Alena (Aztekoraphidia) horstaspoecki nov. spec. – a new snakefly from Mexico (Raphidioptera, Raphidiidae)\(^1\)

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Abstract: Alena (Aztekoraphidia) horstaspoecki nov. spec., a new species of snakefly, from Hidalgo state, central Mexico, is described and illustrated. With this discovery the number of snakefly species recorded from Mexico increases to 14. Morphological criteria of the hypovalva reveal diagnostic characters for the differentiation from all other species of Alena, and support arguments for the hypothesis of a hypovalva-paramere-complex.

Resumen: Una especie nueva de rafidioptero, Alena (Aztekoraphidia) horstaspoecki nov. spec., es diagnosticada, descrita e ilustrada con ejemplares del estado de Hidalgo, en el centro de México. Esta es la décimocuarta especie de rafidioptero registrada en México. Criterios morfológicos de la hipovalva revelan caracteres diagnósticos para la separación de todas las demás especies de Alena, apoyando además la hipótesis de un complejo hipovalva-paraméro.

Key words: Raphidioptera, Alena (Aztekoraphidia), new species, Mexico.

Introduction

The Raphidioptera is a small order which comprises two families, the Raphidiidae with 186 described valid species, and the Inocelliidae with 21. Raphidioptera together with its adelphotaxon Megaloptera + Neuroptera constitute the Neuropterida, a superorder at the base of the Holometabola. The Raphidioptera is distributed throughout the Holarctic region, except for the northern and eastern parts of North America, the southernmost records being from high altitudes at the Mexican-Guatemalan border, northern Africa, northern India, Myanmar, northern Thailand and Taiwan (H. ASPÖCK, U. ASPÖCK & RAUSCH 1991). In Mexico, hitherto 13 species have been recorded, 10 Raphidiidae, and three Inocelliidae. All available information on Mexican snake flies has been summarized in U. ASPÖCK & H. ASPÖCK (1996). The discovery of a new species in this part of the earth is not at all surprising, nevertheless it is of great significance for several reasons: 1) for a relict taxon comprising altogether 207 extant described species the discovery of species number 208 is a spectacular event, 2) the new species is from a region of Mexico where so far no raphidiopterans have been reported, 3) it documents once more the importance of the Mexican region as an evolutionary centre of these living fossils, and 4) a remarkable anatomical character of the hypovalva induces a new interpretation of this structure.

Alena (Aztekoraphidia) horstaspoecki nov. spec.

Derivatio nominis: The name of this new species is a grateful homage to Horst Aspöck, Vienna, Austria, for his extensive contribution to neuropterology, on the occasion of his 65th birthday.

Material studied: Holotype, \(\sigma\): Mexico, Hidalgo, Huasca, Rancho Sta. Elena, Manantial de las Vigas, 20°07'53.4"N/98°31'38.5"W, 2500 m, 26.III.-9.IV.2003, Menchaca, Contreras; Malaise 1; Paratypes: 1 \(\varphi\): Same data as holotype, but 9.-23.IV.; 1 \(\varphi\): Same locality as holotype, 26.III.-26.IV.03, Malaise 2; (\(\sigma\) horst and one \(\varphi\) paratype in coll. Centro de Investigaciones Biologicas, UAEH, Pachuca, Mexico, one \(\varphi\) paratype in coll. Naturhistorisches Museum Wien).

Morphology (Fig. 1-11): A small tender species, length of forewing of the \(\sigma\) 8 mm, of the \(\varphi\) 8.2-9 mm. Head elongate rectangular, black with brownish pattern, with a fine sculpture, clypeus brownish, with a group of bristles; labrum brownish with yellow margins. Antennae: scapus brown, pedicellus and basal flagellomeres yellowish, otherwise brown. Pronotum: in front and laterally with broad yellow margins, anterior part brownish, longer caudal part dark brown, almost black, with ochre pattern. Legs: first coxae basally brown, distally yellow,

\(^1\) Dedicated to Horst Aspöck on the occasion of his 65th birthday, gratefully and in all the excitement of 40 years fascinating collaboration on Neuropterida, and of continuous stimulating scientific discussions. Ulrike Aspöck.

Dedicated to Prof. Horst Aspöck, gladly and as a great honour, on the occasion of his 65th birthday. Atilano Contreras-Ramos.
Fig. 1: Alena (Aztekoraphidia) horstaspecki nov. spec., holotype, ♂, head and thorax, lateral.

Fig. 2: Alena (Aztekoraphidia) horstaspecki nov. spec., holotype, ♂, abdomen and wings, ventral.

Fig. 3: Alena (Aztekoraphidia) horstaspecki nov. spec., holotype, ♂, genital segments, ventral.

Fig. 4: Alena (Aztekoraphidia) horstaspecki nov. spec., holotype, ♂, genital segments, lateral.

Fig. 5: Alena (Aztekoraphidia) horstaspecki nov. spec., paratype, ♀, abdomen and wings, ventral.

Fig. 6: Alena (Aztekoraphidia) horstaspecki nov. spec., paratype, ♀, genital segments, ventral.
second and third coxae brown; tarsalia 3-5 brown, legs otherwise yellowish. Wings: membrane hyaline, venation predominantly brown, basal half of C, basal R and Cu yellowish; basal part of Ma in hind wing as a longitudinal vein. Pterostigma yellow, above the distal half of the first pterostigmal cell, with one vein crossing, and with apical vein. Abdomen: tergites speckled brownish; sternites anteriorly black, with two yellow spots in female, but two large yellow windows in male; caudally yellow, medially with a brownish deltoid patch; pleural region brownish-yellowish.

