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A new species of the genus *Stilpon* Loew, 1859 from Morocco

(Diptera: Empidoidea, Hybotidae)

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Front cover: *Stilpon moroccensis* Grootaert & Zouhair, sp. nov., female, lateral view. © I. Van de Velde.

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Abstract

A new species of the genus *Stilpon* Loew (Diptera: Hybotidae) is described from Morocco, based on material collected from the north and eastern parts of the country. *Stilpon moroccensis* Grootaert & Zouhair, **sp. nov**. is close to *Stilpon subnubilus* Chvála, 1988, but is distinguished on the basis of the following characters: mid tibia in male as in female with a row of long black strong anteroventral setae; mid femur with 4 long ventral bristles in basal half that are a little longer than femur is wide; tarsomere 5 is black only on fore leg, while in *S. subnubilus* apical tarsomere of all legs almost black; the costa is black from just before the tip of R_1 to beyond the tip of R_{2+3}. The new species and *S. subnubilus* are now the only recognized species of *Stilpon* in Morocco.

Keywords: Diptera, Hybotidae, new species, Morocco, *Stilpon*

Introduction

Stilpon Loew, 1859 is a genus assigned to the tribe Drapetini (= Drapetidini), one of the three tribes composing the subfamily Tachydromiinae belonging to Hybotidae (Diptera). Tachydromiinae is a group that is generally highly adapted for predaceous activity (CHVÁLA, 1975), suggesting that *Stilpon* is a predacious genus. It includes very small flies, usually 1.0–1.5 mm (rarely 2.0–2.5 mm) (GROOTAERT & SHAMSHEV, 2012). The Drapetini, and particularly *Stilpon*, possess most of the apomorphic characters and represent the specialised forms of Tachydromiinae (CHVÁLA, 1975).

Stilpon can be recognized from other drapetine genera by the following combination of features: eyes contiguous on face, frons with sides nearly parallel; antenna with dorsoapical arista-like stylus; wing with cell br much shorter than cell bm, A_1 very weak or absent; abdominal tergites lacking squamiform setae; male terminalia with single rod-shaped ejaculatory apodeme (GROOTAERT & SHAMSHEV, 2012).

Species of this genus inhabit various biotopes but usually occur in the low-lying vegetation zones (COLLIN, 1961; CHVÁLA, 1975; CUMMING & COOPER, 1992; PRZHIBORO & SHAMSHEV, 2007). The adults are exclusively terrestrial and are often found in grass tufts or sphagnum moss, or in heaps of cut sedge, and are sometimes obtained when sieving soil or flood refuse in early spring (CHVÁLA, 1975). According to PRZHIBORO & SHAMSHEV (2007), adult habitat for each species is only sufficiently known for three species of *Stilpon* in Central Europe: *S. lunatus* Walker, 1851, *S. nubilus* Collin, 1926, and *S. graminum* Fallén, 1815.

Little is known about the immature stages of *Stilpon* and their ecology (PRZHIBORO & SHAMSHEV, 2007). *Stilpon* larvae are mentioned in some guides as aquatic or semiaquatic larvae (VAILLANT, 1967, 1978; CUMMINS *et al*., 1978; COURTNEY *et al*., 1996; PRZHIBORO & SHAMSHEV, 2007). Larval habitat of this genus was classified by CUMMINS *et al*. (1978) and

COURTNEY *et al*. (1996) as "lotic erosional", their life habit as "clingers", and their trophic relationships as "predators (engulfers)" (PRZHIBORO & SHAMSHEV, 2007).

The group is almost worldwide in the distribution (except Australia) (SHAMSHEV & GROOTAERT, 2004). In the Palaearctic region, twelve species are known till now from this genus (GROOTAERT & SHAMSHEV, 2012; BEUK, 2014).

The Moroccan fauna of Hybotidae is insufficiently investigated, and particularly for the *Stilpon* genus. So far, only one species of *Stilpon* is known to occur in Morocco, represented by *S. subnubilus* (EBEJER *et al*., 2019: 148). A third undescribed and unrecognized species (*S. demnatensis*) was reported by VAILLANT (1956) but the latter name is a nomen nudum (CUMMING & COOPER, 1992).

