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A new species of extinct wasp (Hymenoptera: Chalcidoidea: Encyrtidae) from Baltic amber with four-segmented funicle

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Encyrtidae is a large family of parasitic wasps, containing some 5,100 described extant species (Noyes, 2023). Five monotypic genera of the earliest fossil Encyrtidae are known from middle Eocene Sakhalinian amber (~45 Ma) (Simutnik, 2014, 2020; Simutnik *et al*., 2021). Some 20 species in 18 extinct genera of Encyrtidae have been described from late Eocene (~35 Ma) Baltic, Danish, and Rovno ambers (summarized in Simutnik *et al*., 2023). Several undescribed encyrtids were reported by Noyes & Hayat (1994) and Manukyan (1999) from Baltic amber. One more monotypic genus was described from amber found in Lower Lusatia (Germany), which is probably also dated to the late Eocene (Simutnik *et al*., 2025). In addition, one species is known from a late Oligocene (23–24 Ma) compression fossil from Rott, Germany (Statz, 1938), and two more species from two extant genera are described from early-middle Miocene (15–20 Ma) Dominican amber (Zuparko & Trjapitzin, 2014; Poinar, 2020).

†*Electrocerus fallaszeki* **sp. nov.** is here described and illustrated based on a single female specimen from late Eocene Baltic amber found in Poland. This is the second fossil species of Encyrtidae documented with a four-segmented antennal funicle, and its postmarginal vein is shorter than its marginal vein. Therefore, we preliminarily assigned it to the genus †*Electrocerus* Simutnik, 2023, and treat this genus as *incertae sedis* in the subfamily Encyrtinae. A key to the fossil genera of the Encyrtinae from late Eocene European amber was provided in Simutnik *et al*. (2025).

Of the over 390 valid extant genera of Encyrtinae (Noyes & Woolley, 2025), very few are characterized by a four-segmented antennal funicle, with all belonging to the tribes Arrhenophagini Ashmead, 1900, Habrolepidini Hoffer, 1955 and Cercobelini Hoffer, 1953 (Noyes, 2023; Simutnik *et al*., 2023). Similar antennae are not known among the representatives of Tetracneminae. Baltic amber inclusions from Pomerania ("Polish amber") are poorly studied (see Legalov *et al*., 2021). Most of the taxa represented in amber from Pomerania are known from Baltic amber from Sambia (*e.g*., Legalov *et al*., 2021; Perkovsky *et al*., 2021), but endemic species are known as well (Legalov *et al*., 2021).

Material and methods. The amber piece containing the holotype was kindly donated to the collection of the Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine, Kiev (SIZK) by Robert Fallaszek of Łosinno, Poland. This inclusion comes from Pomeranian Voivodeship (województwo pomorskie), Poland, with the precise location being unknown.

The specimen was examined using the techniques illustrated in Simutnik *et al*. (2022a). Photographs were taken using a Leica Z16 APO stereomicroscope equipped with a Leica DFC 450 camera and processed with LAS Core and Adobe Photoshop software (brightness and contrast only).

Some standard measurements and ratios given in the description may be imprecise or unobtainable due to light refraction, perspective distortion, or the inaccessibility of certain angles in the amber specimen.

Terminology and abbreviations follow Gibson (1997) and Noyes (2023). The abbreviations used in the text and figures are explained in the figure captions.

This work and the included nomenclatural acts are registered in ZooBank (https://www.zoobank.org, accessed on 24 November 2025) under the LSID: urn:lsid:zoobank.org:act:58F899DA-66AA-43B0-A4E7-4A6A5EC68AE3.

†*Electrocerus* Simutnik, 2023

Type species. †*Electrocerus brevifuniculatus* Simutnik, 2023

Species included. †*Electrocerus brevifuniculatus* Simutnik, 2023 and †*Electrocerus fallaszeki* **sp. nov.**

†*Electrocerus fallaszeki* Simutnik **sp. nov.**
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(Figs 1, 2)

Material. Holotype, SIZK B-21, ♀, Pomeranian Voivodeship, Poland. Baltic amber; late Eocene. The inclusion is in a yellow,

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clear piece of amber (*ca*. 12 × 4 × 4 mm). Deposited at the Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine, Kiev (SIZK).

