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The Rediscovery of *Nemedina alamirabilis* Chandler from Hungary (Diptera: Empidoidea), and First Description of the Male

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Abstract. *Nemedina alamirabilis* Chandler is rediscovered in Hungary, including the collection of the first male specimens of this species. The male is described and genitalic features discussed and compared to congeneric species. The sister group relationships between *Nemedina* and the Atelestinae is confirmed.

Key words: Diptera, Empidoidea, *Nemedina*, Palearctic, male, systematics

1. INTRODUCTION

Over the past five years, much new information on the *Nemedina* genus-group has been published. *Nemedina alamirabilis* Chandler, 1981, the type species, was described over 20 years ago on the basis of a single, slide-mounted female specimen from Hungary (CHANDLER 1981). A second species, *N. eocenica* Sinclair & Arnaud, 2001, represented by a pair in copula was discovered in Baltic amber (SINCLAIR & ARNAUD 2001). Prior to the publication of this Baltic amber species, GRIMALDI & CUMMING (1999) published a review of Eremoneuran Cretaceous ambers and described five new genera assigned to the *Nemedina* genus-group. Most recently SINCLAIR & SHAMSHEV (2003) described a new species from Kazakhstan, *N. zaitsevi* Sinclair & Shamshev, 2003, which included the first detailed description of the male terminalia. On the basis of the latter study, convincing evidence was presented for the sister group relationship between the *Nemedina* genus-group and the Atelestinae.

Ever since its first discovery, additional specimens of *N. alamirabilis* were sought after. It was collected in 1960 and was never recollected again until the spring of 2002. No other specimens have been found in Museum collections and the holotype had until recently been misplaced in the Hungarian Natural History Museum. Given the apparent rarity of collections of extant species and limited species diversity of *Nemedina* compared to its fossil history, it would appear that this unique genus group was much more diverse in the past than today, especially during the Cretaceous.

In this paper, the collection of additional specimens is reported and the male of *N. alamirabilis* is described for the first time.

2. MATERIAL AND METHODS

This study is based on materials housed in the Diptera collections of the Hungarian Natural History Museum, Budapest (HNHM) and Zoologisches Forschungsinstitut and Museum A. Koenig, Bonn, Germany (ZFMK).

Pinned adult specimens were examined only. The morphological terms mainly follow MCALPINE (1981). The interpretation of the genital sclerites follows CUMMING et al. (1995) and SINCLAIR (2000). To facilitate observation, dissections were macerated in hot 85% lactic acid and immersed in glycerin.

3. RESULTS

3.1 Taxonomy

3.1.1 *Nemedina alamirabilis* Chandler Figs. 1-5

Type material: Holotype female (mounted in Canada balsam on a round micro-cover glass (diameter 12 mm), attached to a white card of 19 x 12 mm; wings hardly visible): This label (card) bears in the handwriting of P. Chandler: "Nemedina alamirabilis sp. n. HOLOTYPE ♀". Three additional labels pinned below: "Bükk-hg. erdõ [forest] 1960. V. 29."; "leg. Tóth S."; "Holotypus" [red – 17x10 mm, printed] (HNHM).

Additional material: Melegmány TT [Természetvédelmi Terület (Nature Reserve)]: Pécs, Melegmányi-völgy [valley], 2002.május [May] 31, patak fölött és mellett [over and along the brook], leg. Papp L. (♂, 3♀ HNHM; ♀ ZFMK).

Diagnosis: Small, shining black, slightly humped-back, with short legs and hyaline wings. Very similar to *N. zaitsevi*, but differing by its dark haltere, dark legs, postpedicel ovate-conical, and male terminalia with epandrial lobes slender, arched and extending well beyond the epandrial lamellae.

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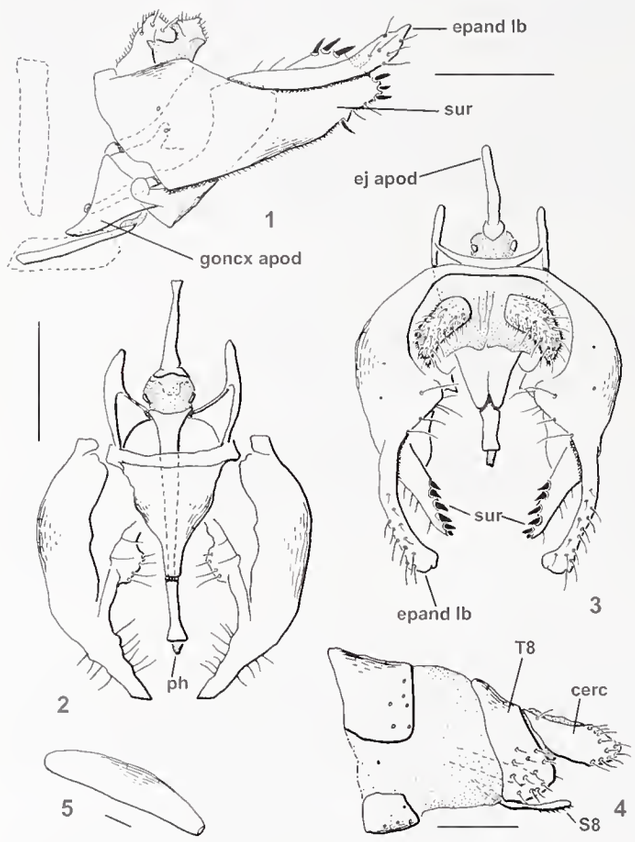

