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Description of *Jezekiella patera* gen. et sp. nov. from Europe (Diptera: Psychodidae)

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Abstract. *Jezekiella patera*, gen. et sp. nov., is described and illustrated based on a single male from Italy. Based on some character states found in this new genus (e.g. spiniform sensilla on basal flagellomeres) it is most similar morphologically to Paramormiini, a tribe that is likely paraphyletic. Other characters (e.g. allurement organs on the prothorax) are more similar to Pericomaini, or with uncertain phylogenetic affinities (e.g. dimorphic tenacula). The parameres of the new species form a flat bowl with a pair of mesally directed, digitate appendages basally and with distal bifurcate, back-folded processes.

Key words. Diptera, Psychodidae, Psychodinae, taxonomy, new genus, new species, moth flies, Italy, Palaearctic Region

Introduction

One of the greatest challenges faced by systematists today is the immense amount of missing data. Particularly in insects, the vast majority of species remain undiscovered and, for many described species, morphological and other characters are not understood well enough to allow for systematic inferences to be made. If a classification or phylogenetic analysis does not sample from the full range of variation within a taxon, its results are less reliable and might be misleading. Descriptive taxonomy thus remains a vital and important part of phylogenetics, especially in taxa where our knowledge of character distributions remains incomplete.

Moth flies (Diptera: Psychodidae) are comparatively well-known in Europe, with more than 500 species described to date (Wagner 2004) and several fairly recent check-lists and keys available for many regions (e.g. Withers 1989; Krek 1999; Ježek 2002, 2003; Kvifte et al. 2011, 2013; Salmela et al. 2014). Nevertheless, new species are regularly discovered,

even in comparatively well-studied areas of this continent (Ježek 2006; Ježek & Hájek 2007; Beran et al. 2010; Omelková & Ježek 2012a,b; Salmela et al. 2012; Kvifte et al. 2013).

The classification of Psychodidae remains a work in permanent progress, with widely different tribe and generic concepts historically followed by various authors (e.g. Duckhouse 1987, Vaillant 1990, Ježek & van Harten 2005). We believe that the best way to resolve these problems is by improving character interpretations through descriptions and redescriptions of important morphological character systems, in particular in the male terminalia.

In the present paper, we present a new European species of Psychodidae that could not be placed in any named genus with confidence. In particular, the characters of its wing and surstyli are highly unusual, and the parameres are unlike anything previously recorded in the literature.

Material and methods

After removal of the wing the specimens' body was cleared in 10% KOH, transferred to acetic acid (96%), then a mixture of acetic acid and clove oil, from which the acid evaporated. Head, wings, thorax and abdomen were then arranged in Canada balsam under four cover slips. Description and drawings were prepared with the aid of a Leitz Dialux 20 EB and a phase contrast Leitz Diaplan, both equipped with a drawing mirror. Leica MZ 12.5stereo microscope was also used.

Morphological terminology is according to Wagner & Ibáñez-Bernal (2009) except that the "cercus" is recognized to be of epandrial origin and is therefore considered to be a surstylus (see discussion in Curler & Moulton 2012).

Description

Jezekiella gen. nov.

(Figs 1–10)

Type species. *Jezekiella patera* sp. nov, by present designation.

Diagnosis. Flagellar segments nodiform, with paired, digitate ascoids; prothorax with stalked allurement organ with sclerotized apex about half length of head; wing with cross veins faint, close to wing base; genitalia with gonocoxites stoutly parallellogram--shaped, shorter than gonostyli, gonostyli curved away from aedeagus, epandrium twice as wide as long, surstyli with an aseriate cluster of dimorphic tenacula, some elongate, fringed and some shorter, spatulate; aedeagus with basiphallus laterally expanded, half as long as distiphallus; distiphallus consisting of a pair of distal sclerites surrounded by a lightly-sclerotized hull; parameres conjoined, forming a flat bowl basally with a pair of inward pointing digitate appendages and distal bifurcate back-folded processes. **Etymology.** The genus is dedicated to our colleague, Jan Ježek, Prague, in recognition of his many contributions to the systematics, taxonomy and faunistics of Psychodidae. Gender is feminine.

