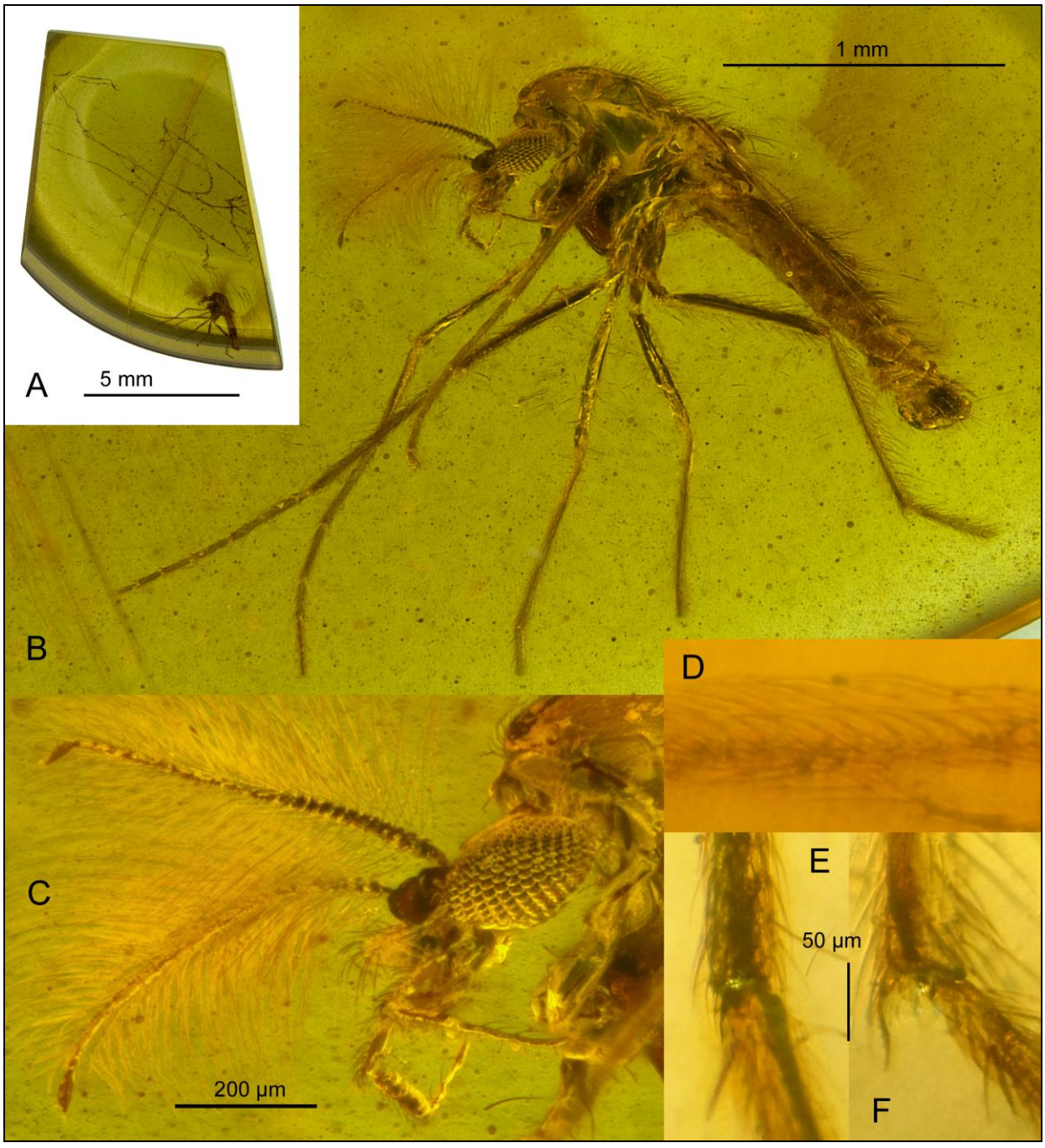

Fig. 2. *Furcobuchonomyia pankowskii* sp. nov., male. **A**: inclusion in amber; **B**: habitus; **C**: head; **D**: two rows of wing scale-like setae on costa near connection with R_1; **E**, **F**: tibial apices of mid (**E**) and hind leg (**F**) with spurs and basitarsi bearing pseudospurs.

