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## New morphological data on *Leptogaster subtilis* Loew, 1847 (Diptera, Asilidae)

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A formal redescription of *L. subtilis* Loew, 1847 is provided, in particular with details of the male and female genitalia and with regard to individual variability. Former descriptions of *L. subtilis* and its synonyms are discussed.

Keywords: *L. subtilis*, redescription, male genitalia, female genitalia, variation.

### INTRODUCTION

Weinberg & Bächli (2005) treated the synonyms of *Leptogaster subtilis* Loew, 1847 and emphasized that the hypopygia illustrated by Janssens (1957), Tsacas (1960), Straka (1979) and Baez (1987) show the same external characteristics and, therefore, refer to the same species. All former descriptions of *L. subtilis* and its synonyms by Loew (1847), Engel (1930), Frey (1936), Janssens (1957), Tsacas (1960), Straka (1979), Baez (1987), Weinberg & Bächli (1995) and Tomasovic (1999) are incomplete and/or inadequate, the illustrations of the male hypopygia are schematic and, in particular, a description of the female genitalia is missing. Here, we take the occasion to give a redescription of the morphology of both sexes of *L. subtilis* based on specimens from Switzerland, including some aspects of individual variability.

### MATERIAL AND METHODS

The four Swiss specimens studied, belonging to the collection of the second author, are mentioned in our paper of 2005; they were collected in Pfynwald VS (male), Leuk VS (female), Ronco s/Ascona TI (female) and Locarno TI (male). Besides the description of morphological details, in particular of the genital components of both sexes, we provide line drawings and photographs, the latter taken by Dr. Eugen Nitzu on a stereo-microscope Olympus SZ60. The terminology is based on Wood (1981) and Majer (1997).

## RESULTS

*Leptogaster subtilis* Loew, 1847

*Leptogaster subtilis* Loew, 1847: 401

*Leptogaster fragilissima* Frey, 1936: 58 (syn. by Weinberg & Bächli 2005: 3)

*Leptogaster gallica* Janssens, 1957: 11 (syn. by Tomasovic 1996: 161)

*Redescription*

*Small flies*: Male 7-8 mm, wings 6 mm; female 6-7 mm, wings 5 mm, with long, slender abdomen (Figs 1A, 1B) and reduced chaetotaxy.

*Head*: Form of face and frons equal in both sexes. Ocellar tubercle and ocelli well developed. Eyes occupy most of the head (Fig. 2A); they are dichoptic and the lower ommatidia are larger than the upper ones. Along the occiput, near the posterior margin of the eyes, with a row of setae.

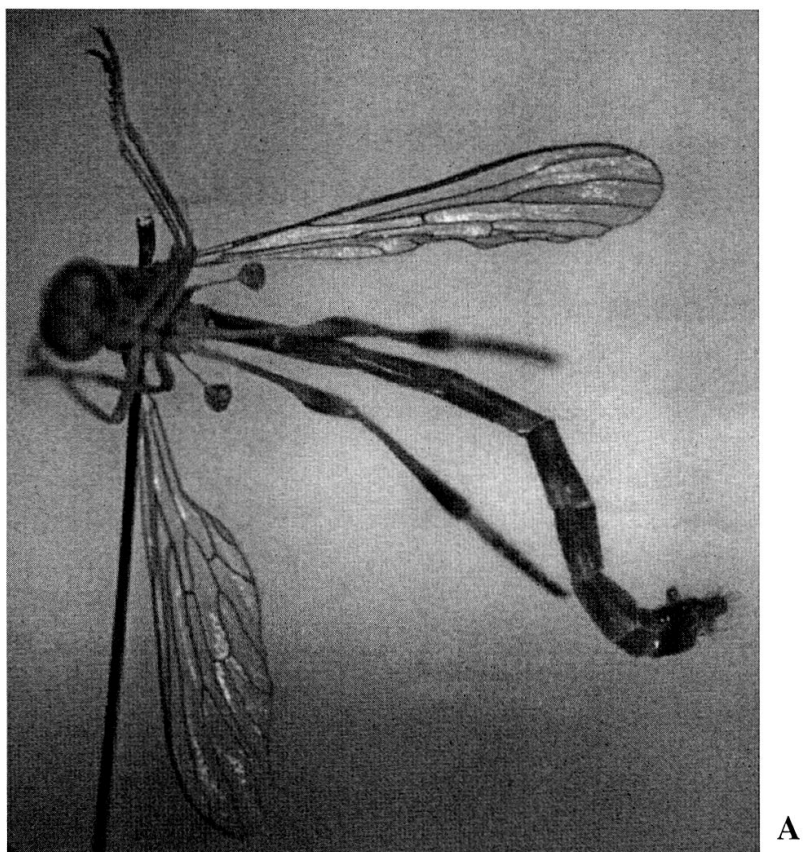
*Antennae* (Fig. 3A): short, yellow and brown, without sexual dimorphism but giving some taxonomic characters: scape and pedicel short, flagellum enlarged and covered with hairs, distally with a long, slender arista which has a sensillum at the apex. Flagellum as long as both basal articles and arista a little longer than pedicel and flagellum together.

