

**Biting midges of the genus *Stilobezzia* KIEFFER, 1911 in Poland  
(Diptera: Ceratopogonidae)**

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**ABSTRACT.** Three species of the genus *Stilobezzia* KIEFFER, 1911 are reported from Poland: *Stilobezzia antennalis* (COQUILLET, 1901), *Stilobezzia gracilis* (HALIDAY, 1833) and *Stilobezzia ochracea* (WINNERTZ, 1852). They are diagnosed and illustrated. A key for the determination of males and females of Central European species is also provided. *Stilobezzia virescens* KIEFFER, 1919 is recognized as a new junior synonym of *Stilobezzia flavirostris* (WINNERTZ, 1852).

**KEY WORDS:** Diptera, Ceratopogonidae, *Stilobezzia*, new synonym.

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INTRODUCTION

Biting midges of the genus *Stilobezzia* KIEFFER, 1911 are a large and widespread group including 346 species (BORKENT 2012). Larvae are found in aquatic and semi-aquatic habitats such as streams, lakes, puddles, swamps, rice fields, rock pools, mosses and wet tree cavities (WIRTH & SPINELLI 1992). Adult females feed on small, soft bodied insects, mainly midges of the family Chironomidae (DE MEILLON & WIRTH 1991, WIRTH & SPINELLI 1992). In Poland three species of *Stilobezzia* have been recorded: *Stilobezzia ochracea* (WINNERTZ, 1852), *Stilobezzia gracilis* (HALIDAY, 1833) and *Stilobezzia flavirostris* (WINNERTZ, 1852) (SZADZIEWSKI 2007). The present study has shown that *Stilobezzia flavirostris* was misidentified and must be replaced by *Stilobezzia antennalis* (COQUILLET, 1901) in the Polish fauna.

### Acknowledgements

The authors thank Dr Pol Limbourg of the Royal Belgian Institute of Natural Sciences, Brussels, and Dr William Grogan of the Florida State Collection of Arthropods, Gainesville, for providing of the some materials used in the present study.

## MATERIAL AND METHODS

Specimens were slide-mounted in a mixture of phenol and Canadian balsam, as described by WIRTH & MARSTON (1968). Most of them are housed in the collection of the Department of Invertebrate Zoology and Parasitology, University of Gdańsk, Poland. The specimens of *Stilobezzia flavirostris* from Belgium were loaned from the collection of the Royal Belgian Institute of Natural Sciences.

## SYSTEMATICS

### Genus: *Stilobezzia* KIEFFER, 1911

Type species: *Stilobezzia festiva* KIEFFER, 1911, by original designation.

#### Diagnosis

Body slender and rather bare (Fig. 1). Eyes bare. Antenna long and slender. Palpus 5-segmented. Third palpomere with small sensory pit. Legs slender, femora of fore legs usually unarmed, rarely with ventral spines; fourth tarsomeres cordiform; male's fifth tarsomeres unarmed, female's unarmed or armed with batonnets; claws of males short and equal, claws of females single, long, with basal tooth (Fig. 2b). Female wing with or without macrotrichia; two radial cells present. Female genitalia with two seminal capsules, rarely with three or one. Aedeagus of male genitalia with pair of oblique lateral sclerites, straight or S-shaped. Parameres separate, straight or curved. Gonocoxite simple or with lobes or tubercles on inner side (WIRTH & GROGAN 1988, DE MEILLON & WIRTH 1991).

### Subgenus: *Stilobezzia* KIEFFER, 1911

#### Diagnosis

Female wing without macrotrichia (Fig. 2a). Female's fifth tarsomeres usually with ventral batonnets (Fig. 2c) (WIRTH & GROGAN 1988). In male genitalia lateral sclerites of aedeagus slender and straight, parameres S-shaped (Fig. 3b).



Fig. 1. Male of *Stilobezzia ochracea*.

***Stilobezzia (S.) antennalis* (COQUILLET, 1901)**

*Ceratopogon antennalis* COQUILLET, 1901: 606 (USA, male).

*Stilobezzia antennalis*: KIEFFER 1919: 308 (combination in key); WIRTH & GROGAN 1981: 66 (male, female, biology, distribution, pupa, larva, USA); KNOZ 1997: 80 (record in the Czech Republic).

**Diagnosis**

Smaller than *S. flavirostris*, with female wing 1.5-1.8 mm long. Female second radial cell 4.5-5.0 times longer than first one. Female third palpomere about 1.5-1.6 times longer than fourth. Distal portion of male paramere slender and pointed.