In this paper, we provide a diagnosis and a description of a new species of this genus: *Stilpon moroccensis* Grootaert & Zouhair, **sp. nov**. The description is based on material composed of male and female adults collected from the north and eastern Morocco.

Material and methods

The material referred to in this paper was collected personally by the third author (KK). Most specimens are preserved in 70° alcohol and housed at the Laboratory of Ecology, Systematics and Conservation of Biodiversity (University Abdelmalek Essaadi, Tétouan). A paratype male is preserved in the collections of the Royal Belgian Institute for Natural Sciences in Brussels, Belgium (RBINS).

The collecting localities include four sites, which were investigated between 2015 and 2017, three of them belong to the north of Morocco, more precisely the western Rif, and the remaining one is located in the eastern part of the country (Fig. 1).

The Rif is a mountain range forming part of the Betic Cordilleras system, facing the Mediterranean in the shape of a crescent which culminates in Jbel Tidghine at 2450 m. This chain occupies the northern part of Morocco, from the confines of the Strait of Tangier in the east, to the Moulouya wadi, the Mediterranean Sea bordering the northern limits, and the Atlantic Ocean the western limits. It is characterized by a wide range of bioclimates ranging from the semi-arid of the Mediterranean coasts to the perhumid of the high mountains of the central and western Rif (BENNAS *et al*., 2001). The vegetation cover is favoured by a rainfall which exceeds 1000 mm in altitude, giving rise to a great diversity of plant species (VALDÉS *et al*., 2002) including nearly all of the Moroccan forest species (MÉDAIL & QUÉZEL, 1999).

The eastern region to which belongs the site of Bouanane, is an arid region, dominated by a continental climate in the south which is subject to Saharan influences (HAUT COMMISSARIAT AU PLAN, 2012). The annual rainfall does not exceed 100 mm per year (HAUT COMMISSARIAT AU PLAN, 2012) leading to the dominance of *Stipa tenacissima*.

The specimens have been partly captured with Malaise trap, and by sweeping over vegetation. Two Malaise traps have been set up in 2015 at two localities (S1, S3), and the sweep net has been used for the other two localities (S2, S4) which have been prospected in 2017 (Table 1). The collected specimens were transferred to bottles and stored in 95 % alcohol.

The material has been examined and identified in the Laboratory of Ecology, Systematics and Conservation of Biodiversity. The terminalia dissection, drawing of figures, and photographing of specimens were performed by the senior author in the Royal Belgian Institute of Natural Sciences (RBINS).