*Variation*: Male from Locarno: antennae brownish-yellow, scape and pedicel laterally brown, flagellum on apical  $\frac{3}{4}$  and arista brown. Pedicel apically with yellow-white hairs, and the arista covered with fine hairs on its whole surface. Male from Pfynwald: antennae yellow, scape brown at the base, pedicel round, yellow, in apical third with brown setulae. Flagellum yellow, brown only basally, with white, fine hairs, arista a little shorter than all 3 articles together, with fine hair, slightly wider terminally, with a microarticle as long as the apical width of the arista. Females from Leuk and Ronco: antennae yellow, apex of flagellum and arista brown.

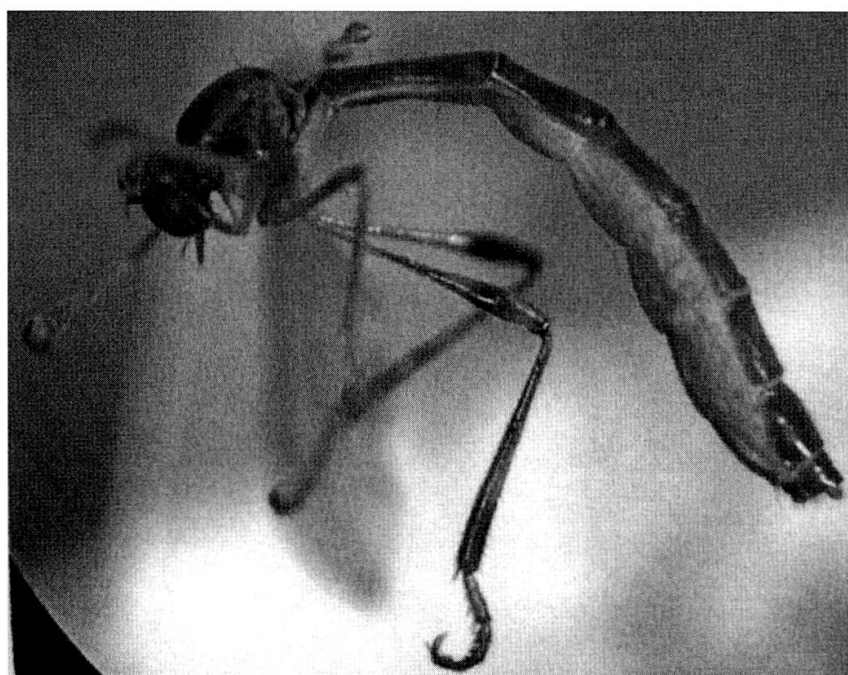
Occiput, frons and face with white microtrichosity. Frons widening dorsad. Face very narrow, distinctly widening ventrad. Face with a reduced mystax, in both sexes with a single row of 4 white setae at the mouth margin. The lower cavity of the head is small, the proboscis is rigid and adapted for piercing. Maxillary palpus short, one-segmented, attached immediately to the distal head capsule. In the male from Locarno proboscis and palpus are yellow. In the male from Pfynwald they are yellow-brown. In both females proboscis and palpus are brownish-yellow, apically brown.

*Thorax* (Fig. 2B): microtrichose, covered with very fine yellow setulae; on both sides with one strong, black notopleural seta and 1-2 shorter, yellow supraalar setae and even finer setulae of the same color (Fig. 3B). The postpronotal and postalar calli are yellow, covered with short, white setulae.

Characteristic for both sexes is that on the margins of the median band the thorax shows two shiny black bands, not extending beyond the middle of the thorax. Specimens of both sexes can have on each side of the thorax a dusty, silvery brown patch (Fig. 3B), which in some illumination appears shiny black. Scutellum short, slightly triangular, flat, dusty microtrichose and with fine, white setulae on its surface and 6 to 8 white setae marginally. The female from Leuk has marginally



A



B

Fig. 1. *L. subtilis* Loew: A, male, ventral view; B, female, lateral view.

