

Short communication

A new species of *Glaesoconis* Meinander (Neuroptera: Coniopterygidae) from the Santonian Taimyr amber



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ABSTRACT

Glaesoconis popovi sp. nov. (Neuroptera: Coniopterygidae) is described from Upper Cretaceous (Santonian) Taimyr amber of northern Siberia (Yantardakh locality). The new species may be distinguished from others in the genus by much smaller eyes and the shape of the terminal segment of the maxillary palpus. The generic affinity of *Glaesoconis baliopteryx* Engel, 2004 from the mid-Cretaceous Burmese amber needs confirmation.

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1. Introduction

The family Coniopterygidae is composed of the smallest Neuroptera, with forewing length not exceeding 5 mm, with few exceptions (Meinander, 1972; Sziráki, 2007). Today, this family is rather speciose, with ca. 570 valid species distributed over much of the globe (Oswald, 2015). The miniaturization of these insects has led to a strong reduction of wing venation, which is very unlike that of other Neuroptera.

Coniopterygids are now considered to be the sister group of all other Neuroptera (Wang et al., 2017). Although the order is known since the early Permian, the oldest fossil coniopterygid is the Late Jurassic *Juraconiopteryx zherichini* Meinander, 1975 found in Karatau (Kazakhstan). Unfortunately, its characters are poorly preserved, and so are not informative as to its systematic position within the family. The oldest known coniopterygids with well-preserved characters are from Barremian Lebanese amber, and belong to the extant subfamilies Coniopteryginae and Aleuropteryginae (Whalley, 1980; Azar et al., 2000). These species do not significantly differ from extant taxa, suggesting that the family appeared much earlier.

To date, twelve species belonging to seven extinct genera have been described from the Cretaceous, i.e., from Lebanese,

Charentese, Burmese, New Jersey, Vendean and Taimyr ambers (Meinander, 1975; Whalley, 1980; Azar et al., 2000; Grimaldi, 2000; Engel, 2002, 2004; Nel et al., 2005; Perrichot et al., 2014). Here, we describe a new species of the genus *Glaesoconis* Meinander, 1975 from the Upper Cretaceous Taimyr amber locality at Yantardakh (northern Siberia), where one other species of this genus is known.

2. Material and methods

This study is based on a single specimen embedded in a piece of Upper Cretaceous Taimyr amber from the Yantardakh locality in northern Siberia. Its location, stratigraphy and age were considered by Perkovsky and Makarkin (2015, fig. 1) and Rasnitsyn et al. (2016). The amber piece was in the shape of a small 'icicle' before cutting, and is 9.1 × 3.7 × 2.9 mm after cutting. The specimen is housed in the Paleontological Institute of the Russian Academy of Sciences (Moscow, PIN).

The photographs were taken by A.P. Rasnitsyn using a Leica M165 stereomicroscope with an attached Leica DFC 425 digital camera. The line drawing was prepared by VM using Adobe Photoshop CS3.

Venational terminology in general follows Kukalová-Peck and Lawrence (2004) as modified by Yang et al. (2012, 2014). Terminology of wing spaces and details of venation (e.g., veinlets, traces) follows Oswald (1993). The venation of Coniopterygidae is peculiar in that ScP splits distally into two branches, and RA does not reach the wing margin. This interpretation is based on examination of

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trachea of the pupa of *Conwentzia psociformis* (Curtis, 1834) (Withycombe, 1922, fig. 1). We preliminarily follow other authors in presuming this venational peculiarity to be characteristics of the whole family, although it needs a confirmation by more extensive evidence. The vein connecting AA2 and the hind margin in the forewing is interpreted here as the crossvein 1aa2-aa3 as such a crossvein connects AA2 and AA3 in the more primitive subfamily Brucheiserinae (Sziráki, 2007, fig. 16).

All taxonomic acts established in the present work have been registered in ZooBank LSID (see below), together with the electronic publication purn:lsid:zoobank.org:pub:94E700DF-8D27-42F4-A598-BADE382B52C1.