### Description

Male. Head brown. Length of flagellum 1.22-1.42 mm. Antennal ratio 1.33-1.46. Third palpomere long and slender, 0.07-0.09 mm long, 1.3-1.6 times longer than fourth; sensory pit indistinct; PR 4.2-5.0. Thorax brown. Scutum slightly darker than the rest of the body. Scutellum with six marginal setae. Wing length 1.32-1.89 mm. CR 0.67-0.71. Second radial cell 5.0-5.8 times longer than first one. Legs yellow, mid and hind femora darker (Fig. 2d). Claws simple, short, equal with bifid apices. TR(I) 1.8-2.2, TR(II) 2.5-2.7, TR(III) 1.9-2.1.

Tergite IX of genitalia rounded caudally. Gonocoxite with ventral bilobed expansion on basal half (gonocoxite apodeme); caudal expansion evidently bicorned. Gonostylus evenly curved (Figs 3a, c). Aedeagus with straight lateral rod-like arms. Parameres S-shaped, strongly sclerotized, distal portion slender, with pointed apex (Fig. 3b).

Female. Similar to male with usual sexual differences. Antennal ratio 1.3-1.5. Third palpomere long and slender, 0.07-0.09 mm long, 1.5-1.6 times longer than fourth (Figs 4a, b); PR 4.2-4.4. Scutellum with six setae. Wing length 1.51-1.79 mm, CR 0.69-0.74. Second radial cell 4.5-5.0 times longer than first one. Fifth tarsomere of fore and mid legs with two batonnets. Claws long, curved, single, with basal tooth. TR(I) 1.8-2.1, TR(II) 2.4-2.6, TR(III) 1.9-2.1.

Two unequal functional seminal capsules present. Larger one oval (0.11-0.13 mm x 0.08-0.10 mm), with short neck and smaller one subspherical (0.04-0.05 mm x 0.04-0.05 mm), with long neck. Third one very reduced and scarcely visible (Fig. 2e).

### Material examined

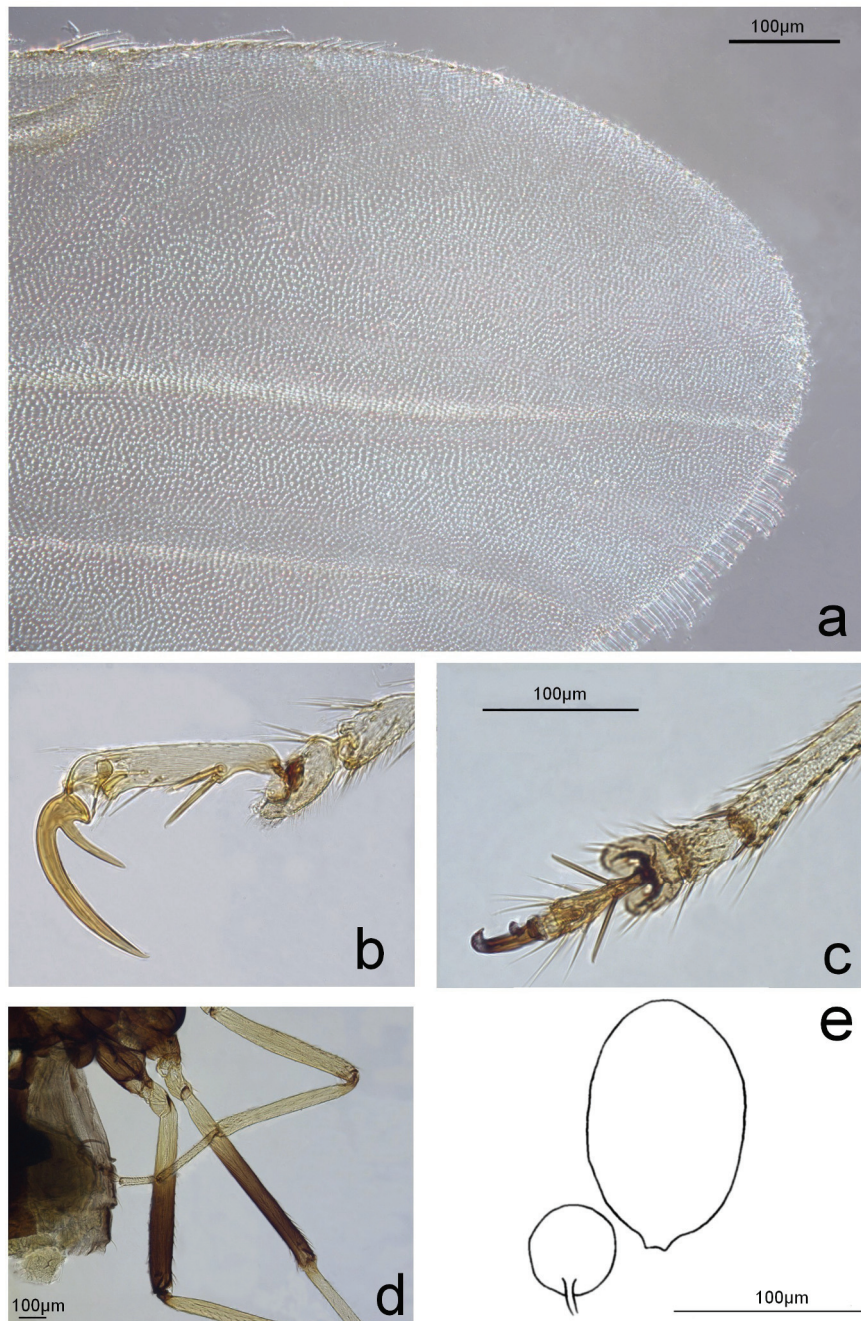
**Poland:** Rzegnowo n. Przasnysz, 12.06.1993, 1 female, leg. K. Grędzińska; Wapnica, Jezioro Turkusowe, Wolin, 24.06.1993, 1 male, leg. J. Krzywiński; **Czech Republic:** Lednice, 06.08.1985, 02.08.1988, 2 males, leg. J. Knoz; Želešice, 30.07.1987, 1 male, leg. J. Knoz; **USA:** Florida, Liberty Co. Torreya St. Park, 15.04.1951, 05.09.1968, 1 female, 1 male, leg. F.S. Blanton; MD, Wicomico Co., Wango Nassawango Creek at Waste Gate Road, 6-12.06.2006, 27.06-04.07. 2006, 1 female, 1 male, W.L. Grogan Jr.