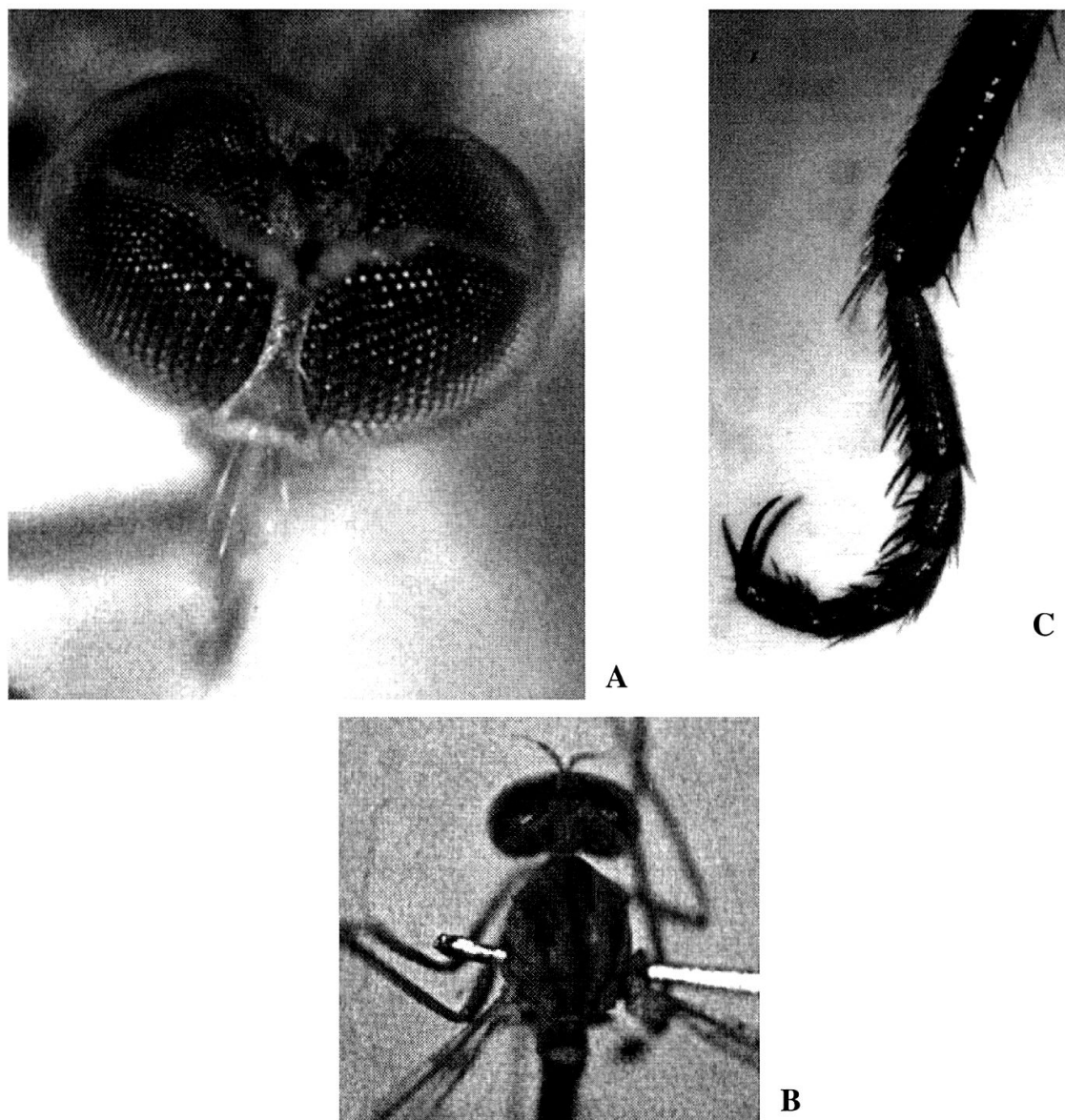


Fig. 2. *L. subtilis* Loew: A, head in dorsal view; B, head and thorax in dorsal view; C, apex of tibia and tarsi.

5 fine yellow hairs in the right half and 4 black setae in the left half of the scutellum.

*Wings* (Fig. 3C): transparent in both sexes, with brown veins, microtrichia and some rainbow-like reflections. All cells except discoidal cell are open. Anal lobe and alula absent.

*Halteres* (Fig. 3D): both stem and knob brown.

*Legs* (Fig. 1A, B): foreleg and midleg slender, without thickened modifications as in the hindleg. Trochanter small. Hindleg with femur and tibia distinctly swollen apically. Five tarsomeres (Fig. 2C), the first one long, the four distal ones shortened. Praetarsus (Fig. 3E) with a pair of claws and an unpaired median process, the empodium. The claws are long and pointed and the empodium is short, (Fig. 3E). Pulvilli absent. Ventral side of all tibiae and tarsomeres with spines and a dense brush of short setae (Fig. 2C).