Abbreviations: AA1–AA3, first to third anterior anal vein; CuA, anterior cubitus; CuP, posterior cubitus; M, media; M1, proximal-most branch of M; RA, anterior radius; RP, posterior sector; RP1, proximal-most branch of RP; ScP, subcosta posterior. Crossveins are designated by the longitudinal veins to which they connect, and are numbered in sequence from the wing base, e.g., 1scP-r, proximal crossvein connecting ScP and RA; 1r-m, basal crossvein between R and M.

3. Systematic palaeontology

Order Neuroptera Linnaeus, 1758

Family Coniopterygidae Burmeister, 1839

Subfamily Aleuropteryginae Enderlein, 1905

Tribe Fontenelleini Carpentier and Leastage, 1928

Genus *Glaesoconis* Meinander, 1975

Glaesoconis popovi sp. nov.

(urn:lsid:zoobank.org:act:CCBC29C5-E33E-44A7-AC17-C10999B5EFEE)

Figs. 1–3

Derivation of name. After the surname of Yuri Alexandrovich Popov (1936–2016), a well-known Russian paleoentomologist, in recognition of his contribution to the study of fossil insects.

Material. Holotype PIN 3311/1243, collected in 2012 during a PIN expedition. A nearly complete specimen; the right wings and the basal part of the left hind wing are poorly visible; the thorax and abdomen are obscured by a milky covering.

Locality and horizon. Russia: Krasnoyarskiy Krai: Taimyrsky (Dolgano-Nenetsky) District: Taimyr Peninsula: right bank of the Maimecha River in 3 km upstream from its confluence with the Kheta River (a left tributary of the Khatanga River), Yantardakh Hill (Yantardakh locality) [71.307222°N, 99.562778°E] (see Perkovsky and Makarkin, 2015, fig. 1). Upper Cretaceous, Santonian (Kheta Formation).

Diagnosis. May be easily distinguished from other species of the genus by much smaller eyes [eye height/head height ratio ca. 0.35; 0.53 in *G. cretica* Meinander, 1975; >0.5 in *G. nearctica* Grimaldi, 2000]; by long, stout, fusiform terminal segment of maxillary palpus, 3.4 times as long as wide [clearly long, slender in *G. cretica* (Fig. 4); distinctly swollen in *G. nearctica* (2.5 times as long as wide) and *G. baliopteryx* Engel, 2004 (twice as long as wide)].

Description. Head capsule dorso-ventrally elongated, ca. 0.4 mm high. Membranous antennal sockets large, with clearly visible boundaries. Frons slightly depressed, probably poorly sclerotized.



Fig. 1. *Glaesoconis popovi* sp. nov. Holotype PIN 3311/1243. A, dorsal view. B, lateral view. C, ventral view. Scale bars represent 0.5 mm.