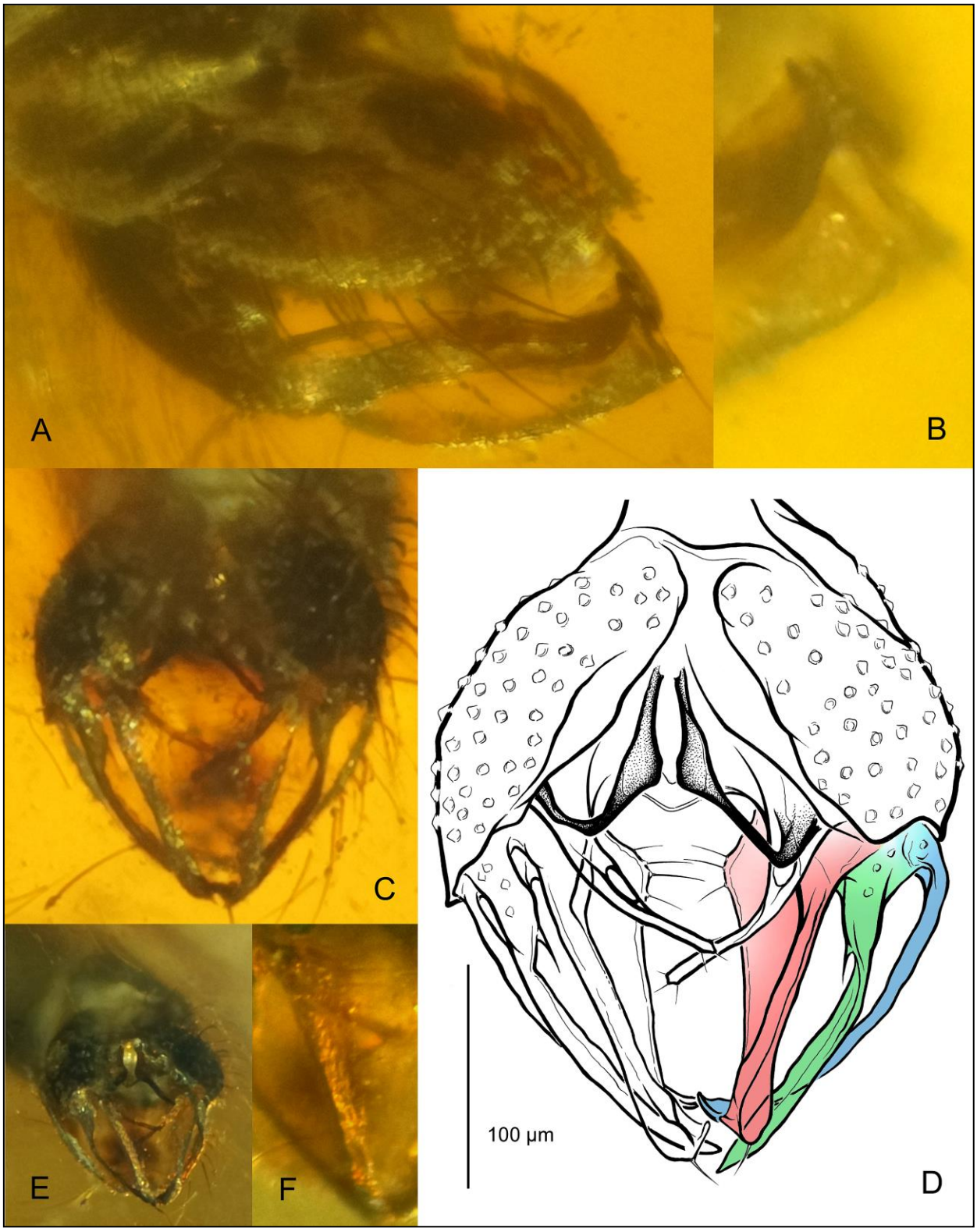

Fig. 3. *Furcobuchonomyia pankowskii* sp. nov., male hypopygium. **A**, **B**: dorsolaterally (**A**) with apices of dorsal and ventral lobes of gonostylus magnified (**B**); **C**, **D**: ventrally photographed (**C**) and drawn (**D**); **E**, **F**: ventrolaterally with exposed aedeagus (**E**) and ventral lobe of gonostylus (**F**). Lobes of gonostylus (**D**): ventral - red, dorsal - green (ventral/central branch) and blue (dorsal branch).

ACKNOWLEDGEMENTS

Sincere thanks are directed to MARK PANKOWSKI and his son MAX (Rockville, Maryland, USA), who recognized the significance of the chironomid specimen and donated the inclusion to the Museum in Gdańsk. For technical help in handling the amber chunk we thank ELŻBIETA SONTAG of our Department.

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STRESZCZENIE

Nowy gatunek podrodziny Buchonomyiinae (Diptera: Chironomidae) z kredowego bursztynu birmańskiego

Furcobuchonomyia pankowskii to nowy fosylny gatunek ochotki (Chironomidae) z niewielkiej podrodziny Buchonomyiinae, odkryty w kredowym bursztynie birmańskim (wczesny cenoman, ~100 mln lat; Noije Bum, Mjanma). Jest to szósty poznany gatunek Buchonomyiinae, trzeci kopalny przedstawiciel tej podrodziny i drugi gatunek Chironomidae opisany z bursztynu birmańskiego. Osobliwa budowa aparatu kopulacyjnego samca, zaopatrzonego w trójdzielny gonostylus, uzasadnia jego włączenie do niedawno poznanego, dotychczas monotypowego rodzaju *Furcobuchonomyia* BARANOV, GÓRAL *et* ROSS, 2017, którego diagnozę zweryfikowano.