

***Protodikraneura ferraria* sp. nov. from the Eocene Baltic amber (Hemiptera: Cicadellidae: Protodikraneurini)**

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ABSTRACT

A new species of Typhlocybinæ leafhopper – *Protodikraneura ferraria* sp. nov., of the extinct tribe Protodikraneurini from the Eocene Baltic amber is described. Key to identification of the genera and species of Protodikraneurini is provided.

KEY WORDS: *Protodikraneura ferraria* sp. nov. Protodikraneurini, Typhlocybinæ, new species, Eocene Baltic amber.

INTRODUCTION

The family Cicadellidae is recognized as one of the ten most numerous insect families in the world (Hamilton 1984). It is one of the most numerous and most diverse families among the Hemiptera. Extant Cicadellidae comprise over 30000 described species and are estimated to comprise five times more of recent species (Dietrich 2002 and unpublished data, Szwedo 2002). Over 40 subfamilies are recognised among Cicadellidae (Dietrich 2005, 2006). The main taxonomic problem within Cicadellidae is the lack of a clearly defined and universally accepted classification at the subfamily and tribal level (Dietrich 2002, 2005). The higher classification of Cicadellidae is currently undergoing revision (Dietrich 2003, 2004), and a provisional key to subfamilies and tribes was presented recently by Dietrich (2005).

The Typhlocybinæ are Worldwide distributed leafhoppers, with know extant diversity of about 470 genera and 5200 species (Dietrich 2006). Typhlocybinæ are usually arboricolous; small, delicate, often brightly colored leafhoppers. Extant Typhlocybinæ are usually divided into several tribes: Alebrini, Dikraneurini, Empoascini (including Helionini), Erythroneurini (including Bakerini), Jorunami, Typhlocybini *s. str.* and Zyginellini. Although Hamilton (1998) added the tribe Forcipatini its included genera, *Forcipata* DeLong et Caldwell, 1936 and *Notus* Fieber, 1866, present most features of typical Dikraneurini, with the same type of tegmen and wing venation. Forcipatini differs distinctly from typical Dikraneurini by aberrant features of the male genital block: the elongated apical portion of style, without a distinct subapical lobe, the subgenital

plates incised at apex, with characteristic chaetotaxy (*Forcipata*), or strongly shortened (*Notus*). However, it seems that these specific features are limited to these two genera, and that both of them should be placed in Dikraneurini. The extinct tribe Protodikraneurini was described in 2006 (Gebicki and Szwedo 2006), with the genera *Protodikraneura* Gebicki et Szwedo, 2006 and *Stareono* Gebicki et Szwedo, 2006 comprising three species. Further findings of inclusions of this group in the Eocene Baltic inclusions let us describe additional species presented below.

SYSTEMATIC PALAEONTOLOGY

Order: Hemiptera Linnaeus, 1758

Suborder: Cicadomorpha Evans, 1946

Superfamily Membracoidea Rafinesque, 1815

Family: Cicadellidae Latreille, 1802

Subfamily: Typhlocybinæ Kirschbaum, 1868

Tribe: Protodikraneurini Gebicki et Szwedo, 2006

Key to genera and species of the tribe Protodikraneurini

1. Lateral incision of the genal margin deep; genal portion of the head capsule reduced, similarly as in extant genera *Aneono* Dworakowska and *Kahaono* Evans.....
.....*Stareono* Gebicki et Szwedo, 2006

Only one species – *Stareono mirabilis* Gebicki et Szwedo, 2006

–. Lateral incision of the genal margin shallow or margin not incised; genal portion of the head capsule of moderate size.....***Protodikraneura*** Gebicki et Szwedo, 2006

2. Apex of tegmen slightly exceeding apex of hind wing.....
.....***Protodikraneura cephalica*** Gebicki et Szwedo, 2006

–. Apex of tegmen distinctly exceeding apex of hind wing.....**3**

3. Vertex lighter than pronotum. Total length 2.7 mm***Protodikraneura nasti*** Gebicki et Szwedo, 2006

–. Vertex and pronotum with same light coloration. Total length 3.6 mm ... ***Protodikraneura ferraria* sp. nov.**

Genus ***Protodikraneura*** Gebicki et Szwedo, 2006.

Type species: *Protodikraneura cephalica* Gebicki et Szwedo, 2006, by original designation.