Etymology. The new species is named in honor of Robert Fallaszek, the founder of a school-based amber museum in Łosinno (Poland), who has preserved numerous important specimens for scientific study.

Description. Female. Habitus as in Fig. 1A–D. Body length 0.85 mm.

Coloration. Body black; mesoscutum and scutellum with a weak blue-green metallic sheen, side and apex of scutellum distinctly metallic blue-green; antenna, legs and gaster black to dark brown; forewing with small weakly infuscate area below marginal vein; wing venation and tarsi brown.

Sculpture. Mesoscutum and scutellum with a polygonally reticulate sculpture of mesh size about the same as diameter of facet (Fig. 2A); sculpture of face visible in Fig. 2B.

Head. About 2× as wide as frontovertex (Fig. 1A), subtriangular in profile, rather opisthognathous (Fig. 1C), slightly wider than thorax in dorsal view; occipital margin sharp (Figs 1A, 2A); eyes bare, without visible setae; posterior ocelli slightly closer to eye than to occipital margin; OOL about equal to posterior ocellar diameter; eye reaching occipital margin (Fig. 2A); antennal scrobes as in Fig. 1F, deep, meeting dorsally, not sharply margined, at least lateral margins weakly rounded, apex extended to anterior ocellus; interantennal prominence slightly protuberant, as in Fig. 2B; antenna attached below eye margin, malar space with complete malar sulcus (Fig. 1C), shorter than height of eye; mandible probably 3-dentate.

Antenna. Nine-segmented, without visible anelli, with four funicular segments and three-segmented clava; radicle short, remainder of scape slender, widest at middle, its accurate ratios not visible, about 5–6× as long as wide; pedicel conical, 2× as long as wide, as long as first two funicular segments combined (Fig. 1C), longer than any funicular; fu1 longer than wide, fu2 and fu3 wider than long; linear sensilla (multiporous plate sensilla) visible on each funicular and claval segments (Fig. 2B); clava as long as funicle, slightly wider than fu4, with rounded apex and small oblique truncation at apical segment only (Figs 1C, 2B); flagellum and clava covered by very short setae.

Thorax. With pronotum short, almost vertical (in lateral view), posterior margin strongly concave (Figs 1D, 2A); mesoscutum as wide as long or nearly so (in dorsal view), with posterior margin medially slightly produced posteriorly, notauli as in Fig. 2A; axillae meeting medially; scutellum convex, apically rounded, as long as mesoscutum (Fig. 2A); mesopleuron enlarged posteriorly; metapleuron triangular, narrow, without visible setation; propodeum bare, touching metacoxa.

Wings. Fully developed, about 2× as long as wide; linea calva complete, with filum spinosum consisting of row of five setae; parastigma slightly thickened but distinct, about as long as marginal vein; hyaline break (unpigmented area) present; marginal vein ~5× as long as wide, as long as stigmal vein, slightly longer than postmarginal vein; stigmal vein with long uncus bearing row of three campaniform sensilla (Fig. 2C: uns); enlarged seta marking apex of postmarginal vein of forewing absent (as long as others on this vein); fringe setae short. Hind wing about 5.5× as long as wide; costal cell without line of long setae.

Legs. Protibia with long, curved, bifurcate calcar; mid tibial spur about as long as basitarsus, tarsi five-segmented.

Gaster. About as long as thorax (Fig. 1C); cerci in apical third of metasoma; hypopygium far from reaching apex of gaster (Fig. 1B, D: hyp); ovipositor slightly exerted, gonostylus free, shorter than mid basitarsus (Fig. 2D).

Male. Unknown.

Measurements (mm). The holotype. Mesosoma 0.4; gaster 0.3; mesotibia 0.27. Antenna: pedicel 0.05; funicle 0.1; clava 0.1. Forewing 0.8:0.4, hind wing 0.5:0.1.