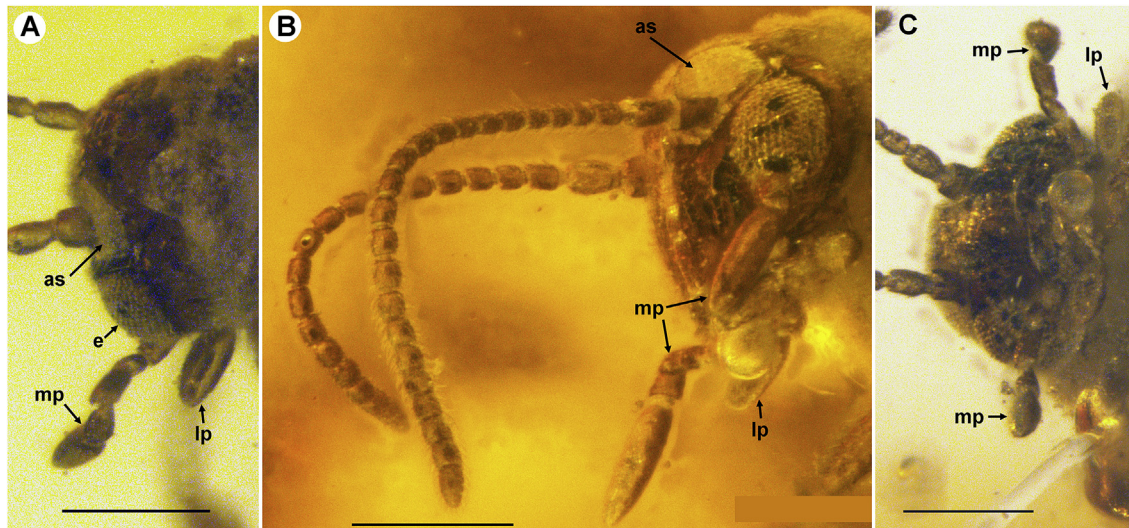


Fig. 2. *Glaesocoelis popovi* sp. nov. Head of the holotype PIN 3311/1243. A, dorsal view. B, lateral view. C, ventral view. as, antennal sockets; e, eye; lp, labial palpus; mp, maxillary palpus. Scale bars represent 0.2 mm.

Lower part of face apparently well sclerotized. Eyes small, 0.14 mm high. Antennae 24-segmented, covered with fine setae, but their arrangement unclear; scapus somewhat enlarged; pedicellus elongate, approximately twice as long as wide; flagellomeres slightly elongate except conical terminal flagellomere. Maxillary palpi five-segmented, relatively stout; first to fourth segment relatively short, at most approximately twice as long as wide (first, third segments) or shorter (second, fourth segments); terminal (fifth) segment long (ca. three times as long as length of fourth segment), stouter than other four segments, in general fusiform (0.17 mm long, 0.05 mm wide). Labial palpi three-segmented; first segment almost not visible (apparently short); second segment short, apparently as long as wide; terminal segment large, stouter than two other, elongate oval in shape.

Legs normally developed. Femora covered with scarce, very fine (poorly visible) setae. Tibiae covered with dense, rather strong setae. Tarsus of all legs relatively short, covered with short, dense

setae; basitarsus of all legs slightly more than twice longer than second and third tarsomeres together; fourth tarsomeres flattened, strongly bilobed.

Thorax, abdomen obscured by milky covering.

Forewing 2.20 mm long, 0.84 mm wide. Costal space very narrow, slightly dilated basally. Two basal subcostal veinlets present, both located proximad 1scP-r. ScP, then ScP1 stout, running parallel to costal margin, not reaching margin. Crossvein-like part of ScP2 located much proximad ra-rp. RA, then distal part of ScP2 stout, not reaching margin. Subcostal space very narrow basally, broad distad short 1scP-r. RP originated very far from wing base, not reaching margin, with one distal branch (RP1). RP1 space broad, with one crossvein connecting ScP2 and RP distad origin RP1. M basally not fused with R. Anterior trace of M without setae on very weak thickenings, distally with two long, widely spaced pectinate branches (M1, M2). Three crossveins between M, R/RP: basal 1r-m stout, short connecting R, M; 2r-m long connecting RP in basal part, M; 3r-m long, slightly arched connecting RP1, M distad origin M2. Two crossveins between M, Cu: basal 1m-cu stout, rather short, located proximad 1r-m; 2m-cu long, opposite 2r-m. Cu dividing into CuA, CuP near wing base, proximad 1m-cu. CuA, CuP long, simple. One crossvein between CuA, CuP: 1cu rather stout. Two crossveins between CuP, AA1 (1cu-a, 2cu-a), both rather stout, located relatively near from one another. AA1, AA2 long, basally stout, connecting by long, rather stout crossvein 1aa1-aa2. Long, stout crossvein 1aa2-aa3 connects AA2, hind margin. Setae of fringe along apical margin scarce, moderately long.