***Protodikraneura ferraria* sp. nov.**

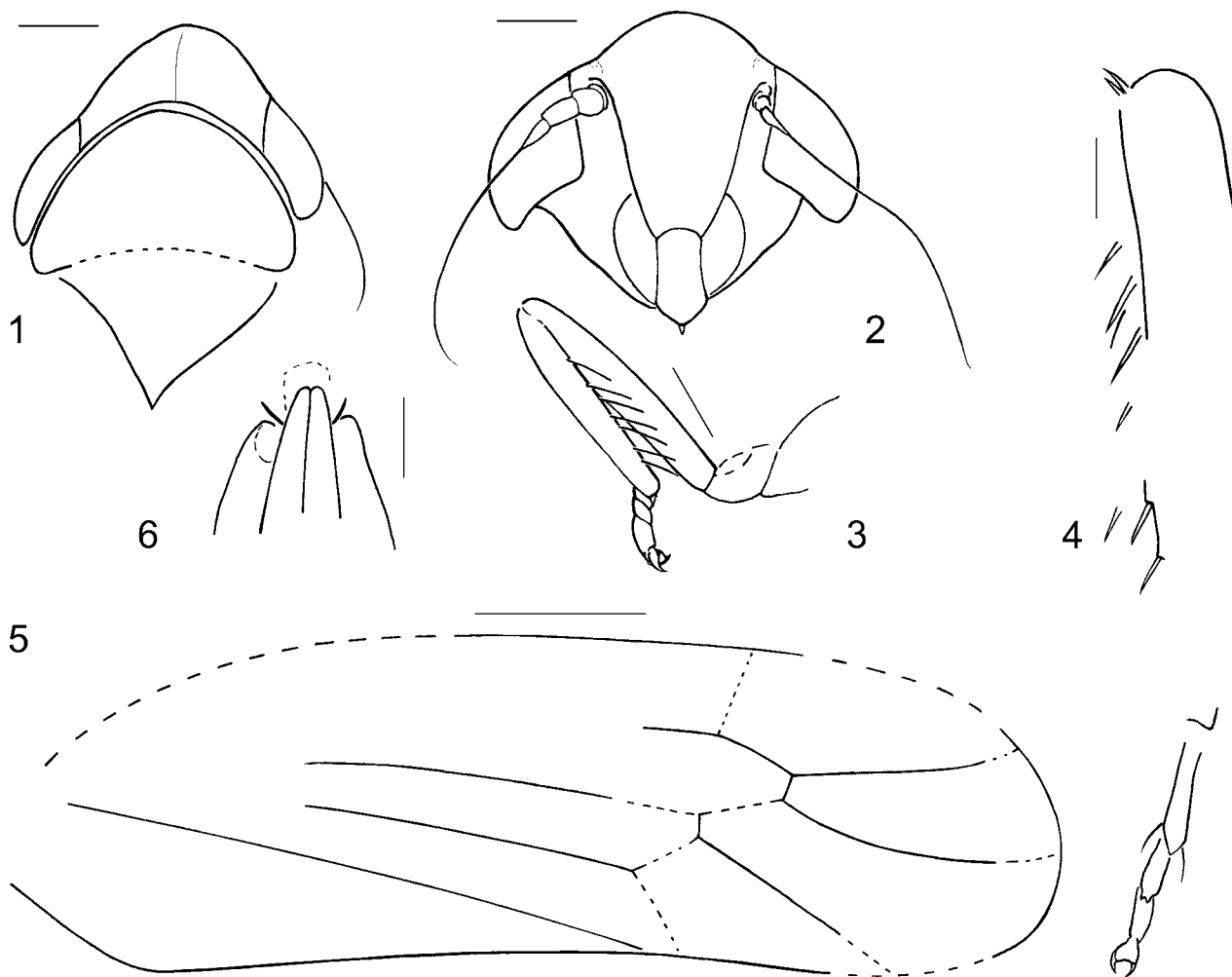
(Figs 1–14)

Diagnosis. Vertex slightly elongated at apex, slightly conical. Frontoclypeus with distinct protuberance in the