### Distribution and biology

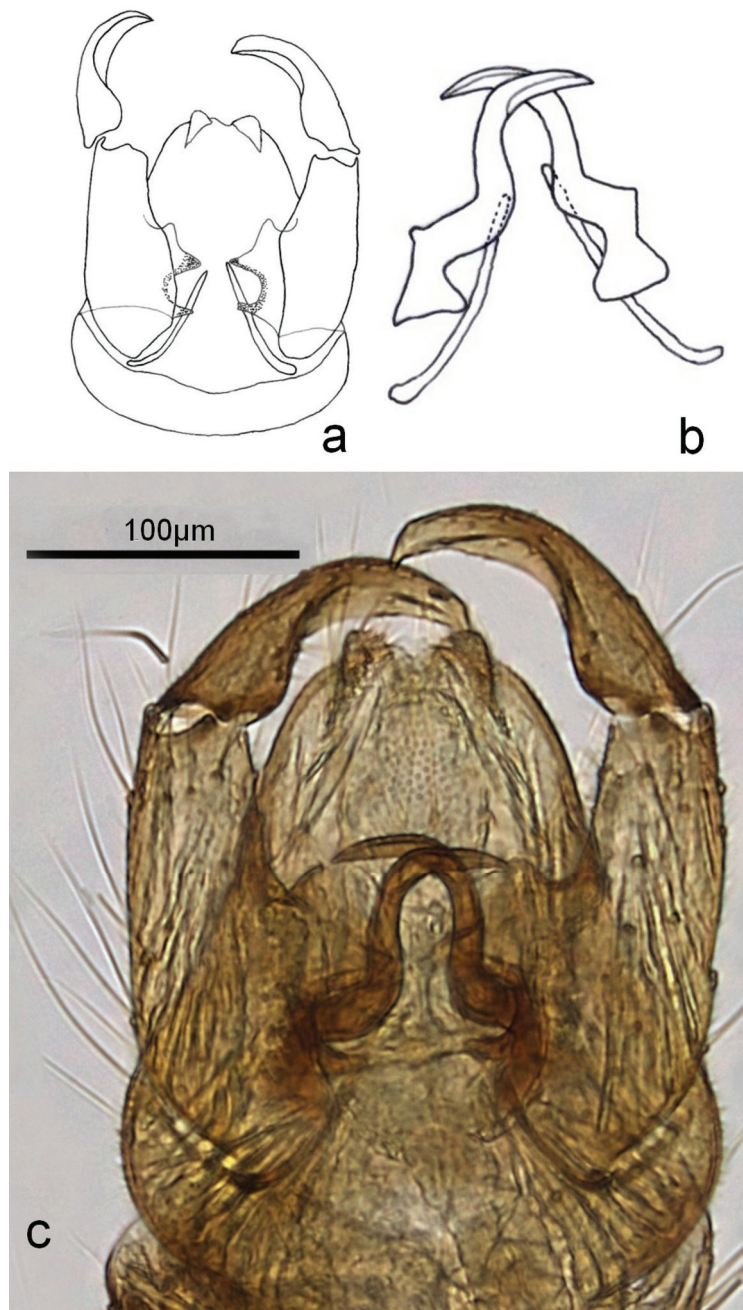
The Czech Republic and USA. Reported from Poland for the first time. Immature stages of *Stilobezzia antennalis* have been reported from mud, a shore line, a small cold stream and pond weeds (WIRTH & GROGAN 1981). W.L. Grogan has collected females of *S. antennalis* with their chironomid prey – *Ablabesmyia monilis* (L.) (personal comm.).