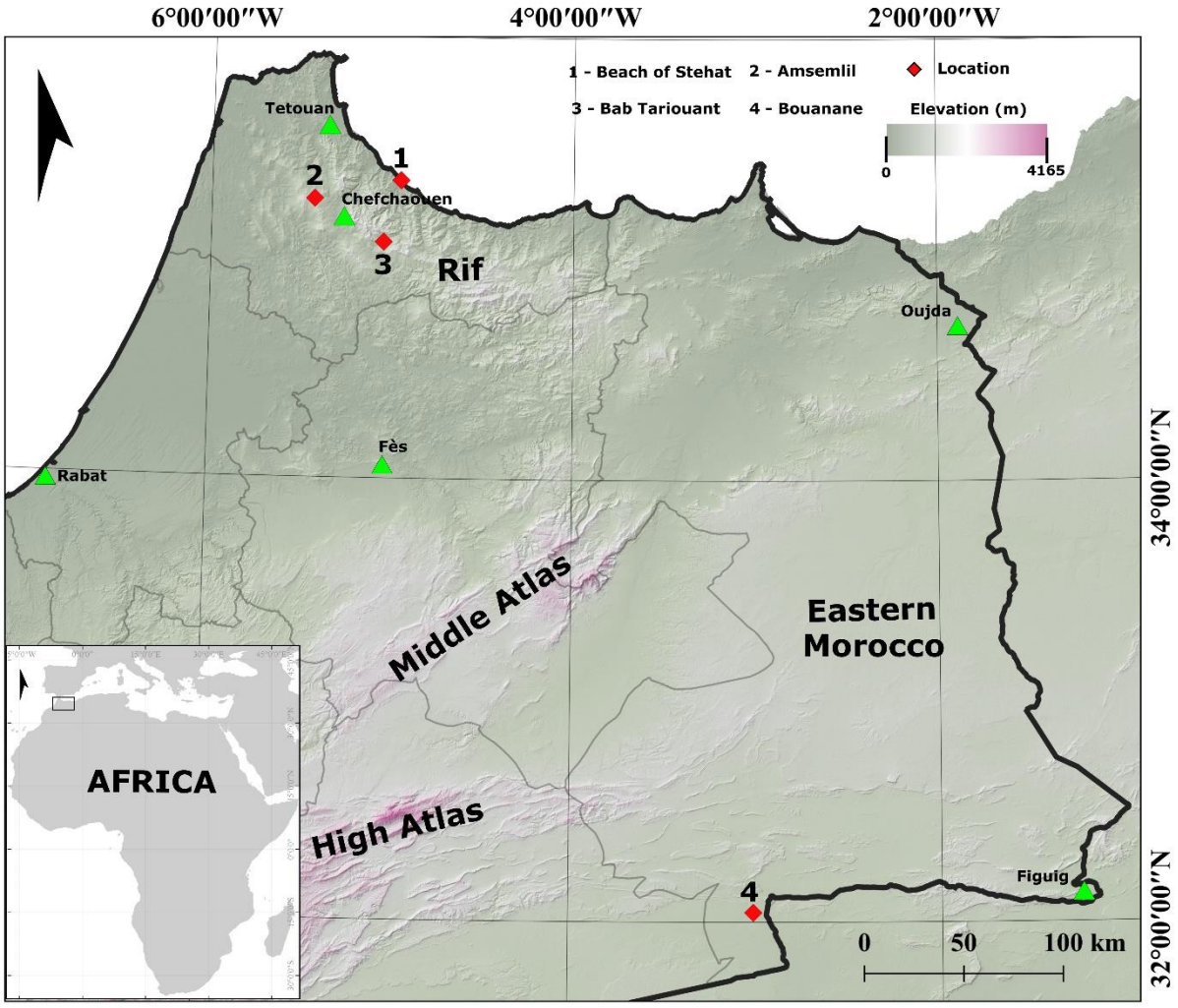

Fig. 1. Location of the four studied sites of *Stilpon moroccensis* Grootaert & Zouhair, **sp. nov.** Red diamond: collection sites; green triangle: reference localities in Morocco.

The main habitat characteristics of the collecting sites can be summarized as follows:

Site 1 (Beach of Stehat): Corresponds to the seaside bordering the village of Stehat. The Malaise trap was placed some 100 m away from the beach, in a vegetable garden (Fig. 2).

Site 2 (Amsemlil): The habitat is a mountain peat bog in a mixed forest composed of *Pinus pinaster* Aiton, *P. halepensis* Mill., *Quercus suber* L., *Q. canariensis* Willd. The riparian vegetation is represented by *Erica arborea* L. and *Pistacia lentiscus* L. *Rubus ulmifolius* J.Presl & C.Presl is the main representative of shrub formations.

Site 3 (Bab Tariouant): The habitat where the Malaise trap was set up is represented by a forest bordering the road to Bab Berred. The vegetation is mainly composed of *Quercus pyrenaica* Steven. The herbaceous formations are represented by *Cistus* sp., *Cupressus* sp. and ferns plants.

Site 4 (Bouanane): The habitat corresponds to an alluvial plain which borders a large river (Oued Bouanane) scattered with *Tamarix* sp.

Specimens were studied and photographed using a Leica S9i and the male terminalia were drawn with a camera obscura in a Laborlux 12. Morphological terminology and abbreviations follow GROOTAERT & SHAMSHEV (2012).

Table 1. Coordinates, altitudes and collecting dates of studied sites.