Jezekiella patera sp. nov.

(Figs 1–10)

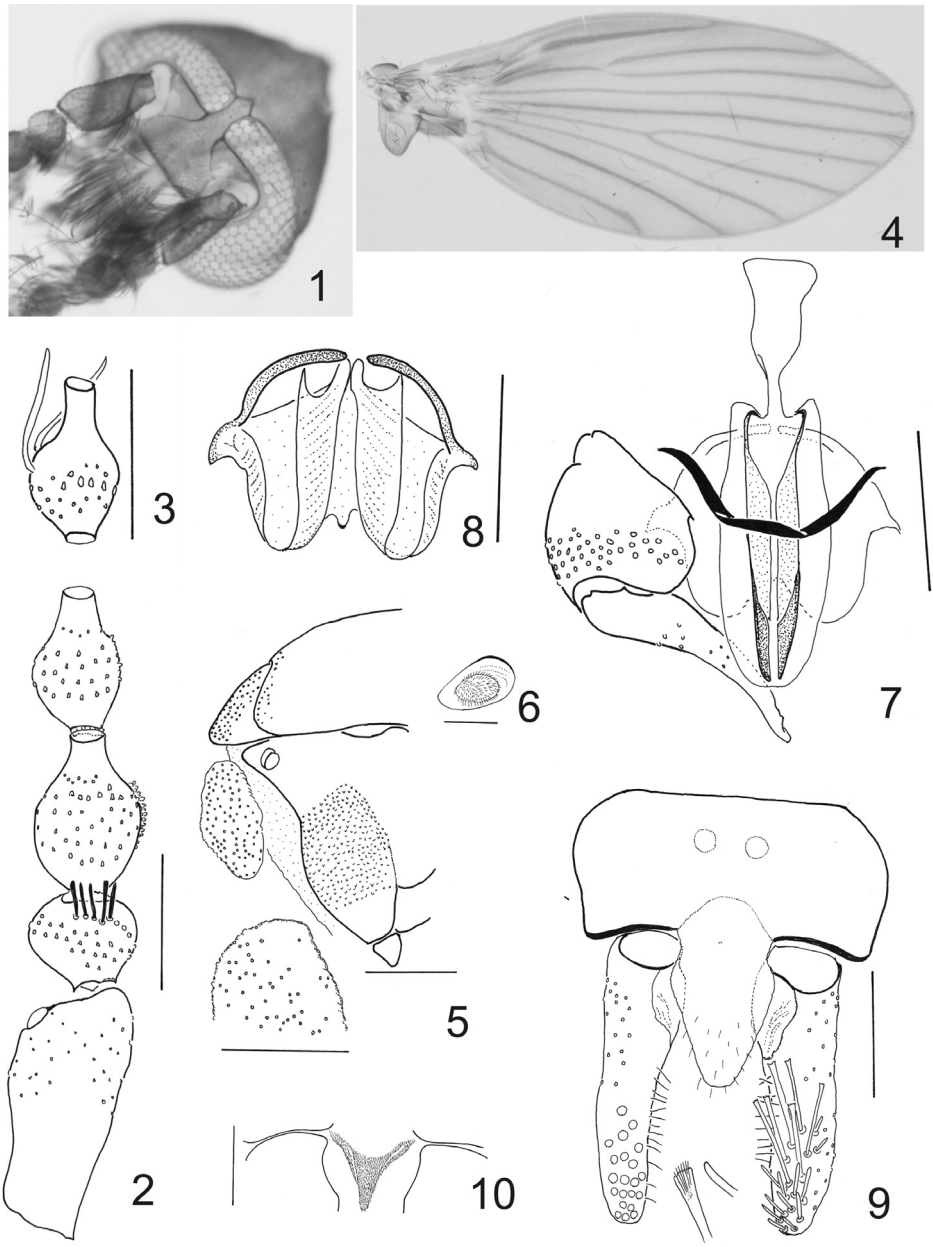
Type material. Holotype: ♂, **ITALY: Liguria:** Torrente Erro, near Hautenotte, 12 May 1980, leg P. Zwick (hand net).The specimen will be deposited in the Museum für Naturkunde der Humboldt Universität zu Berlin.