Figs 1-5. *Nemedina alamirabilis*. (1) male terminalia (lateral view; sclerites of segment 8 outlined; (2) male terminalia (ventral view, epandrial lobes omitted); (3) male terminalia (dorsal view); (4) female terminalia (lateral view); (5) egg. Scale bars = 0.1 mm. Abbreviations: cerc, cercus; ej apod, ejaculatory apodeme; epand lb, epandrial lobe; goncx apod, gonocoxal apodeme; ph, phallus; S, sternite; sur, surstylus; T, tergite.

Description (This species was thoroughly described by CHANDLER (1981), and additional observations are listed below):

Male.

Head. Holoptic, upper ommatidia enlarged, border between upper and lower ommatidia indistinct; ommatrichia lacking. Postcranium subshining, with fine greyish pruinescence, setation reduced. Upper postocciput somewhat convex, lower postocciput produced posteriorly. Ocellar triangle raised above ommatidia, lacking setae, clothed in long dense pruinescence. Frons reduced to small area just above antennae, with fine greyish pruinescence. Antenna black, similar to female; scape lacking setulae, short, somewhat similar in length to pedicel; pedicel subovate, ringed with minute subapical setulae; postpedicel ovate-conical, pubescent; stylus arista-like, two-segmented, lacking apical seta-like segment.

Thorax. Anterior and posterior spiracles black. Dorsal mesepimeral pocket absent; metasternal furca rod-shaped, lacking anterior and posterior arms. Intersegmental ridge between meso- and metapleuron nearly touching metepisternal ridge, forming small internal concavity; ventral and dorsal metepisterna narrowly separated.

Legs. Blackish brown.

Wing. Length: wing 1.7 mm. Hyaline, with fine microtrichia; lacking basal costal seta(e); veins dark; stigma distinct, confined between apex of Sc and apex of R_1; C fading beyond M_{1+2}. Haltere dark.

Abdomen. Black, shiny, with fine greyish pruinescence, bearing scattered minute setulae; lacking longer posteromarginal setae. Segments 1-5 broad, remaining segments progressively narrowed. Tergite 8 slender, rectangular; less than half-length of sternite 8. Abdominal plaques present as minute scars inconspicuously scattered about face of tergite.

Terminalia. Symmetrical, unrotated, held obliquely upright from abdomen; concolorous with abdomen. Cercus small, truncate apically in lateral view, weakly sclerotized; hypoproct subtriangular, setose, continuous ventrally with broad subepandrial sclerite. Epandrium clothed with pubescence, bearing several setae, especially along lateral margins; epandrial lamellae with narrow dorsal bridge anterior to cerci (Fig. 3). Epandrial lobe slender, arched (Figs 1,3), extending dorsal to and beyond surstylus; lobe arched and truncate apically; apicolateral margin with setae; inner basal margin with several setae mounted on small tubercles. Surstylus broad, weakly articulated to epandrium; inner apical margin with row of ca. 9 short, flattened spine-like setae (Figs 1,3); subepandrial sclerite broad, articulated with lateral bacilliform sclerites; bacilliform sclerites bear rounded basal knob. Hypandrium short, subtriangular, produced apically as pair of flat, rounded apically, appressed sclerites encircling phallus (Figs 1,2); anterolateral corner extending to articulate with epandrium. Postgonites absent. Ventral apodeme(s) beneath ejaculatory apodeme absent. Gonocoxal apodeme with slender and greatly lengthened rod-like process (Fig. 1), slightly shorter than ejaculatory apodeme; narrow in ventral view, triangular in lateral view. Phallus tube-like, straight; apex with short membranous tube (Fig. 2); phallus not extended beyond epandrium; broad base of phallic plate arched and narrowed from phallus to subepandrial sclerite. Ejaculatory apodeme separated from phallus by membranous sperm sac (Figs 1-3); strongly sclerotized; extended posteriorly as short knob or fulcrum, facilitating lever-like action of apodeme.