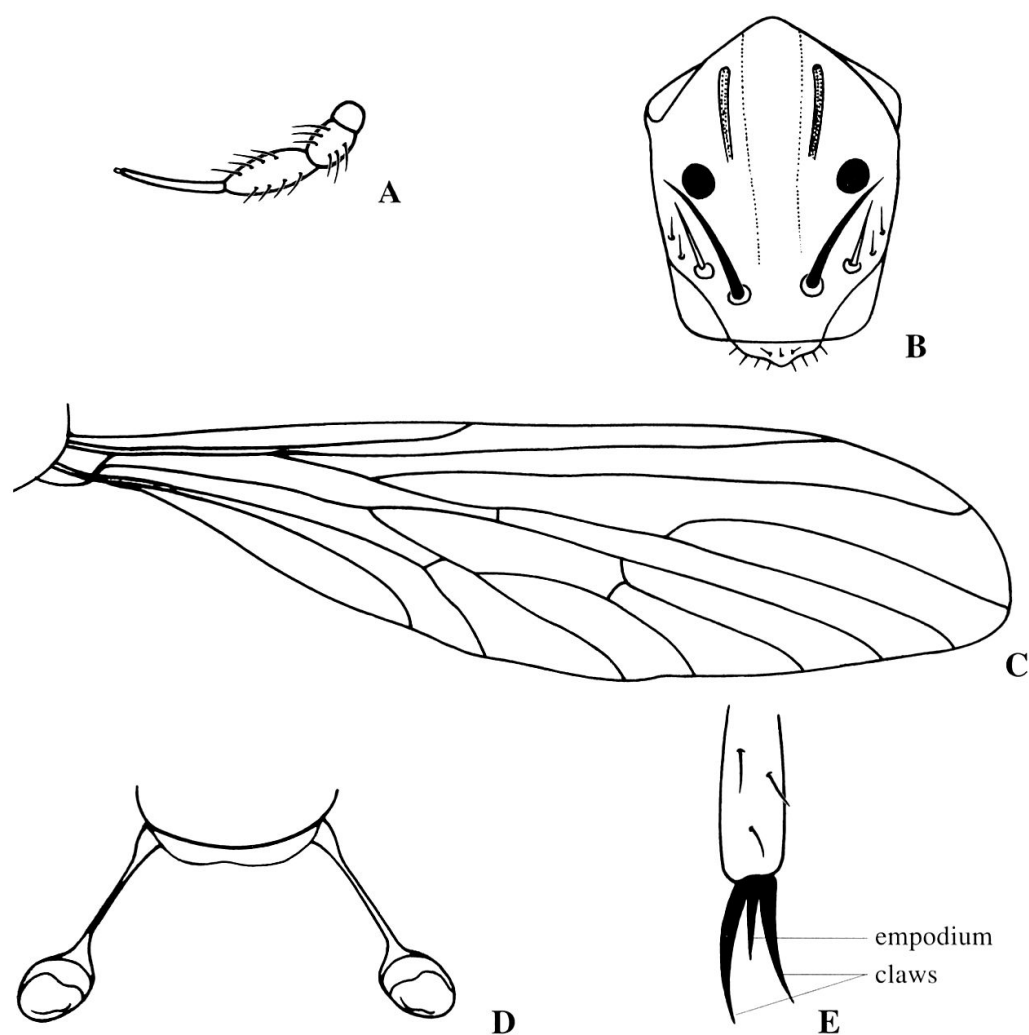


Fig. 3. *L. subtilis* Loew: A, antenna in lateral view; B, thorax in dorsal view; C, wing, D, halteres; E, apex of praetarsus with claws and empodium.

The color of the legs varies individually. In the male from Locarno (Fig. 1A), the legs are partially yellow, but the coxae, trochanter and the last 3 tarsomeres are brown. In the female from Leuk femora and tibiae of the foreleg and midleg are yellow, the thickened parts of femur and tibia of the hindleg are apically brown (Fig. 1B).

*Abdomen* (Figs 4A, 4B): long, slender, in both sexes with 8 segments anterior to the genitalia. Its length is 4.5–5 times as long as the thorax. The tergites have different lengths: tergite 1 almost invisible; tergite 2 very long in both sexes (Fig. 4A, B) and with lateral spines; tergite 2 as long as tergites 3 and 4 together, which are subequal; tergites 5 to 7 subequal, each one slightly shorter than the preceding one; tergites 7 and 8 with setae. All tergites have microtrichia and their color is brown, with narrow yellow zones at the connections between them. Anus and cerci are the most prominent elements of the proctiger (Figs 4A, 4B, 5A, 5B).

*Male genitalia* (Figs 5A, 6A, 6B, 7A-D): Hypopygium basally black, apically brown-yellowish. Epandrium divided into two parts, connected at the base, with



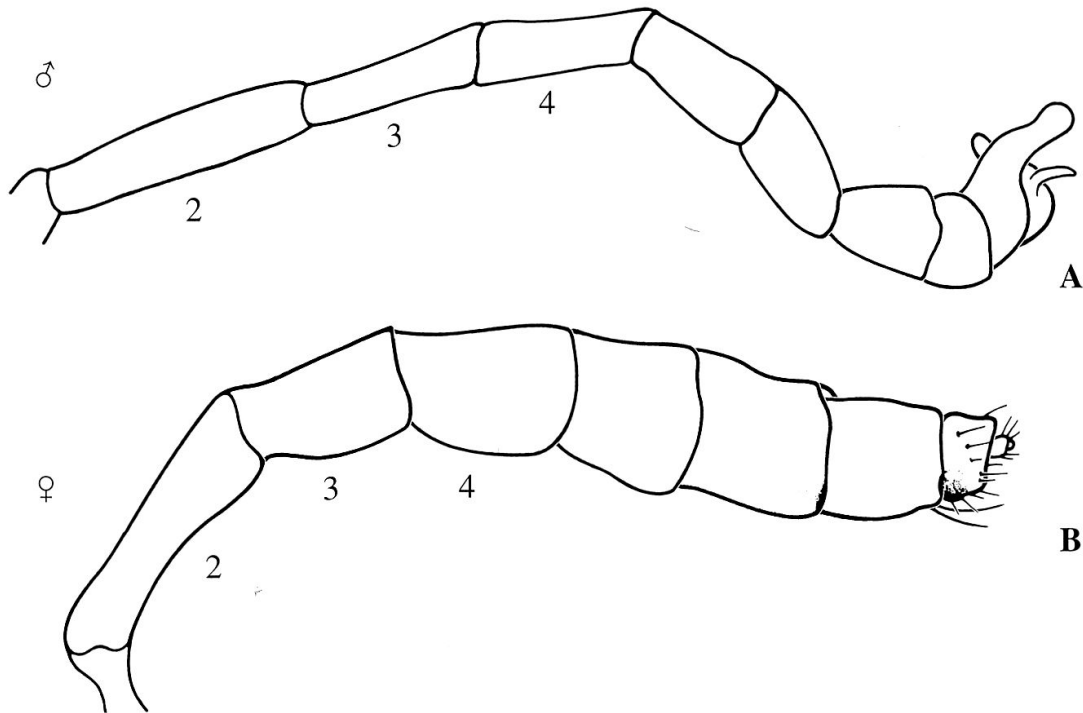


Fig. 4. *L. subtilis* Loew: draft of abdomen in lateral view; A, male; B, female.