### Discussion

This species can be easily identified from the males. Smaller females of *S. antennalis* (wing length 1.5-1.8 mm) are very similar to larger females of *S. flavirostris* (wing length 2.1-2.2 mm). The females of both species also differ in having different proportions of palpomeres and wing radial cells. In females of *S. antennalis* third palpomere is about 1.5-1.6 times longer than the fourth, and the second radial cell is 4.5-5.0 times longer than the first one. In females of *S. flavirostris* these values are 1.8-1.9 and 4.2-4.3 respectively.



**Fig. 2.** Female of *Stilobezzia antennalis*: a – apex of wing, b – claw of fore leg, c – batonnets of mid leg, d – colouration of legs, e – seminal capsules.



**Fig. 3.** Male genitalia of *Stilobezzia antennalis*: a – ventral aspect without parameres, b – parameres and aedeagus, c – photo of ventral aspect.

*Stilobezzia (S.) flavirostris* (WINNERTZ, 1852)

*Ceratopogon flavirostris* WINNERTZ 1852: 52. (male, female) (Germany).

*Stilobezzia albicornis* KIEFFER, 1919: 84. (Austria).

*Stilobezzia flavirostris*: KIEFFER 1925: 91. (Belgium, the Netherlands, Austria, England, France), SZADZIEWSKI & BORKENT 2003: 257 (distribution).

*Stilobezzia virescens* KIEFFER, 1919: 84 (female, Hungary); GOETGHEBUER, 1934: 55 (female, Hungary); ZILAHİ-SEBESS 1940: 72 (female, Hungary); SZADZIEWSKI, 1986: 75 (male neotype, Bulgaria). **Syn. n.**

**Diagnosis**

Males easily distinguished by the stout and blunt parameres. Females very similar to *S. antennalis* (see above). Wing 2.1-2.2 mm long, second radial cell 4.2-4.3 times longer than first one. Third palpomere 1.8-1.9 times longer than fourth.

**Description**

Male. Head dark. Antennal ratio 1.29. Third palpomere 0.09 mm long, 1.7 times longer than fourth; PR 6.2. Thorax brown. Scutellum with six setae. Wing length 1.98 mm, CR 0.66- 0.68. Second radial cell 4.1 times longer than first one. Legs yellow, mid and hind femora half brown, fore femora completely yellow. TR(I) 1.9-2.1, TR(II) 2.5-2.7, TR(III) 2.0.

Tergite IX massive, caudal margin with V-shaped incision. Cerci distinct. Gonocoxite with massive lobe. Apex of gonostyle pointed (Figs 5a, c). Sclerites of aedeagus long and thin. Parameres S-shaped, short and massively ended with big recess (Fig. 5b).

Female. Similar to male with the usual sexual differences. Antennal ratio 1.41-1.55. Third palpomere 0.13 mm long, 1.8-1.9 times longer than fourth (Figs 4c, d); PR 5.3. Scutellum with six setae. Wing length 2.16-2.19 mm, CR 0.75-0.80. Second radial cell 4.2-4.3 times longer than first one. Fifth tarsomeres of fore and mid legs with two batonnets. Claws long, curved, single with basal tooth. TR(I) 2.1-2.3, TR(II) 2.7, TR(III) 2.1-2.3. Two functional seminal capsules present, the bigger one (0.12-0.14 x 0.09-0.12 mm) with short neck and the smaller one (0.05-0.06 x 0.05-0.06 mm) with long neck; the third one vestigial and scarcely visible.

**Material examined**

**Belgium:** Destelbergen, 05-08.06.1915, 2 males, 1 female; Gand, 28.05.1914, 08.06.1910, 11.06.1910, 3 females. **Bulgaria:** Jasna Poliana, 10.06.1982, 1 male, neotype of *S. virescens*, leg. W. Krzemiński. **Czech Republic:** Želešice, 13.07.1987, 30.07.1987, 1 female, 1 male, leg. J. Knoz.

**Distribution**

*S. flavirostris* has been recorded in Austria, Belgium, Bulgaria, the Czech Republic, Estonia, France, Germany, Great Britain, Hungary, Italy, Lithuania, the Netherlands, Central and Northwest Russia, Ukraine. It does not occur in Poland. The earlier report from

Poland by SZADZIEWSKI & BORKENT (2003) turned out to be a misidentification based on a female that is now identified as *S. antennalis* (see above).