♂ genital segments (Fig. 3-4, 7-9): Sternite of segment 8 only slightly shorter than tergite; tergite 9 trapeziform; gonocoxites 9 forming huge plates with a blunt short, yellowish-whitish, only proximally and basally brownish apex; styli slim; sternite 8 rather indistinct; hypovalva paired, with broad basal rods, dorsally curved...
Fig. 12 and 13: Type locality of *Alena (Aztekoraphidia)* horstaspoecki nov. spec.

The identification of the ♂ seems to be more difficult; the enlargement of the basal plate of the gonapophyses and the „horns“ of the atrium bursae complex are only visible after maceration in KOH. Whether the remarkable bristles on the clypeus and the yellow colour of the ovipositor are reliable characters for a safe identification can not yet be decided without having more material of all other species of the genus at hand.

**Habitat** (Fig. 12, 13): The type locality consists of two sites, one adjacent to a first order stream close to its origin (Malaise 1), and a second one at about 20 meters from the stream into the forest in a fairly open area (Malaise 2). The vegetation consists of a pristine oak-pine forest at the base of a mountainous area. Both Malaise traps were maintained operating continuously for one year. However, the three snakefly specimens on which this paper is based were the only ones collected throughout the sampling period.

Almost nothing is known on the biology of the new species, its discovery in a pine-oak forest may, however, lead to the conclusion that the larvae are corticolous, as are all *Alena* species whose larvae are known (H. Aspöck 2002).

**Distribution** (Map 1): So far *A. horstaspoecki* is known from the type locality only, and most probably it is another endemic species of the genus, which now comprises seven species endemic to Mexico, and, in addition, *A. distincta* (Banks 1911) and *A. minuta* (Banks 1903), the only species with a larger distribution area north of Mexico.
Discussion

The anatomy of the raphidiopteran hypovalva, which has been interpreted as the gonapophyses of segment 9 (U. Aspöck 2002), deserves some further considerations. In the family Raphidiidae the hypovalva is a paired or unpaired sclerite, closing the male terminalia ventrally. The family Inocelliidae lacks a comparable hypovalva, but the ninth gonapophyses are still to be found as the so called pseudostyli in some species. The hypovalva may be of very different shape, and at any rate it is of enormous taxonomic and systematic importance. Based on considerations turned over already long ago the hitherto unpublished hypothesis of the composed nature of the hypovalva of certain Raphidiidae is corroborated by male genital characters of the new species. This is particularly obvious in species of the Nearctic subgenus Aztekoraphidia U. Aspöck & H. Aspöck 1970 of the genus Alena Naváš 1916, but probably also of the Mediterranean genus Hispanoraphidia H. Aspöck & U. Aspöck 1968. The basal parts and the apical parts of the paired rods of the hypovalva show traces of a disruption, in a way or the other, either by skinny parts, or by special structures, e.g. Alena (Aztekoraphidia) caudata, A. minuta, A. australis (Banks 1895), or A. tenochtidana (U. Aspöck & H. Aspöck 1978). In A. horstaspoecki the apical hooks and the lateral plates of the hypovalva appear as if they were amalgamated structures, and resemble certain internal sclerites known from Palaeartic species: e.g. Atlanoraphidia maculollis (Stephens 1836) (see H. Aspöck, U. Aspöck & Rausch 1991, Fig. 1036, 1037), Italoraphidia solariana (Naváš 1928) (see H. Aspöck, U. Aspöck & Rausch 1991, Fig. 1069, 1070). The homologisation of these sclerites (U. Aspöck 2002) as parameres (tenth gonocoxites + tenth gonapophyses) or, alternatively, as the gonarcus (eleventh gonocoxites), has always been problematic. On the other hand, there are similar structures, accompanying the hypovalva laterally, partly externally and more basally, which have been identified as parameres, e.g. in the Palaeartic Raphidia (R.) ophiopsis Linnaeus 1758, or in the Nearctic Agulla (Glavia) modesta Carpenter 1936 (see H. Aspöck, U. Aspöck & Rausch 1991, Fig. 771-810 and Fig. 1794-1845) respectively.

Under these aspects the study of the new species offers the following hypotheses:

1) The apical part of the hypovalva, comprising the lateral plates and the curved hooks are interpreted as the amalgamated parameres (gonocoxites + gonapophyses of segment 10).

2) In other species of Aztekoraphidia – although not evident at a first glance, as the lateral plates are missing – the hypovalva too seems to be of composed nature, and the apices represent the amalgamated parameres.

2) If the hypothesis of amalgamation of parameres and hypovalva holds, identical phenomena in Palaeartic species could be of phylogenetic relevance, if they are synapomorphic. The genera Harraphidia Steinmann 1963 and Hispanoraphidia H. Aspöck & U. Aspöck 1968
have to be considered under this aspect, as both lack parameters, and the hypovalva might include the parameters in these (and perhaps additional) taxa. Moreover, this could be also of biogeographic relevance for an understanding of the origin of the Nearctic Raphidiidae.

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Zusammenfassung


References


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