Code site	Site	Locality	Coordinates	Altitude	Collecting date	Collecting tool	Habitat
S1	**Beach of Stehat**	Rif, Chefchaouen, Stehat.	35.349837 N/ -4.957649 W	2 m	25. IV - 25.V.2015	Malaise trap	Beach
S2	**Amsemlil**	Rif, Tétouan, Project of Natural Park of Bouhachem, Beni Leit.	35.26234 N/-5.43341W	1067 m	23.IV.2017	Sweep net	Bog
S3	**Bab Tariouant**	Rif, Chefchaouen, Bab Tariouant	35.0189000 N/-5.0097429 W	1294 m	31.V – 28.VI.2015	Malaise trap	Forest
S4	**Bouanane**	Eastern Morocco, Figuig, Bouanane	32.0430556 N/-3.0091666 W	797 m	5.IV.2017	Sweep net	Alluvial plain

Results

Hybotidae Meigen, 1820
Tachydromiinae Meigen, 1822
Stilpon Loew, 1859

Stilpon moroccensis Grootaert & Zouhair, sp. nov.

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(Figs 3–5)

MATERIAL EXAMINED. HOLOTYPE ♂. MOROCCO, Rif, Stehat, 2 m, 25.iv–25.v.2015, Malaise trap, leg. K. Kettani, (in University Abdelmalek Essaadi, Tétouan).
PARATYPES 6♂♂, 4♀♀. MOROCCO, Rif, 1♂, Amsemlil Bog, 1067 m, 23.iv.2017, sweep net, leg. K. Kettani ; 1♂, 1♀, Bab Tariouant, 1294 m, 31.v–28.vi.2015, Malaise trap, leg. K. Kettani; 3♂♂, 3♀♀, Beach of Stehat, 2 m, 25.iv–25.v.2015, Malaise trap, leg. K. Kettani; Eastern Morocco, 1♂, Bouanane, 797 m, 5.iv.2017, sweep net, leg. Fekrani; terminalia illustrated by P. Grootaert, (5♂♂, 4♀♀ in University Abdelmalek Essaadi, Tétouan, 1♂ in RBINS).

ETYMOLOGY. The new species is named *moroccensis* after the country of Morocco where it was found.

DIAGNOSIS. Very small species (1.25–1.5 mm) brownish black thorax in ground-colour. Wing with a brown patch anteriorly in middle of the wing. Costa black between tip of R_1 to a little beyond tip of R_{2+3}. Only fore leg with apical tarsomere contrastingly black. Mid femur in basal half with 4 long brown setae slightly longer than femur is wide with a very long black preapical anterior seta. Mid tibia over entire length with a row of long black anteroventral setae as long as tibia is wide; a single row of strong black ventral spinules present in apical half, the spinules are pale and weaker in posterior half. In male: right cercus with an apical fork bearing 2 stout setae. Left cercus shorter than right cercus bearing 4 strong setae.

Fig. 2. Type locality in Stehat, 25.04.2015. © K. Kettani.

DESCRIPTION. MALE. Length: body: 1.5–1.6 mm; wing: 1.3 mm (Fig. 3A, B).

Head black in ground colour. Occiput and vertex greyish, subshining, with dense pollinosity. A pair of black vertical bristles present. Eyes with ommatidia slightly enlarged below antennae. Frons narrow to fairly wide. Antenna placed in middle of head, with basal segments pale yellowish brown, postpedicel and stylus brown. Pedicel with a long, black apical, ventral seta (exceptionally 2 long setae). Palpus white with a long black apical seta as long as palpus.

Thorax black brownish in ground colour. Scutum tomentose. Humeri not differentiated, humeral bristles moderately long, acrostichal and dorsocentral bristles very small and arranged in 2 rows, longs postalar bristle and basal scutellar seta.

Wings broad (Fig. 5A), with a brown patch anteriorly in middle of wing. Veins brownish, pale near tip of wing. Costa darkened from about apex of R_1 to a little beyond tip of. Veins R_{4+5} and M running parallel and turning up before reaching wing tip. Halteres pale yellow.