Diagnosis. As for the genus.

Description. *Head*. Eyes reniform, eye bridge comprised of 4 facet rows, distance between eyes almost 3 facet diameters (Fig. 1). Interocular suture obtusely V-shaped. Frons and clypeus separate. Frontal setae alveoli patch undivided at middle, reaching between the eyes. About three postocular bristles on the dorsolateral side. Palpus with four segments, terminal palp segment slightly sclerotized, annulate, length 0.73 mm. Length of palp segments: 0.136-0.186-0.200-0.221 mm. Relative length proportions: 19-26-28-31. Antenna with scape about two times longer than its greatest width in the distal part; scape/pedicel short, globular with a row of about 8 flat androconia along the inner distal margin (Fig. 2). Flagellomeres nodiform, symmetrical, with internodes about 1/3 of a segment length; basal two flagellomeres with spiniform sensilla on medial surface. Every flagellomere with a pair of digitate ascoids about as long as a flagellomere (Fig. 3). Absolute length of antennomeres present: 0.160-0.069-0.115-0.099-0.099-0.099-0.099-0.099-0.096-0.088-0.093-0.091-0.088 mm. Relative proportions of antennomeres: 24-12-17-16-15-15-15-15-15-14-13-13-13, distal articles of antennae lost.

Thorax. Prothorax with a pair of stalked allurement organs about twice as long as wide, sclerotized, half as long as head and with small holes unevenly distributed over their surface (Fig. 5). Metathoracic spiracle with setose operculum (Fig. 6). Legs without special features. Wing opaque, darker in the costal cell between costa and R_1, and with a lighter spot near base of R_1 (Fig. 4). Sc comparatively long, approaching but not reaching R_1; crossveins r_4-r_5, R-M r-m, m_{1+2}-m_3, and m-cu faint, close to wing base, most of them almost in line at the level of the tip of Sc; thus cells bm and br very short. Radial fork in the basal half of wing and slightly basal of medial fork, medial fork between tips of CuA_1 and CuA_2 in costa. Wing tip between R_4 and R_5. Wing length 2.95 mm.

Abdomen with eight pre-genital segments. Terminalia with epandrium more than twice as wide as long with a pair of circular openings. Hypoproct elongate oval, about half as long as surstylus, slightly sclerotized, sparsely setose (Fig. 9). Epiproct shorter, Y-shaped, basally curved with a clear distal tip, densely setose (Fig. 10). Surstyli twice as long as epandrium, almost straight in dorso-ventral view, about 4 times longer than the greatest width, distally with about 15 to 17 dimorphic tenacula. 10 to 11 shorter digitate and pointed tenacula on the distal and lateral surfaces of the surstyli, 5 to 6 stronger, longer and distally fringed ones are at some distance from the tip (Fig. 9). Some short lateral retinacula appear increasingly similar to setae on the surstyli. Hypandrium narrow, of equal width, median ventral part bent upward in specimen. Connection to basilateral prolongations of epandrium little sclerotized, almost unrecognizable. Gonocoxites short and strong, parallelogram-shaped. Gonostyli bent outward, distal inner margin irregularly serrate. Aedeagus with a horizontal, short, bottle-shaped basiphallus sclerite, with a distal pair of straight sclerites that form an open tube, enveloped by a thin translucent hull (Fig. 7). Parameres between the aedeagus and epandrium bowl-shaped, of complex structure (Fig. 8) consisting of a dorsal plate from which basally



Figs 1–10. *Jezekiella patera* gen. et sp. nov.1 – head with eye bridge and basal antennomeres; 2 – scape, pedicel and flagellomeres 1 and 2; 3 – flagellomere 6 with ascoids; 4 – wing; 5 – fore part of thorax with allurement organ; 6 – metathoracal spiracle; 7 – genitalia, hypandrium, gonocoxite, gonostyle, aedeagus, parameral complex indicated; 8 – parameral complex; 9 – epandrium, proctiger and surstyli with tenacula; 10 – epiproct with bases of sustyli

thin digitate processes span to the middle but do not meet. The distal processes are bifurcate with a blunt inner and a sharp lateral tip; they are folded back towards the tips of the lateral processes which they as well do not meet. Mediodistally where the parameres are fused, lies a small setose protuberance.