setae and spines, constricted in the middle and laterally with a short, triangular extension, apex broadly round, truncate, curved inwards and with a bunch of short black setae (Figs 6A, 6B, 7A). Between the two parts of the epandrium is the procitiger which consists of a dorsal and a ventral part; between them, the anus and distally the two cerci are separated (Fig. 5A). Hypandrium very large, convex with rounded sides and with apical processes, two rounded ones in the middle and two pointed ones laterally (Fig. 7B), covering the gonopods which are fused with the hypandrium at its inner ventral base. The two gonopods are complicated, gonocoxites with two characteristic processes, one below middle and one below apex; both articulating with the posterior margin of the hypandrium. The gonostylus is inserted apically on the gonocoxite (Figs 7A-C). The external processes of the gonocoxites are slender, apically rounded, with two white setae; the inner ones are rounded, pointed processes which are bifid distally (Fig. 7A). Gonostylus broadly rounded, apically with pointed end (Fig. 7B, C). Aedeagus (Fig. 7D) short, slightly curved, basally with a large, rounded apodema and two long, lateral plates which in lateral view are pointed at the end. The aedeagus is situated between the gonocoxites and laterally connected with them by the two basal plates (Fig. 7A).

*Female genitalia:* the short ovipositor is not differentiated. Sternit 8 laterally with grey, roundish microtrichosity (Fig. 5B). Genital orifice between segments 8 and 9. Tergite 8 (Fig. 8A) without grey microtrichosity. Tergite 9 (Fig. 8B) with anus and cerci. Hypogyna medially weakly sclerotized (Fig. 8C). Three spermathecae (Fig. 8D), with weakly sclerotized tubes. The ends of the tubes are not visible because they are covered by eggs. Common duct of spermathecae moderately long and relatively weakly sclerotized. Furca with two lateral arms, connected by a membrane. The two separate lateral bars are connected at both ends.

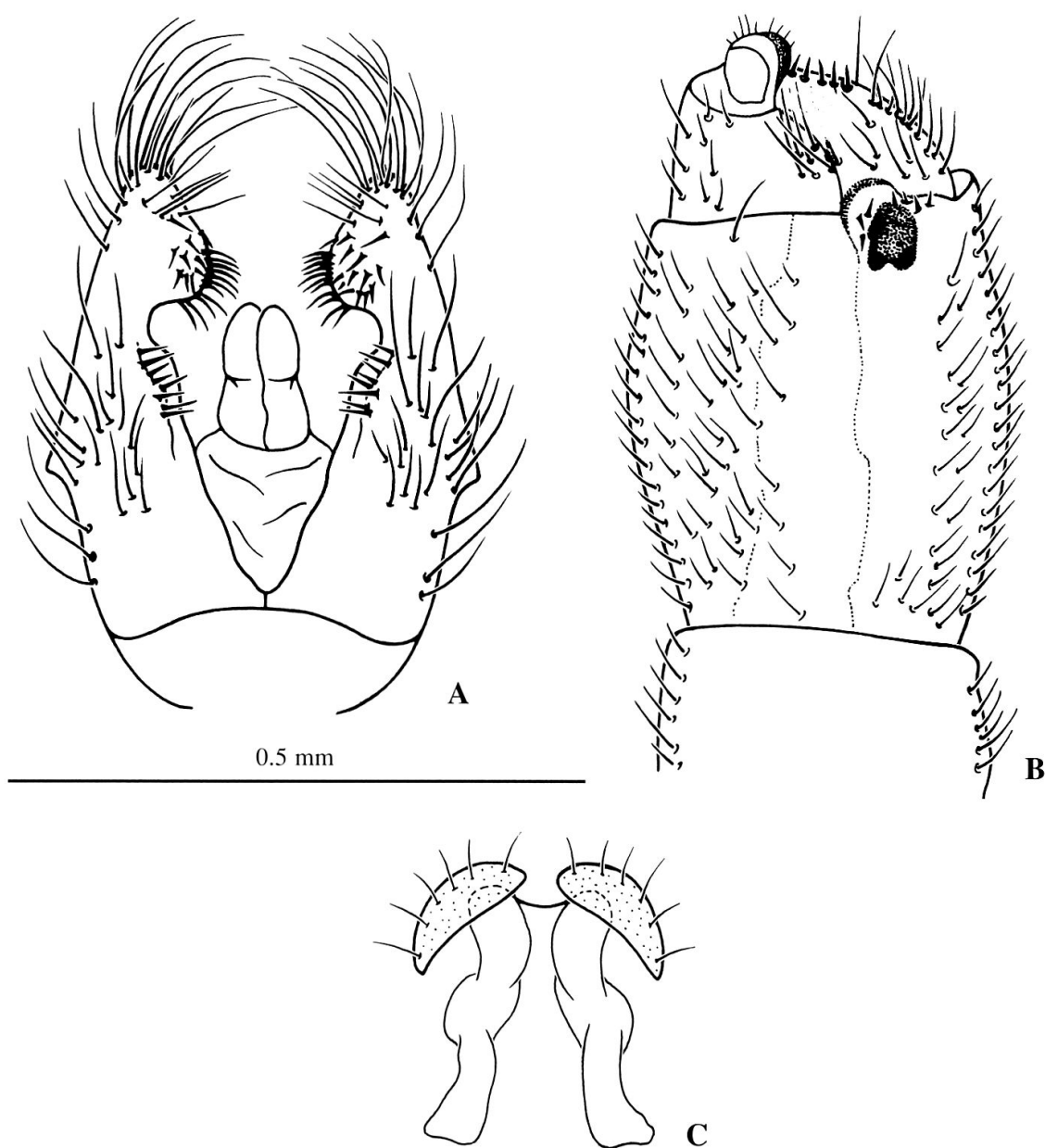


Fig. 5. *L. subtilis* Loew: A, terminalia of the male in dorsal view; B, terminalia of the female in lateral view; C, anus and cerci.