Legs yellow, tarsomere 5 black on fore leg only. Fore femur very thickened, more than twice as wide as mid femur, with a row of pale brownish ventral setae over entire length, the setae at least half as long as femur is wide. Fore leg with apical tarsomere contrastingly black. Mid femur (Fig. 5B) in basal half with 4 long brown setae slightly longer than femur is wide, with a very long black preapical anterior seta. Mid tibia (Fig. 5B) over entire length with a row of long black anteroventral setae that are as long as tibia is wide; a single row of strong black ventral spinules present in apical half, the spinules are weaker in posterior half. Hind femur longer than mid femur, with 2 long and dark bristles on apical half. Hind tibia longer than mid tibia, with short hairs.

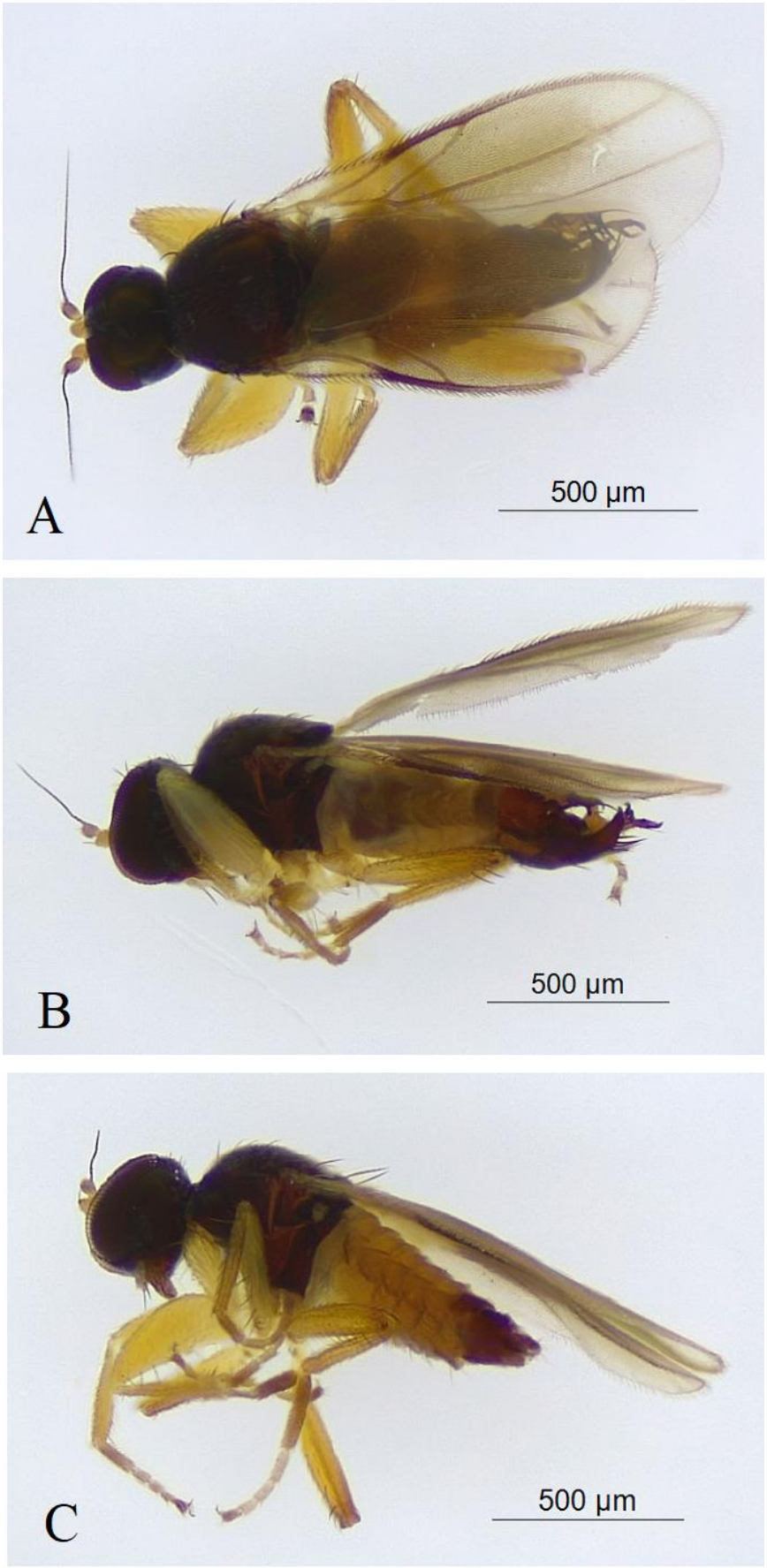

Fig. 3. *Stilpon moroccensis* Grootaert & Zouhair **sp. nov.** A, male, dorsal view. B, male, lateral view. C, female, lateral view. © I. Van de Velde.

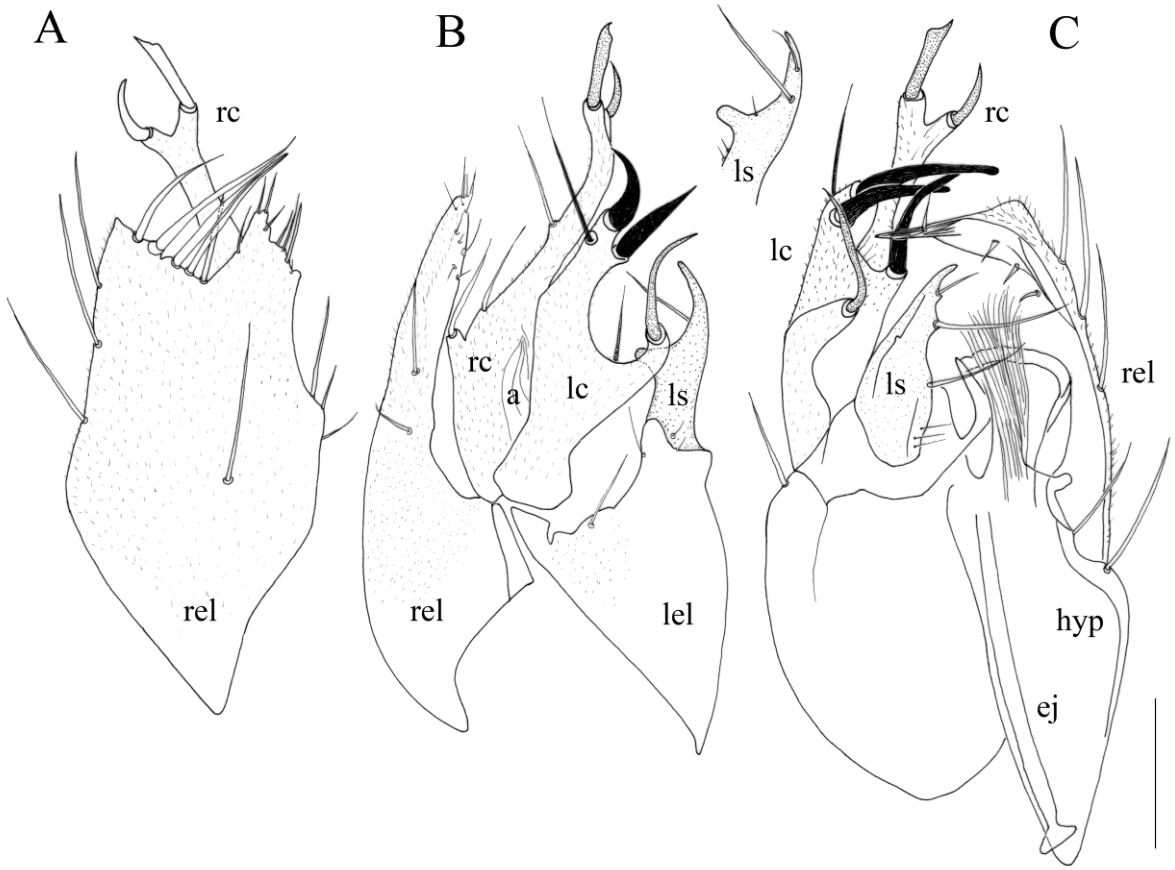

Fig. 4. *Stilpon moroccensis* Grootaert & Zouhair, **sp. nov**., male paratype. A, right epandrial lamella with right cercus. B, epandrium dorsal view, inset tip of left surstylus in ventral view. C, ventral view on epandrium. Scale bar 0.1 mm.