Hind wing 2.00 mm long, 0.75 mm wide. Costal space very narrow. ScP, then ScP1 very stout, running parallel to costal margin, not reaching margin. Crossvein-like part of Sc2 located much proximad ra-rp. RA, then distal part of ScP2 becomes stouter toward apex, not reaching margin. Subcostal space very narrow basally, then gradually broadened toward apex; crossveins not detected. RP originated much more proximad than in forewing, with one distal branch (RP1). RP1 space broad, with one crossvein connecting ScP2, RP distad origin RP1. Anterior trace of M distally with two long, widely spaced pectinate branches (M1, M2). Two crossveins between M, R/RP detected: 2r-m long connecting RP in medial part, M distad origin of M1; 3r-m long, slightly arched connecting RP1, M distad origin M2 (in distal half of this length). One short crossvein between M, Cu (1m-cu) in proximal half of wing. CuA, CuP long, simple. Other details of venation not clearly

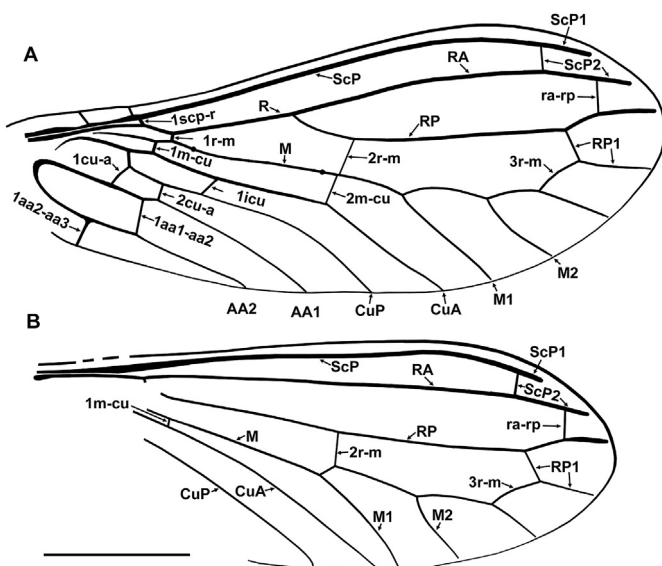


Fig. 3. *Glaesocoelis popovi* sp. nov. Wing venation of the holotype PIN 3311/1243. A, left forewing. B, left hind wing. Scale bars represent 0.5 mm.

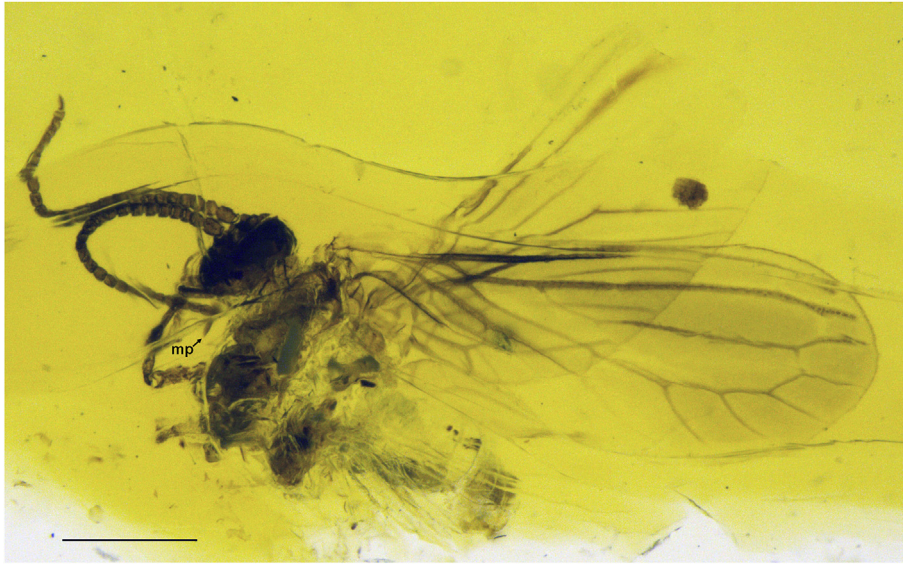


Fig. 4. *Glaesoconis cretica* Meinander, 1975. Holotype PIN 3311/62 in its present condition. mp, maxillary palpus. Scale bar represents 0.5 mm.

visible. Setae of fringe scarce, moderately long along apical margin; slightly longer along posterior margin.