#### Discussion

SZADZIEWSKI (1986) mentioned that more or less brown *S. flavirostris* and green *S. virescens* were very similar. It was suggested that they might be synonyms. The differences between these species, such as colouration, are not significant enough to be taken into account. They may be caused by nutrition (green colour) and a mixture of xanthophyll and  $\beta$ -chlorophyll (FUZEAU-BRAESCH 1985) supplied in the food. The species of this genus are predators, also in the larval stage, mainly of chironomid midges, which feed on algae or plants (SILVA et al. 2008). Pigments can accumulate in their bodies, which may affect the colour of newly hatched *Stilobezzia*. Present studies of larger material confirm the earlier suggestion that *S. virescens* is a junior synonym of *S. flavirostris*.

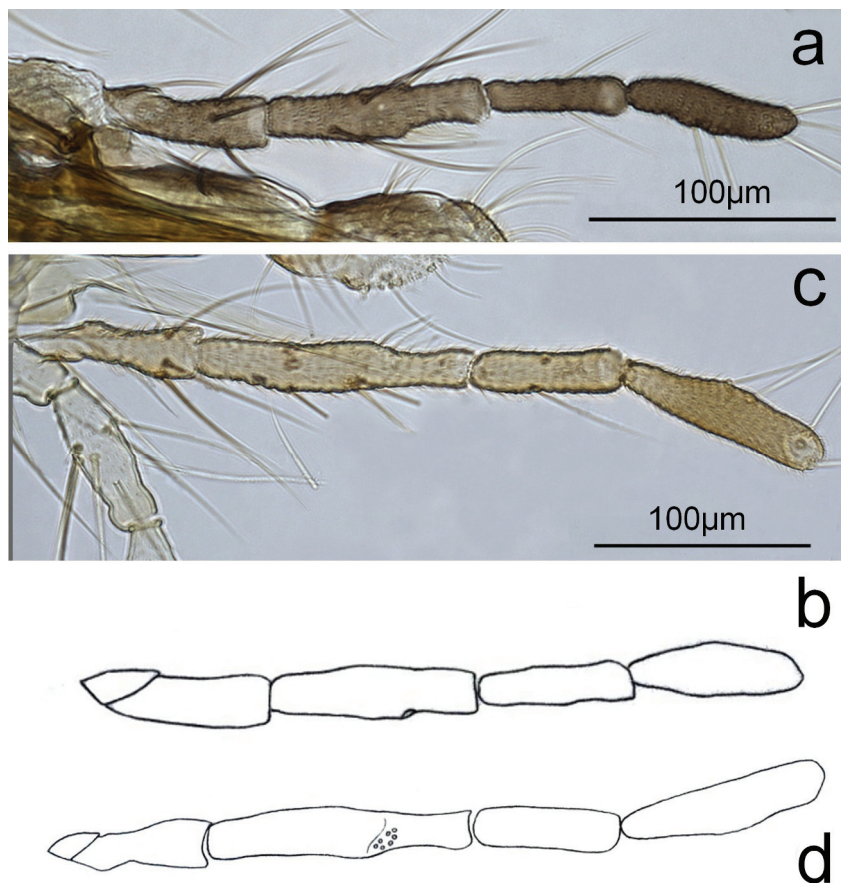
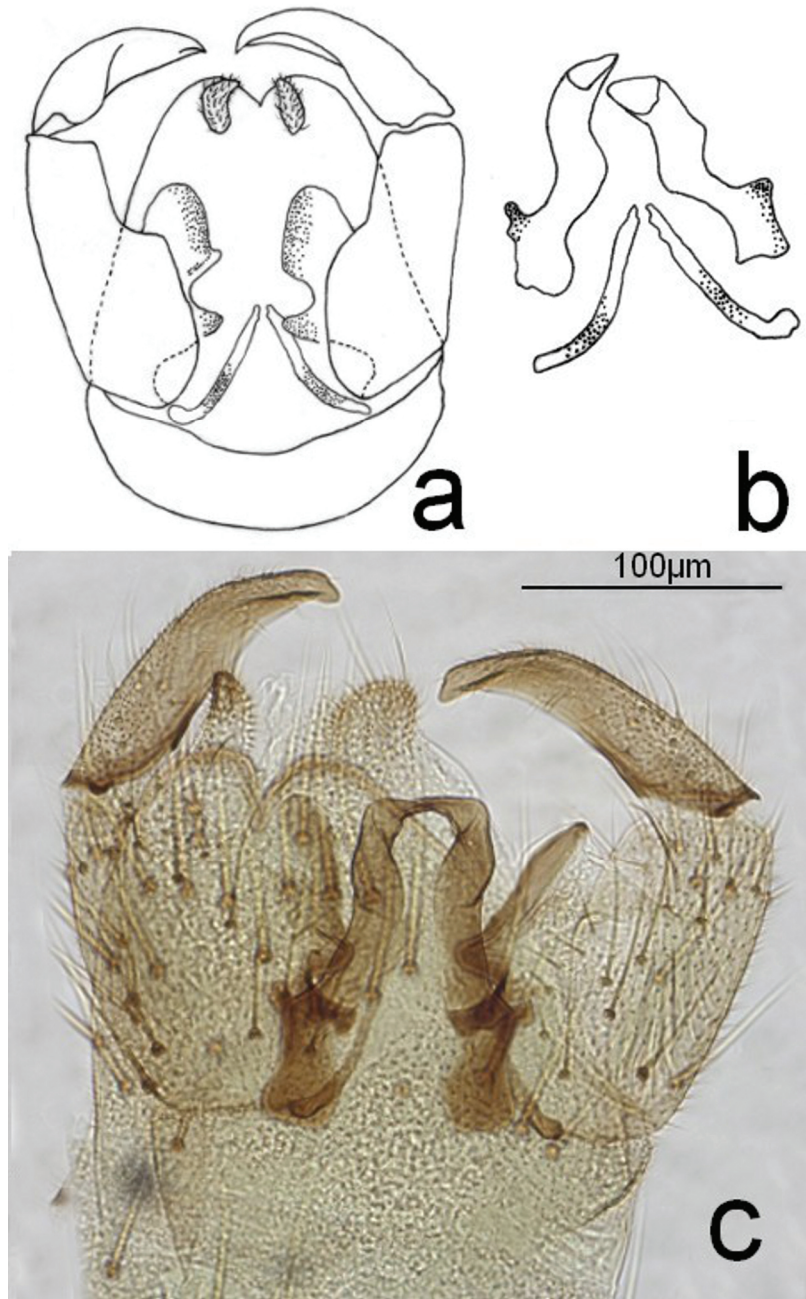