Abbreviations: a: anus; ej: ejaculatory apodeme; hyp: hypandrium; lc: left cercus; lel: left epandrial lamella; ls: left surstylus; rel: right epandrial lamella.

Abdomen with tergites and sternites brownish yellow, weakly sclerotized.

Terminalia (Fig. 4). Right cercus with an apical fork bearing 2 stout setae (setae paler than the setae on the left cercus); at the right side of the cercus 3 setae: upper 2 long and fine while the most basal seta is a little stronger and inserted on a papilla.

Left cercus shorter than right cercus, bearing 4 setae. The left cercus is broadly forked with at its right fork 2 stout apical setae while at the tip of the left fork a longer, slenderer seta (Fig. 4B); at the ventral side of the left cercus there is a fourth strong black seta on a projection (only visible in lateral view, Fig. 4C).

Right epandrial lamella (Fig. 4A) with a somewhat concave apical border, at the right side with 5 strong flattened setae, while at the left side with some fine hair-like setae. Left surstylus (Fig.4B, inset), with a short rounded projection at the inside.

FEMALE. Length: body: 1.25 mm; wing: 1.25 mm (Fig. 3C).

Similar to male in most aspects. Mid tibia also with a row of long black anteroventral setae that are as long as tibia is wide, but ventral spinules are lacking, instead some pale short setae.