The shape of the female genitalia of *L. subtilis* is close to those of *L. gracilis* Loew as illustrated by Theodor (1976: 17), but the common duct in *L. gracilis* is shorter than in *L. subtilis*.

*Remarks.* Certain parts of the genitalia cannot be described in detail. This applies particularly to the gonopods of the male and to the spermathecae ends of the female, as explained above.



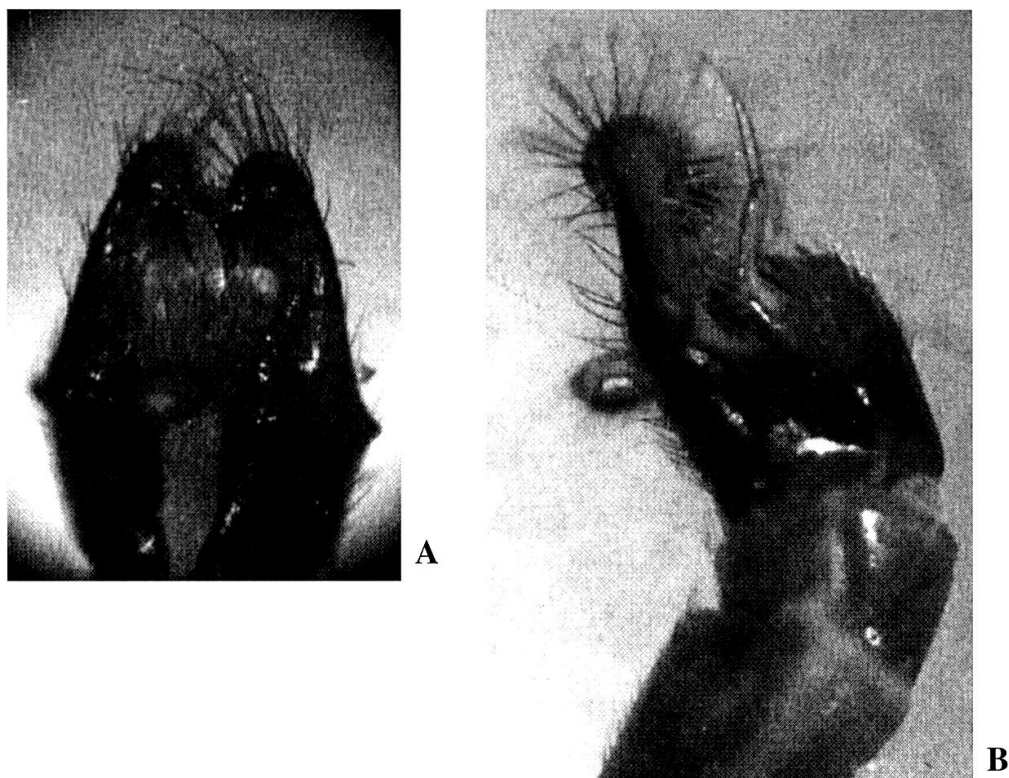


Fig. 6. *L. subtilis* Loew: Hypopygium in dorsal and lateral view.

#### DISCUSSION

After the study of 4 specimens only, we now know that the specimens of this species are subject to individual variability. Therefore, we re-analyzed the morphological descriptions given by Janssens (1957) for his *L. gallica*, Tsacas (1960) and Straka (1979) for *L. subtilis*, and Baez (1987) for *L. fragilissima* Frey, 1936. In addition, we have redrawn the illustrations published by the authors mentioned (Figs 9A-D). The great resemblance of their illustrations, compared with both drawings and photos for *L. subtilis* from Switzerland given here by us (Figs 6, 7A), is obvious.

After analyzing the formal descriptions of the authors mentioned above, we found that the differences are not very big and they are considered to fall within the variability among individuals of the species, as we have shown above for the coloration variability in the four Swiss specimens. Also Straka (1979) supposed that the morphological characters of the male from Slovakia are within the variability of *L. subtilis* (Fig. 9B). Baez (1987), in comparison with the description of *L. fragilissima* given by Frey (1936), found small differences only; all males show no chromatic differences and have the same shape of the hypopygium (Fig. 9D).

Therefore, our former decision (Weinberg & Bächli 2005: 3) about the synonymies of *L. subtilis*, based on the overall shape of the male genitalia but without considering many details described in older descriptions, is now corroborated.