Etymology. From latin *patera*, flat bowl, referring to the general shape of the parameres. The name is to be treated as a noun in apposition.

Distribution. The new species was collected in the SW Alps, along the Torrente Erro, a large river that flows through the Ligurian provinces Savona and Allessandri into the Mediterranean Sea.

Discussion

The characters of *Jezekiella* gen. nov. are ambiguous in placing the genus close to any other known genera of Psychodidae in Europe. Most characters are, however, consistent with a placement in Paramormiini, a tribe which most likely is paraphyletic (see Espindola et al. 2012, Kvifte 2014). Within this group, several taxa share similarities with *Jezekiella*; however the combination of characters is unique and does not give any clear indications of sister group relationships at present.

Dimorphic tenacula can be found in members of several tribes of Psychodinae, in genera such as *Trichopsychoda* Tonnoir, 1922 (Psychodini), *Platyplastinx* Enderlein, 1937 and *Alepia* Enderlein, 1937 (Maruinini/Setomimini), *Brunettia* Annandale, 1910 (Brunettiini), some species of *Mormia* Enderlein, 1935 (e.g. *Mormia* (*Lepimormia*) *palposa* (Tonnoir, 1919)), a couple of undescribed species of *Pericoma* Haliday, 1856 and possibly *Szaboiella* Vaillant, 1971. The dimorphic tenacula character system is still not well understood, and must be given further consideration in future studies.

The tenacula covering most of the surstyli is found in many different genera of Paramormiini, including the *Panimerus* (*Panimerus*) *maynei* (Tonnoir, 1919) group, the *Mormia tenebricosa* Vaillant, 1954 group, *Peripsychoda fusca* (Macquart, 1826), *Paramormia* (*Parapanimerus* Wagner, 1984) and *Hyrcanoresslia* Ježek, 2001. In Pericomaini, the character occurs in *Bazarella centiretinacula* Wagner, 1981. In all of these taxa, however, the tenacula are all of the digitate to lanceolate type, similar to the apical ones in *Jezekiella*.

The interrupted R_1 with a dorsal pseudovein is a character shared with the genus *Psycmera* Ježek, 1983, where at least *Psycmera integella* (Jung, 1956) has it. The paramere of *Psycmera* furthermore appears to be slightly bowl-shaped with similar mesal paired appendages as in *Jezekiella*; however, the lateral appendages are elongate and sickle-shaped as in *Panimerus*. This wing character is also found in some species of Pericomaini, e.g. *Pericoma pseudexquisita* Tonnoir, 1940, but as its full distribution and variability is not known care must be taken in its interpretation.

The spiniform sensilla present on flagellomere 1 are reminiscent of some species of *Seoda* Enderlein, 1935 and *Parajungiella* Vaillant, 1974; however, the structure of the parameres, basiphallus and surstyli is very different in these genera compared to *Jezekiella*. The wing apex between R_4 and R_5 is found in most members of Paramormiini and Pericomaini, as is the Sc approaching the costa. Prothoracic allurement organs are otherwise only known from Pericomaini (Quate 1955) and Maruinini/Setomimini (Quate & Brown 2004).

That *Jezekiella patera* does not have any obvious affinities to other genera in the world fauna is especially notable since it was collected in a particularly well-studied part of Western Europe. The possibility of discovering phylogenetically significant, novel taxa even here underlines the importance of biodiversity surveys and subsequent alpha taxonomic studies regardless of region.

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