Fig. 4. Female palps: a, b – *Stilobezzia antennalis*, c, d – *Stilobezzia flavirostris*.





**Fig. 5.** Male genitalia of *Stilobezzia flavirostris*: a – ventral aspect without parameres, b – parameres and aedeagus, c – photo of ventral aspect.

**Subgenus: *Acanthohelea* KIEFFER, 1917**

*Acanthohelea* KIEFFER, 1917: 198.

*Paleotetragoneura* MEUNIER, 1920: 897 (1920b: 1221).

*Neostilobezzia* GOETGHEBUER, 1934: 53 (as subgenus of *Stilobezzia*); WIRTH, 1953: 63.

**Diagnosis**

This subgenus was distinguished because of the presence of macrotrichia at the top of the wing (Fig. 6a). Male genitalia have a bent aedeagus with a bulge in the middle (WIRTH 1953). Femora without spines, setae on legs are strong, especially on tibiae (Fig. 6c); fifth tarsomeres rarely with ventral spines. One or two seminal capsules present (DE MEILLON & WIRTH 1991).

***Stilobezzia gracilis* (HALIDAY, 1833)**

*Ceratopogon gracilis* HALIDAY, 1833: 152 (male, female, Ireland).

*Ceratopogon dorsalis* ZETTERSTEDT, 1850: 3644 (male, female, Sweden).

*Stilobezzia gracilis*: KIEFFER, 1919: 82 (male, female, Hungary, combination), KIEFFER 1925: 90 (France), REMM 1966: 65 (record, Lithuania), SZADZIEWSKI 1986: 74 (male, female, synonymy, distribution), ORSZAGH & CHALUPSKY 1987: 50 (record, Slovakia), KNOZ 1997: 80 (record, Czech Republic), DELECOLLE 2002: 28 (record, Andorra).