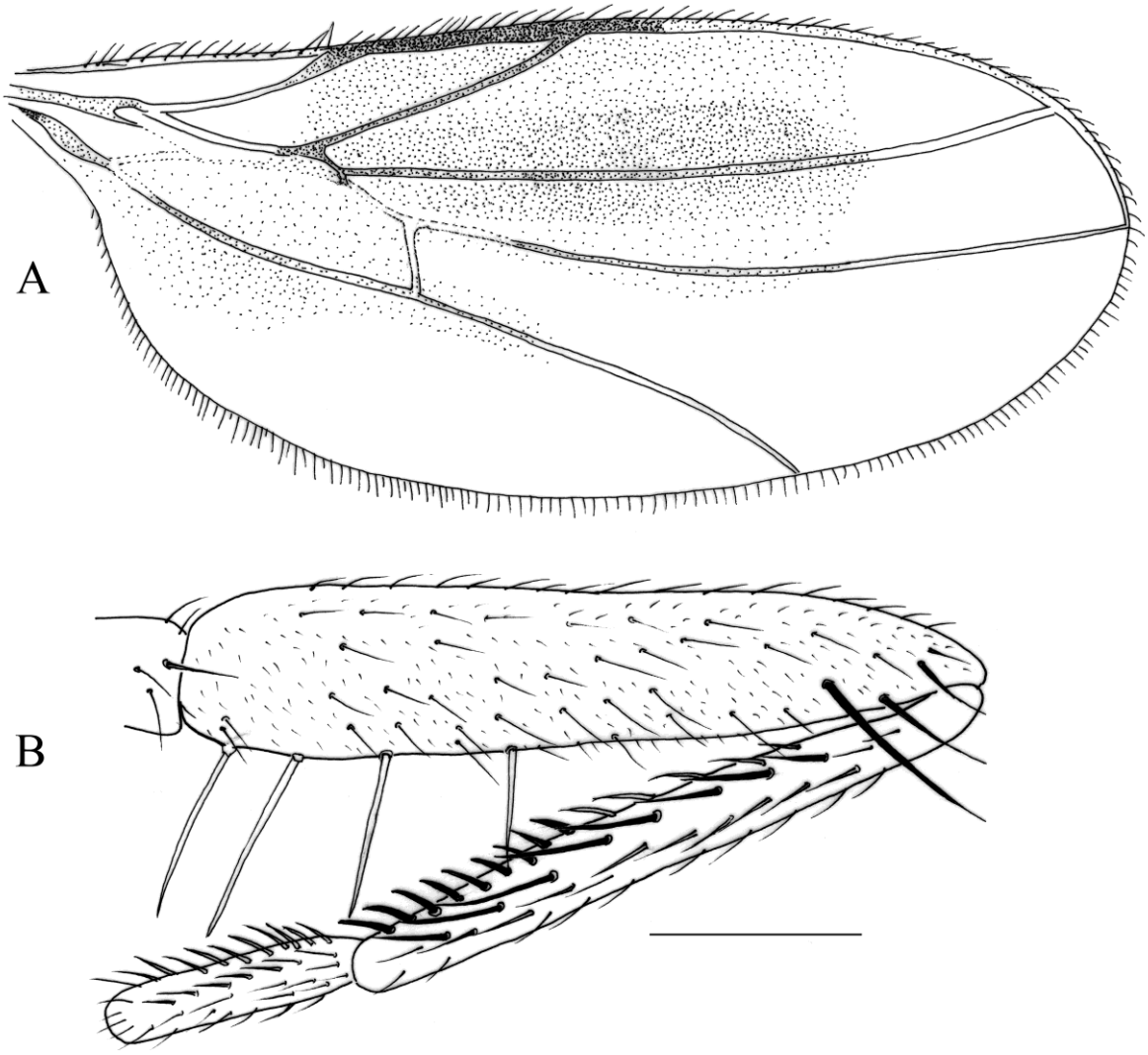

Fig. 5. *Stilpon moroccensis* Grootaert & Zouhair, **sp. nov.** male paratype. A, wing. B, mid femur and tibia anterior view. Scale bar 0.1 mm.

General comments and discussion

The present new species is a small species that is very similar to *S. subnubilus* Chvála, 1988. In fact we believe that it forms a species-complex with the latter. However, there are a number of distinct differences. So, the tarsomere 5 of only the fore leg is contrastingly black in the new species, while on the other legs the apical tarsomere is at most brown. In *S. subnubilus* the apical tarsomere of all legs is almost black. The fore femur in *S. moroccensis* Grootaert & Zouhair, sp. nov. has a row of pale brownish ventral setae over the entire length and the setae are at least half as long as the femur is wide. According to CHVÁLA (1988), the ventral bristles are nearly one third of the width of the femur in *S. subnubilus*. This is perhaps not a good character since in dried specimens the femur can be laterally compressed and the femur will look wider and thus the ventral setae will appear shorter.

In the new species the mid femur bears 4 long setae in the basal half that are slightly longer than femur is wide. These setae are much shorter in *S. subnubilus*. CHVÁLA (1988) wrote that

in *S. subnubilus*, the mid femur has similarly long bristles to the fore femur, but less numerous. Since the setae in the new species are longer than the femur is wide, it is a clear distinction.

In the new species, the mid tibia bears a row of long black anteroventral setae that are as long as the tibia is wide. This character is present in male and female. CHVÁLA (1988) remarks that in *S. subnubilus* there is a row of anteroventral hairs on the mid tibia. Indeed, in a male we saw from Gilmonde (Portugal) of *S. subnubilus* (courtesy of Mr. Rui Andrade) and a specimen of the Netherlands (courtesy of Mr Ruud van der Weele and quoted in BELGERS *et al*., 2021), that there are fine pale anteroventral hairs and no strong black setae as in the new species. However, there is some variability in the colouration and strength of these setae. In some specimens there are only a few strong setae while in others there is an entire row (Fig. 5B). Apparently, there are only 3 strong setae on the left cercus in *S. subnubilus* however since the fourth strong seta is hidden at the inside it might have been overlooked. On the other hand, it is visible in lateral view, even on a not dissected specimen. The shape of the fork of the left cercus is gently curved in the new species (Fig. 4B) while it seems more angular in *S. subnubilus*. A long fine seta in the middle of the fork seems also lacking. The right cercus seems to lack the 3 setae on the right side (compare Fig. 4B with Fig. 4 in CHVÁLA, 1988). The shape and the bristling of the left surstylus (compare Fig. 4B, C with Fig. 3, 7 in CHVÁLA, l.c.) seems also different

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