Key to species of †*Electrocerus* (females)

1 (2) Fu1 and fu2 ring-like, shortest and smallest segments of funicle; antennal torulus located very close to mouth margin..... .....†*E. brevifuniculatus* Simutnik, 2023

2 (1) Fu1 longer than wide, almost as long as fu2 and fu3 combined, which are smallest segments of funicle (Fig. 1C); antennal torulus located slightly below level of lowest margin of eye (Fig. 2B).....†*E. fallaszeki* **sp. nov.**

Discussion. The taxonomic position of the genus †*Electrocerus* within Encyrtinae remains uncertain (*incertae sedis*). It differs from all known fossil and the majority of extant encyrtids, in particular, by its four-segmented funicle. The species of extant genera from the tribe Habrolepidini with a similar four-segmented funicle are mainly specialized primary parasitoids of armoured scale insects (Hemiptera: Diaspididae) (*Plagiomerus* Crawford, 1910; *Caenohomalopoda* Tachikawa, 1979; *Homalopoda* Howard, 1894; *Pseudhomalopoda* Girault, 1915) (Trjapitzin, 1989; Noyes, 2023). In addition, representatives of these genera, like †*Electrocerus*, have an opisthognathous head. Similar characters, such as the four-segmented funicle or the opisthognathous head, may arise in distant systematic groups independently and in parallel (Trjapitzin, 1989). For example, species of the extant genus *Cercobelus* Walker, 1842, parasitoids of jumping plant lice (Psylloidea), also possess a four-segmented funicle but differ in having a hypognathous head.

The available fossil record cannot represent the full diversity of Eocene encyrtids. Nevertheless, it still reveals morphological differences from most modern representatives of the family. All known Eocene encyrtids are full-winged, generally have broad wings (about 2× as long as wide) without a dark pattern, with the veins not shortened and the parastigma distinctly thickened, without elongated seta at the apex of the postmarginal vein; the radicle is short; the cerci are often poorly advanced; the metapleuron is always without pubescence. In addition, the cerci of the earliest known middle Eocene Encyrtidae from Sakhalinian amber are located close to each other, at the very apex of the gaster, similar to the ground plan state for all other Chalcidoidea. Such a close and extremely apical placement of cerci is no longer observed in either late Eocene or extant encyrtids (Simutnik, 2020). These changes were important stages in the evolution of the

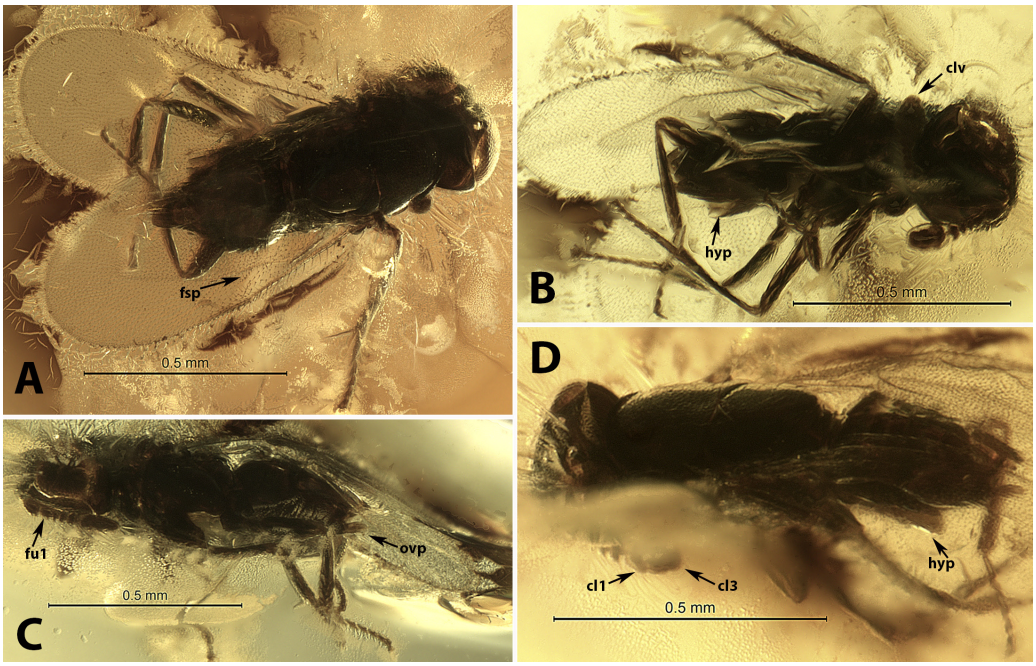

FIGURE 1. *Electrocerus fallaszeki* **sp. nov.**, holotype female. **A**, Body, dorsal view. **B**, Body, ventrolateral view. **C**, Body, lateral view. **D**, Dorsolateral view (clv—clava; cl1, cl3—segments of clava; fsp—filum spinosum; fu1—first funicular segment; hyp—hypopygium; ovp—ovipositor).