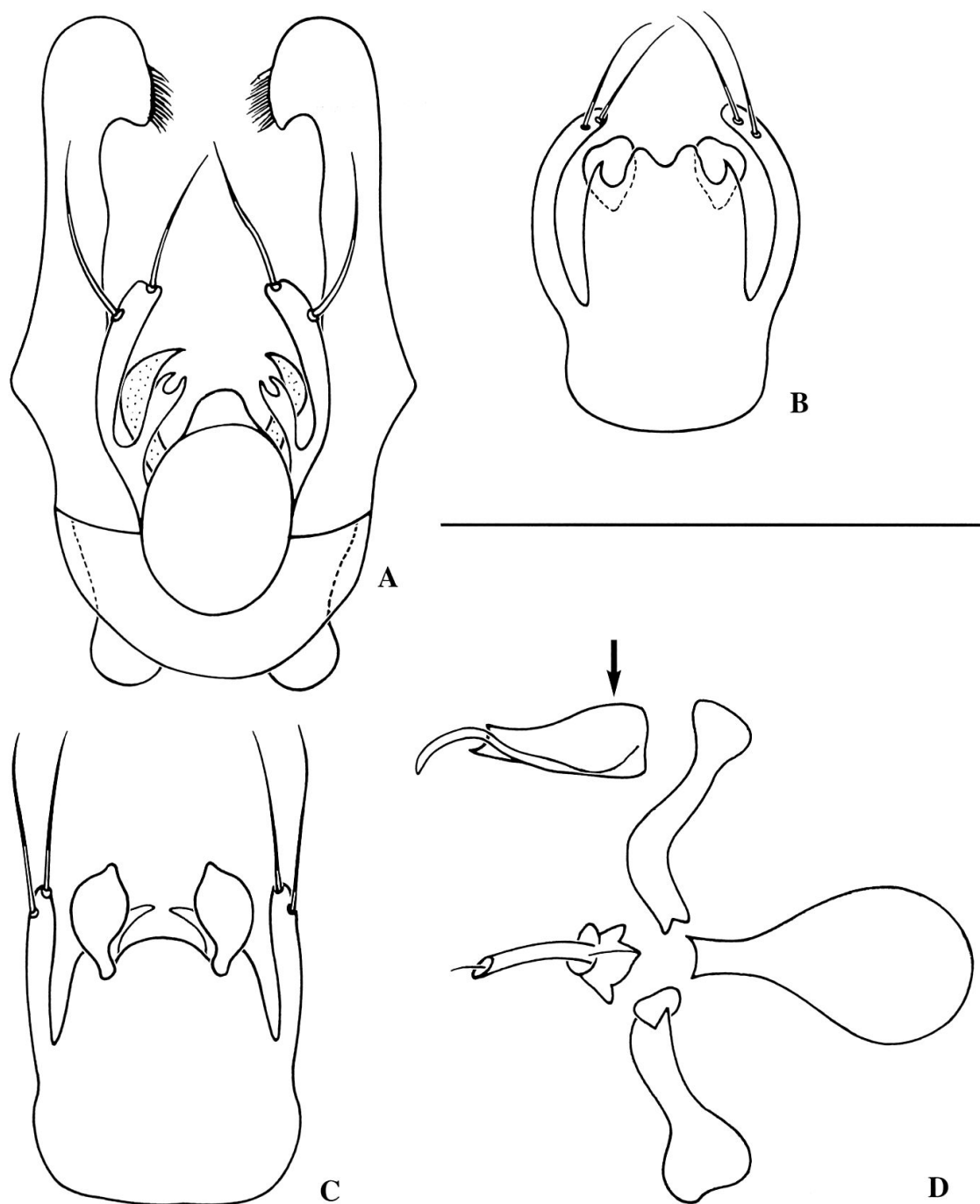


Fig. 7. *L. subtilis* Loew: A, hypopygium in ventral view; B, hypandrium with apical half of gonopods in dorsal view; C, hypandrium with apical gonopods in ventral view; D, aedeagus in dorsal view, with one basal plate in lateral view. A and D belong to 1 mm scale, B and C belong to 0.5 mm scale.