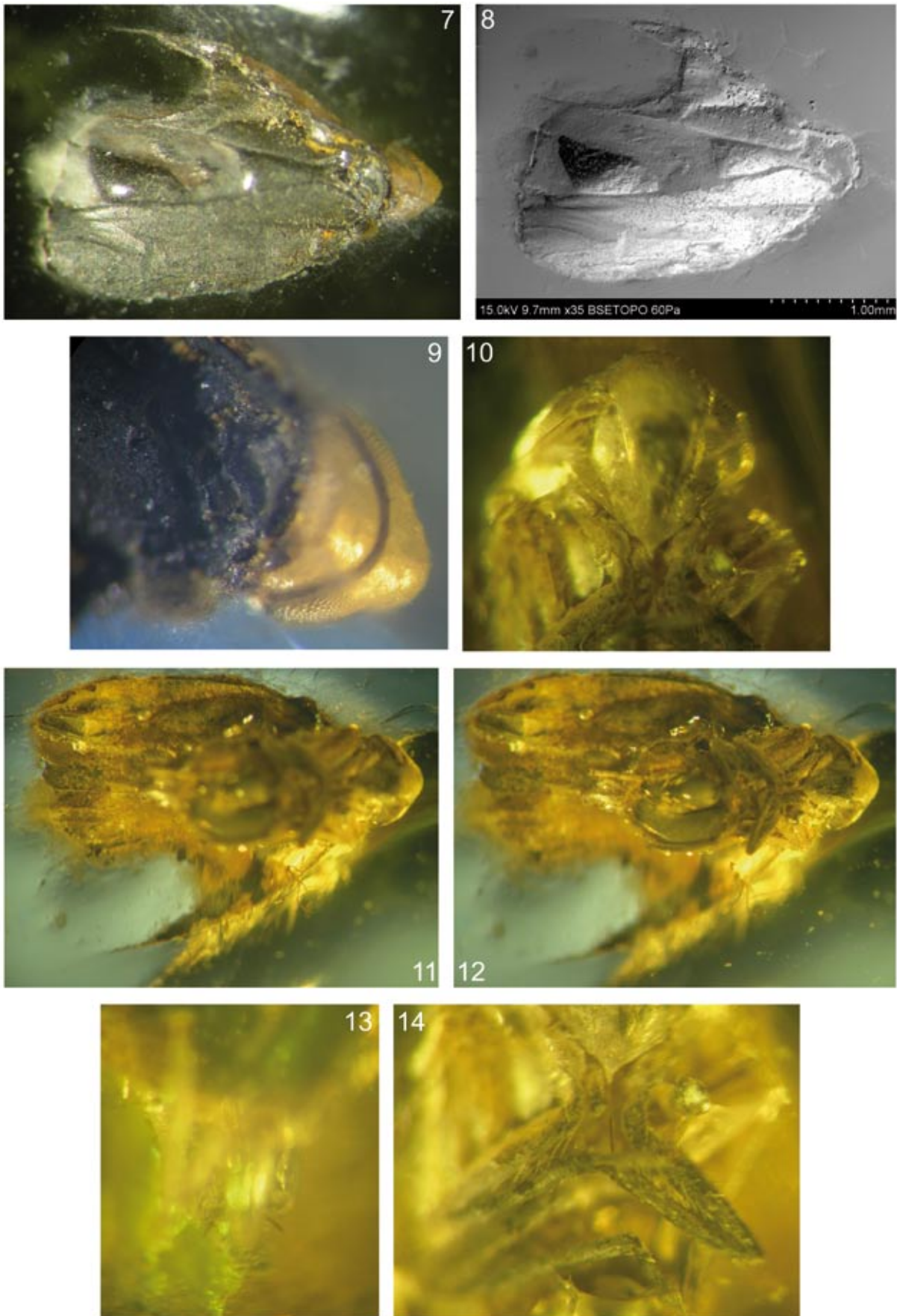
middle of its length. Tegmen distinctly exceeding apex of abdomen. Male genital plates narrow, arcuately curved, without apical widening.

Description. Vertex and pronotum uniformly light colored. Apices of pygofer and genital plates light.

Head with compound eyes distinctly wider than pronotum, elongated in median portion, rounded in apical portion. Sutura coronalis long, reaching almost to the apex of head. Facial portion rhomboid, lateral margins nearly straight, with small and shallow incision below compound eye, diverging at straight angle. Antennal fovea relatively shallow, placed close to the upper margin of the compound eye, without distinct supraantennal ridges. Antennal furrows distinctly visible below lower margin of eye. Antenna with long arista, exceeding posterior margin of pronotum; scapus short, pedicelus at least twice as long as scapus. Frontoclypeus narrow, with maximal width slightly smaller than length of compound eye, distinctly converging toward anteclypeus, with distinct median protuberance in the middle. Sutura clypealis distinctly arcuate. Anteclypeus narrow, about twice as long as wide, slightly widened in api-



Figures 1–6. *Protodikraneura ferraria* sp. nov. Holotype, MIB UG 5136 (AUC 103JS). 1. Anterior portion of the body; 2. face; 3. left fore leg; 4. right hind leg (visible portion); 5. right tegmen; 6. apex of male genital block. Scale bars: 0.2 mm for 1–4 and 6, 0.5 mm for 5.