Female. Length: wing 1.6-1.7 mm.

Similar to male except as follows: mouthparts as in Sinclair & Shamshev (2002). Dichoptic, all ommatidia of equal size. Frons very broad, shiny, bearing minute marginal setulae. Ocellar tubercle slightly prominent,

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level with ommatidia. Abdominal intersegmental membranes yellowish-brown, paler than sclerites. Sclerites progressively broader; tergite 8 broad, produced laterally toward sternite 8 (Fig. 4); genital chamber with broad sclerotized floor and pair of dorsal plates. Tergite 10 absent (Fig. 4). Cerci black, broad, pubescent, with apex slightly narrowed and truncate. Spermathecal receptacle darkly pigmented, spherical; spermathecal duct long, pigmented at base of receptacle.

Egg. Length: ca. 0.45 mm.

Elongate oval, one end with broad rounded tip; opposite end bears micropyle (Fig. 5), ridge smooth, not raised. Chorion sculptured.

Distribution: Mecsek and Bükk Mts (Hungary).

Biology: The abdomen of one female specimen was engorged with mature eggs. The date of collection (May 31) indicates that oviposition occurs in spring and this would be the appropriate time to search for the breeding habitat and larval stages. Perhaps, the larvae could be obtained by using the techniques detailed in CUMMING & COOPER (1993).

Key to extant species of *Nemedina*

1 Haltere and legs dark, blackish brown; postpedicel ovate-conical; male terminalia with long, arched epandrial lobes, extending beyond epandrial lamellae (Figs. 1,3)..... ***N. alamirabilis*** **Chandler**

– Haltere pale, legs yellowish-brown; postpedicel elongate and strongly tapered; male terminalia with short, tapered epandrial lobes, not extending beyond epandrial lamellae..... ..... ***N. zaitsevi*** **Sinclair & Shamshev**

4. DISCUSSION

The male terminalia of *N. alamirabilis* clearly indicate that it is closely related and congeneric with *N. zaitsevi*. Both species possess long processes of the gonocoxal apodemes and a shortened hypandrium. These derived genitalic characters are also shared with the Atelestinae, whose assignment within the Empidoidea has been controversial (CUMMING et al. 1995). These characters, along with several additional synapomorphies, were proposed by SINCLAIR & SHAMSHEV (2003) as evidence strongly supporting the hypothesis that the *Nemedina* clade is the sister group to the Atelestinae. The discovery of the male of *N. alamirabilis* and its similar male terminalia confirms this relationship.

The Melegmány-völgy TT – Melegmány Valley Nature Reserve (7.09 km^2) is a small area of cool microclimate, in the central Mecsek Mts (in the territory of Pécs, a minor part in Mánfa), protected since 1957, with considerable botanical and zoological, as well as geological interest. The Nature Reserve is a part of the Mecsek karstic area, mainly with Triassic limestone. There are dolinas (sink-holes), caves, karstic sources, tufa gates and terraces with small waterfalls. Calcareous water deposits limy sediments on leaves and twigs fallen into brooks, enclosing them in a thick crust. Indeed, the Melegmány Brook in the Melegmány Valley is fed by karstic sources and spectacular tufa gates have already been formed this way. There are five large karstic cave systems with brooks in the Mecsek Mts. One of them opens at the lower section of the Nagy-Mély [Great Deep] Valley (westward to the former one): this is the strictly protected Mánfai-kőlyuk ["Stone Hole of Mánfa"].

As a consequence of their comparatively wet cool climate and northern exposure, the vegetation is mainly beech (*Fagus*) forest, locally mixed with oaks (*Quercus*) and hornbeam (*Carpinus*). There are a number of valuable and protected species in their herb layer, for instance, *Polystichum setiferum* (Forskal) Th. Moore (rather characteristic for the whole Mecsek Mts) and other ferns, *Helleborus odorus* (Forskal) Th. Moore, *Trollius europaeus* L. ssp. *demissorum*, *Aruncus dioicus* (Walter) *Ruscus aculeatus* L. and *R. hypoglossum* L., *Chaerophyllum aureum* L., *Lathyrus venetus* (Miller), *Stachys silvatica* L., *Asperula taurina* L. and *Digitalis ferruginea* L.

The hybotine, *Chvalaea sopianae* Papp & Földvári, 2001 (Empidoidea) was also described from this nature reserve (PAPP & FÖLDVÁRI, 2001). This is the only known locality in Hungary for *Chvalaea rugosiventris* (Strobl, 1910) and of the stratiomyid *Berkshiria hungarica* (Kertész, 1921). A high number of rare Mycetophilidae, hybotines (e.g. *Megagrapha europaea* Papp & Földvári, 2001) and other flies have also been captured there.

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