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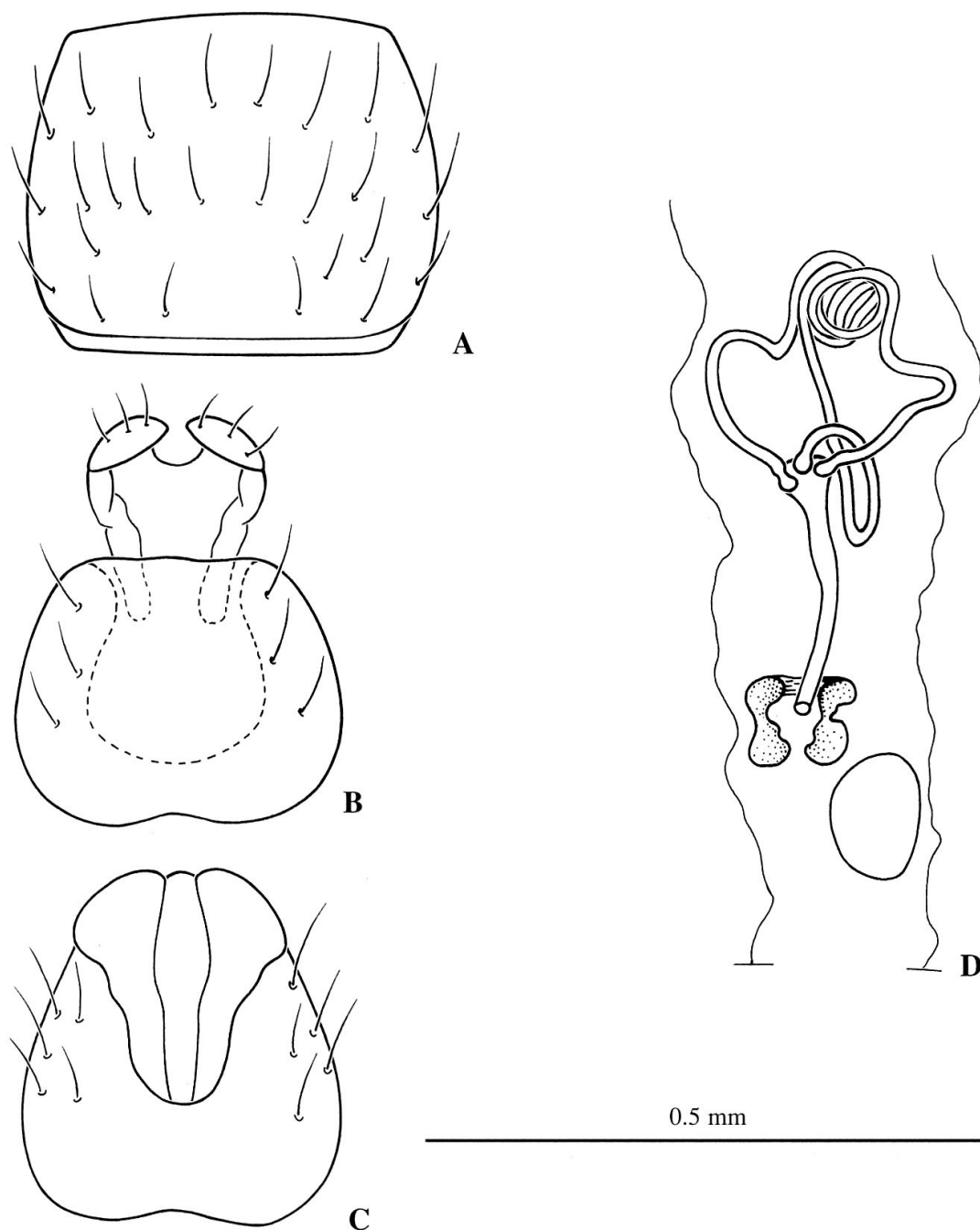


Fig. 8. *L. subtilis* Loew: Sclerite of female genitalia, A, tergite 8; B, tergite 9 in dorsal view with anus and cerci; C, hypogyna in ventral view; D, furca with common duct and spermathecae.

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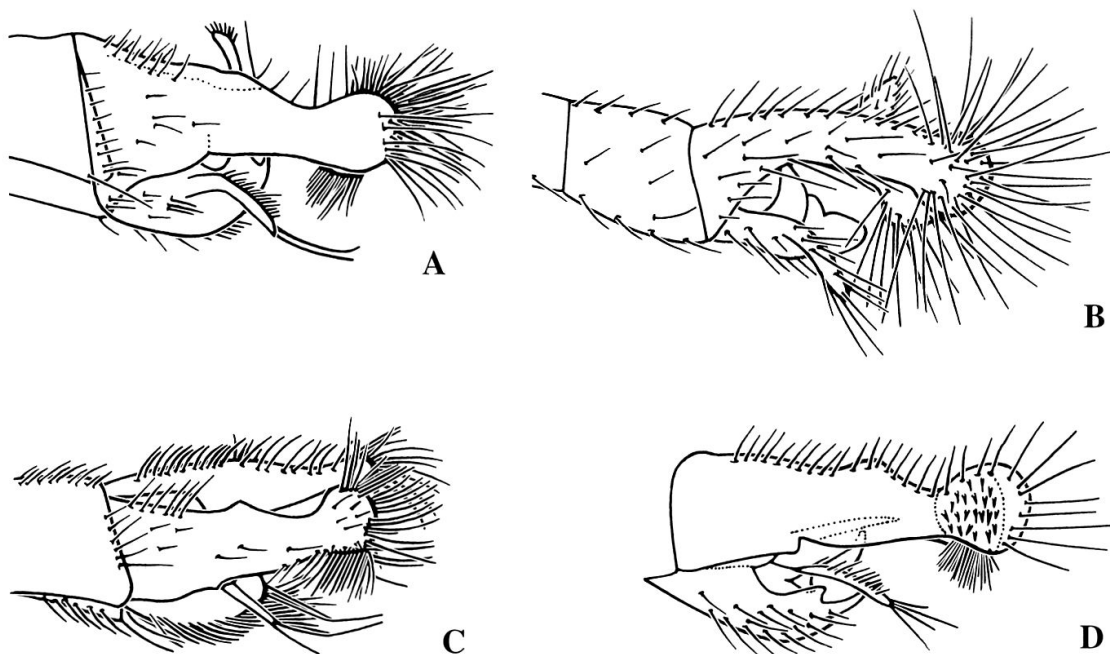


Fig. 9. Hypopygium in lateral view: A, *L. subtilis*, redrawn from Tsacas (1960); — B, *L. subtilis*, redrawn from Straka (1979); — C, *L. gallica*, redrawn from Janssens (1957); — D, *L. fragilissima*, redrawn from Baez (1987).

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