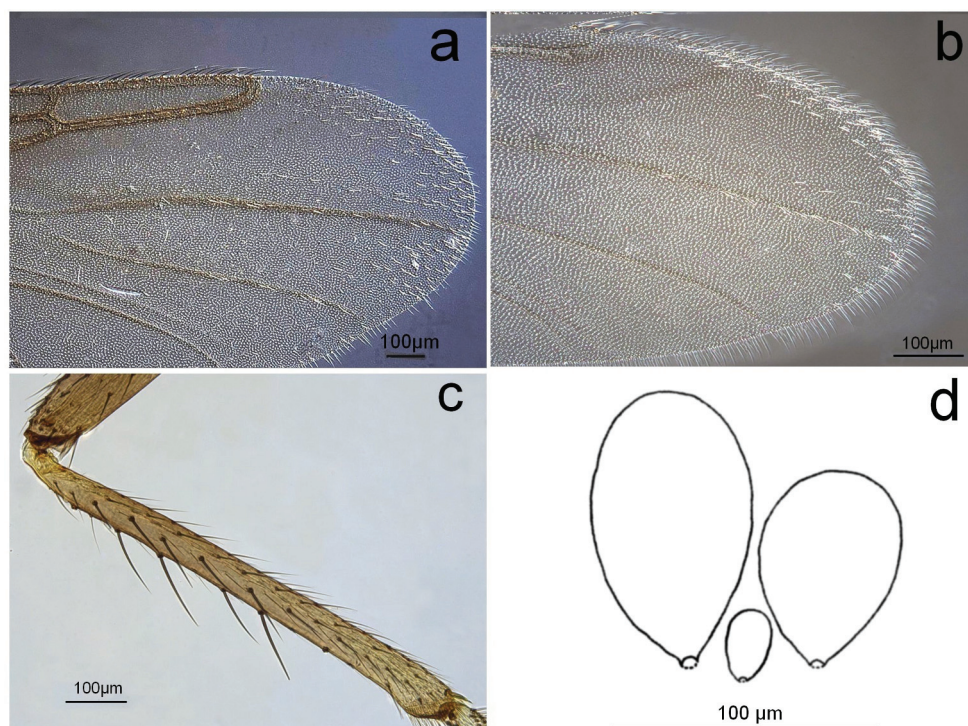
**Diagnosis**

The species is characteristic in having the following combination of characters: both sexes with macrotrichia on apical portion of wing membrane (Figs 6a, b), hind femur and tibia dark brown, scutellum bearing 6-7 bristles; female legs without batonnets; male genitalia with simple gonocoxite, without tubercles, aedeagus with sinuate lateral sclerites, parameres straight, with slender base and pointed apex.

**Description**

Male. Head brown, antenna brown. Antenna length 1.2-1.3 mm, antennal ratio 0.90-1.07. Third palpomere 0.07-0.1 mm long, 1.7-2.2 times longer than fourth; sensory pit present; PR 3.7-4.7. Thorax yellow, scutum, postscutellum and abdomen blackish brown, scutellum yellow, with six long setae, rarely more, even up to 10. Wing brown, length about 1.76-2.13 mm, CR 0.72-0.75. Second radial cell 1.8-2.1 times longer than first one. Fore and mid legs yellow, hind femur and tibia darker. Hind tibia with row of long setae. Claws simple, equal, with bifid apices. TR(I) 1.5-2.1, TR(II) 2.1-2.3 TR(III) 1.7-1.9.

Male genitalia brownish yellow. Ninth tergite short and massive (Figs 7a, c). Aedeagus with narrow, long and sclerotized, S-shape arms. Parameres long, massive and sharply ended. Lateral elements of parameres long and curved (Fig. 7b).



**Fig. 6.** *Stilobezzia gracilis*: a – apex of female wing, b – apex of male wing, c – hind tibia of male, d – seminal capsules.

Female. Similar to male with usual sexual differences. Antenna length about 1.2-1.4 mm, antennal ratio 1.06-1.14. Third palpomere 0.09-0.11 mm long, 1.7-2.4 times longer than fourth; PR 3.5-4.0. Scutellum with six setae. Wing length 1.89-2.34 mm, CR 0.75-0.76. Second radial cell 2.0-2.5 times longer than first one. Hind tibia with row of long setae. Claws simple, long, with basal tooth. TR(I) 2.0-2.5, TR(II) 2.4-2.5, TR(III) 1.9-2.1. Two functional seminal capsules (0.08-0.09 x 0.06-0.07 mm and 0.06-0.07 x 0.05-0.06 mm). Third one vestigial, small (Fig. 6d).

#### Material examined

**Poland:** Bachanowo, 01.07.1993, 1 male, leg. J. Krzywiński; Bieszczady, 11.07.2005, 1 male, 2 females, leg. P. Dominiak; Borucino, 29.06.2001, 1 male, leg. P. Dominiak; Chmielonko, 28.06.2001, 3 males, leg. P. Dominiak; Gdańsk-Oliwa, 11.06.1983, 1 male, leg. R. Szadziewski; Góry Stołowe, 26.07.2006, 1 female, leg. P. Dominiak; Jurkiszki n. Gołdap, 03.06.1981, 1 male, leg. R. Szadziewski; Karkonosze, Sosnówka, 09.08.1982, 1 male, leg. R. Szadziewski; Kotlina Orawsko-Nowotarska, 28.06.2006, 1 female, leg. P. Dominiak; Krzeszna, 14.07.2003, 1 male, leg. P. Dominiak; Nadole, 08.06.1982, 1 male,

leg. R. Szadziewski; Roztocze, Zwierzyniec, 04.07.2006, 1 male, leg. P. Dominiak; Strzebielino, 15.06.1978, 5 male, leg. R. Szadziewski; Sztabin n. Augustów, 24.06.1984, 1 male, leg. J. Krzywiński; Ustrzyki Górne, 23-30.07.1980, 3 males, 4 females, leg. R. Szadziewski; Wyspa Wolin, 22.06.1993, 1 male, leg. J. Krzywiński; Zakopane, Jaszczurówka, 06-08.08.1981, 5 males, 1 female, leg. R. Szadziewski; Żarnowiec, 23.05.1989, 1 male.