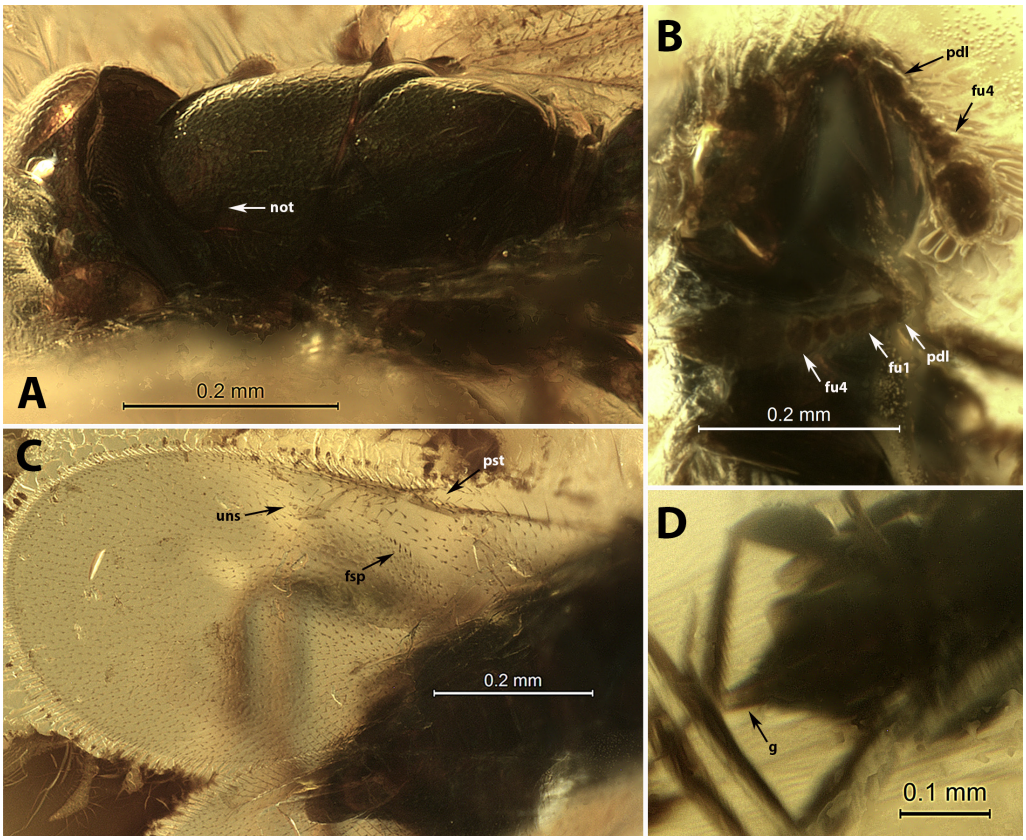

FIGURE 2. *Electrocerus fallaszeki* **sp. nov.**, holotype female. **A**, Head and thorax: visible sculpture of surface. **B**, Head: face and antennae, ventrolateral view. **C**, Left forewing. **D**, Gaster, ventral view (fsp—filum spinosum; fu1, fu4—segments of funicle; g—gonostylus; not—notaulus; pdl—pedicel; pst—parastigma; uns—uncal (or campaniform) sensillae).

family. The earliest known middle Eocene Encyrtidae are not assigned to a subfamily. Morphological evidence for both extant subfamilies of Encyrtidae has been present since the late Eocene—specifically, the paratergite between the outer plate of the ovipositor and the apex of the syntergum in females of Tetracneminae (Simutnik *et al*., 2022b), and the filum spinosum

at the forewing in Encyrtinae (Simutnik *et al*., 2014). However, reliably described members of the extant Encyrtidae genera *Copidosoma* Ratzeburg, 1844 (Zuparko & Trjapitzin, 2014) and *Hambletonia* Compere, 1936 (Poinar, 2020) are known only since the Neogene. Manukyan (1999) reported the discovery of several specimens from Baltic amber that may belong to the extant Australian genera *Austroencyrtoidea* Girault, 1922 and *Coccidoxenoides* Girault, 1915, but these findings require verification.

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