Figures 7–14. *Protodikraneura ferraria* sp. nov. Holotype, MIB UG 5136 (AUC 103JS). 7. General, dorsal view of the inclusion in amber; 8. SEM image of surface of amber with portion of the inclusion exposed; 9. anterior part of the body; 10. face; 11. visible portion of tegmen and hind wing venation; 12. body; 13. apex of male genital block; 14. fore legs.

cal portion, its tapered apex distinctly exceeding lateral margins of genae. Lora oval, relatively huge, delimited by distinct suture, longer than anteclypeus. Genae elongately curved, divided into two portions. Subantennal wider portion adhering to frontoclypeus, connected with lora directly; distinctly narrower subocular portion forming external emargination. Ocelli present, placed near frontoclypeal margin, about 2 times their width from the compound eyes. Suturae frontales distinct, but short, directed obliquely to external margins of ocelli.

Pronotum slightly longer than head, with lateral margins slightly diverging posteriad, anterior margin arcuate.

Internal margin of fore tibiae with row of setae, setae twice as long as fore tibial width.

Basitarsomere and mid tarsomere of hind leg subequal in length, apical tarsomere about twice as long, with distinct tarsal claws and arolium.

Tegmen elongate, with posterior margin shallowly concave and not widened apical portion, appendix absent. Clavus long, reaching of tegmen length. Four apical cells, elongate, of similar shape. Fourth cell (internal) subtriangular. Stems of longitudinal veins subparallel.

Hind wing (preserved portion) with independent stems of veins R, M and CuA (weakly visible). Both tegmen and hind wing distinctly exceeding apex of abdomen.

Male genital plates narrow, with a few macrochaetae, arcuately curved, not widened at apex, reaching anal tube. Pygofer elongate, without lateral incisions and separated lobes, with two long, crossed in apical portion spine-like processes, slightly exceeding lateral margins of pygofer (visible on ventral side). Genital chamber of male wide, aedeagus not visible.

Measurements: Total length 3.6 mm; length of body 2.77 mm; head with compound eyes 0.86 mm; length of vertex 0.18 mm, width of vertex 0.46 mm; length of face 0.79 mm; length of compound eye 0.43 mm; length of frons 0.51 mm, width of frons 0.33 mm; length of anteclypeus 0.27 mm, width of anteclypeus 0.11 mm; length of antenna 0.79 mm; length of tegmen 3 mm; width of tegmen 0.87 mm; fore femur 0.59 mm long, fore tibia 0.57 mm long, fore tarsus 0.3 mm long; hind tibia 1.51 mm long, hind tarsus 0.61 mm long, basitarsomere 0.34 mm, mid and hind tarsomeres 0.24 mm respectively.

Preservation: The specimen is partly damaged. The apical portion of the left tegmen is missing and probably also the whole left hind wing. The ventral portion of the abdomen is shaded by two huge bulbs of gas. The exposed portion, probably as a result of a longitudinal break, of the marked portion of the abdominal side, i.e. scutum, scutellum, both tegmina and a portion of the hind wing, is covered with a blackish, shining layer. The chemical composition of this layer was analysed using X-Ray analysis (see results in Kowalewska & Szwedo in litt.), and several elements identified. Part of the exposed layer is composed of pyrite, in the state of markazite, part of the layer contains high amounts of aluminium and silicone, respectively.

Syninclusions: part of the tarsus of a Nematocera fly, very probably family Tipulidae.

Etymology. The species name is derived from Latin “ferrarius” meaning “belonging to iron”.

Holotype. Holotype, male, Baltic amber, acquisition number MIB UG 5136 (AUC 103JS), collection of Mr. Jacek Serafin, deposited in the Museum of Amber Inclusions (Muzeum Inkluzji w Bursztynie), University of Gdańsk, Poland.

Occurrence. Middle Eocene, Baltic amber.

DISCUSSION

Protodikraneura ferraria sp. nov. is related to the formerly described species of the genus. However, it differs from *P. cephalica* Geb. et Szw. by a larger size; the distinct protuberance of the frontoclypeus; the length of the tegmina, distinctly exceeding the apex of abdomen; and the light coloration of genital plates and pygofer. It differs also from *P. nasti* Geb. et Szw. by a more elongate vertex and the uniformly light colored anterior portion of the body.

Extinct taxa, including the species described above comprised in the fossil tribe Protodikraneurini, represent an extinct group of ancient Typhlocybinae. It seems that this group was highly differentiated and widely distributed in the Eocene amber forest of Northern Europe. It seems that Protodikraneurini could be placed as a stem group of the tribes that probably originated during the Oligocene, i.e. Dikraneurini and Typhlocybini.

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