4. Discussion

Three species of the genus *Glaesoconis* were previously known, occurring in upper Lower to Upper Cretaceous ambers, i.e., *G. baliapteryx* (uppermost Albian/lowest Cenomanian Burmese amber), *G. nearctica* (Turonian New Jersey amber), and *G. cretica* (Santonian Taimyr amber, Yantardakh locality). *Glaesoconis popovi* sp. nov. from the Yantardakh locality has very similar venation to that of *G. cretica*, but is easily distinguished from it and from other species of the genus by characters of the head (see diagnosis). The strongest difference in venation between *G. popovi* and *G. cretica* is the configuration of the branching of M in the hind wing: the anterior trace of M and M2 are more widely spaced and M2 is shorter in *G. popovi* sp. nov. than in *G. cretica* (cf. Fig. 3 and Meinander, 1975, fig. 4). The difference between the specimens of *G. popovi* and *G. cretica* in the position 2r-m in the hind wing (before or after the origin of M1) seen in these figures is not a species-level difference, as in *G. cretica* both variants occur (see Meinander, 1975). Unfortunately, the condition of the types (including the holotype) of *G. cretica* became much poorer since the 1970s, especially of its hind wing characters (Fig. 4). However, the head with palpi and antennae, and one of the forewings remain in relatively good condition.

The genus is assigned to the tribe Fontenelleini based mainly on the presence of a large unsclerotized area of the frons, which includes the antennal sockets and extends downwards to the clypeus (the fontanel) in the type species *G. cretica*, a synapomorphy of the tribe according to Meinander (1972). However, the fontanel is not clearly visible in any fossils of the genus. In his description of *G. cretica*, Meinander (1975) used such phrases as “apparently with a large unsclerotized area” (p. 55) and “head apparently with a very large unsclerotized area on frons” (p. 56). Grimaldi (2000) found that the frons is “largely sclerotized, without membranous areas that form a fontanel” in *G. nearctica* (p. 266). Engel (2004) reported that *G. baliapteryx* lacks this character: “head capsule strongly sclerotized” (p. 134). The presence of a large unsclerotized area on the frons in *G. popovi* sp. nov. is not certain. Its antennal sockets have clearly visible boundaries, and the only indication of a possible presence of a fontanel is the slightly depressed frons.

The Burmese amber *G. baliapteryx* may actually not belong to this genus. Its forewing possesses some character states which strongly differ from those of the three other species, e.g., the crossvein 3r-m is extremely short; the crossvein 1cu is shifted very distally; and four dark spots are present. The type of *G. baliapteryx* should be reexamined to more firmly establish its generic attribution. If this species does indeed not belong to *Glaesoconis*, then this genus occurs only in the Upper Cretaceous (Turonian to Santonian), i.e., the North Siberian Yantardakh locality and North American New Jersey amber (Sunrise Landing and White Oaks localities).

In general, deciduous-coniferous forests with a warm-temperate to temperate climate dominated in the Late Cretaceous of Siberia (see Vakhrameev, 1988), and the mid-Cretaceous tropical equatorial forest of Burma are different enough to expect common genera to be rare. Nevertheless, a few genera of Ceratopogonidae (Diptera) do occur in both Yantardakh (Taimyr) and Burmese ambers, i.e., *Atriculicoides* Remm, 1976, *Austroconops* Wirth and Lee, 1958, and *Leptoconops* Skuse, 1889. However, these genera, two of which are extant, have very wide geological and geographical distribution occurring in other Cretaceous and Cenozoic ambers, suggesting eurytopic tolerances (Perkovsky, 2013; Szadziewski et al., 2015).

5. Conclusion

Glaesoconis popovi sp. nov. is the second known species of Coniopterygidae from northern Siberian Taimyr amber (the Santonian Yantardakh locality) and belongs to the same genus. *Glaesoconis* was probably widely distributed across the Northern Hemisphere in the Late Cretaceous, having been found in northern Asia (Yantardakh) and North America (Turonian New Jersey amber). The generic affinity of the fourth species (i.e., *G. baliapteryx* from the mid-Cretaceous Burmese amber) needs confirmation.

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