#### **Distribution**

*S. gracilis* has been recorded in Andorra, Austria, Belgium, the Czech Republic, Estonia, France, Germany, Great Britain, Hungary, Ireland, Lithuania, Poland, Slovakia, Spain and Sweden.

#### ***Stilobezzia (A.) ochracea* (WINNERTZ, 1852)**

*Ceratopogon ochraceus* WINNERTZ, 1852: 48 (Germany).

*Stilobezzia ochracea*: KIEFFER 1919: 85 (female, Croatia), KIEFFER 1925: 89 (France), EDWARDS 1926: 412 (Great Britain), REMM 1966: 65 (record, Lithuania), REMM 1973: 353 (female, Hungary), REMM 1979: 45 (record, Estonia), KNOZ 1997: 80 (record, Czech Republic), DELECOLLE 2002: 28 (Spain), SZADZIEWSKI 1991: 104 (Poland).

*Stilobezzia rufithorax* KIEFFER, 1919: 84 (female, Slovak Republic).

*Stilobezzia scutellata* GOETGHEBUER, 1920: 111 (Belgium).

#### **Diagnosis**

Legs are uniformly yellow, scutellum bearing 4 bristles. Gonocoxite in male genitalia with two tubercles, lateral sclerite of aedeagus sinuate, paramere straight with broad base.

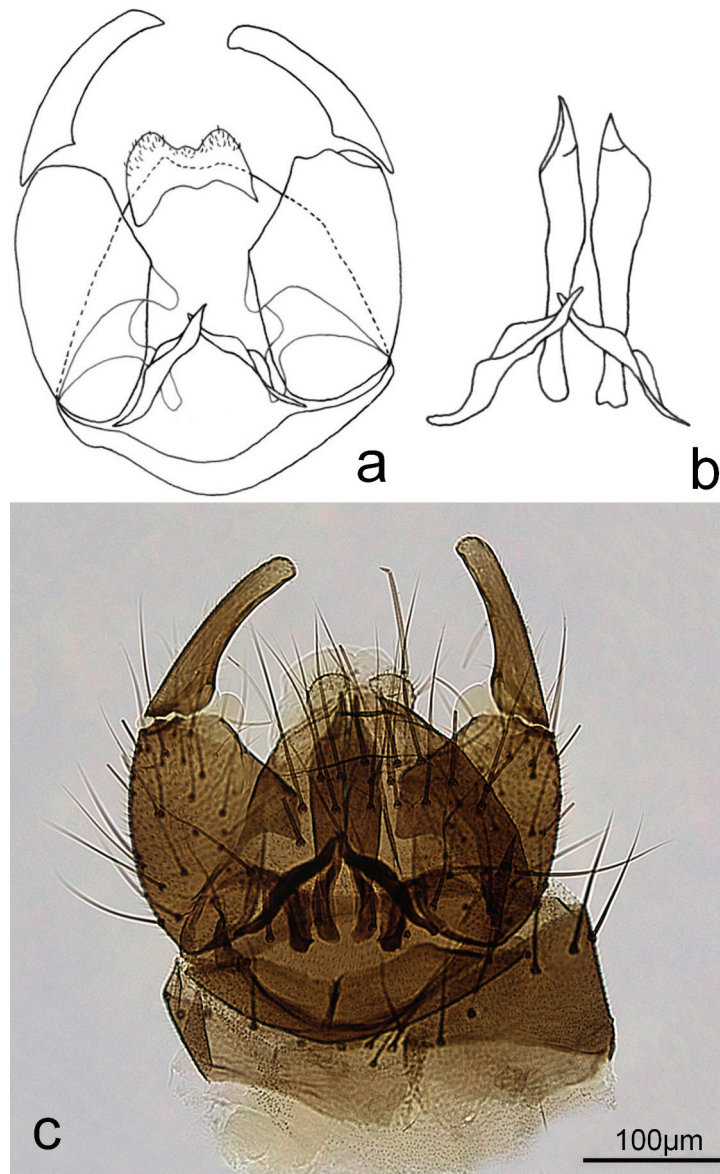
#### **Description**

Male. Whole body pale, more or less yellowish. Antenna pale brown, length 0.9-1.0 mm, antennal ratio 0.86-1.07. Third palpomere 0.05-0.07 mm long, 1.3-1.5 times longer than fourth; sensory pit present; PR 2.7-3.0. Thorax pale. Scutum slightly brownish. Scutellum bearing four bristles. Wing length 1.44-1.52 mm, CR 0.63-0.65. Second radial cell 2.2-2.4 times longer than first one. Legs uniformly yellow (Fig. 8). Claws simple, equal. TR(I) 1.8-2.0, TR(II) 1.9-2.5, TR(III) 1.9-2.0.

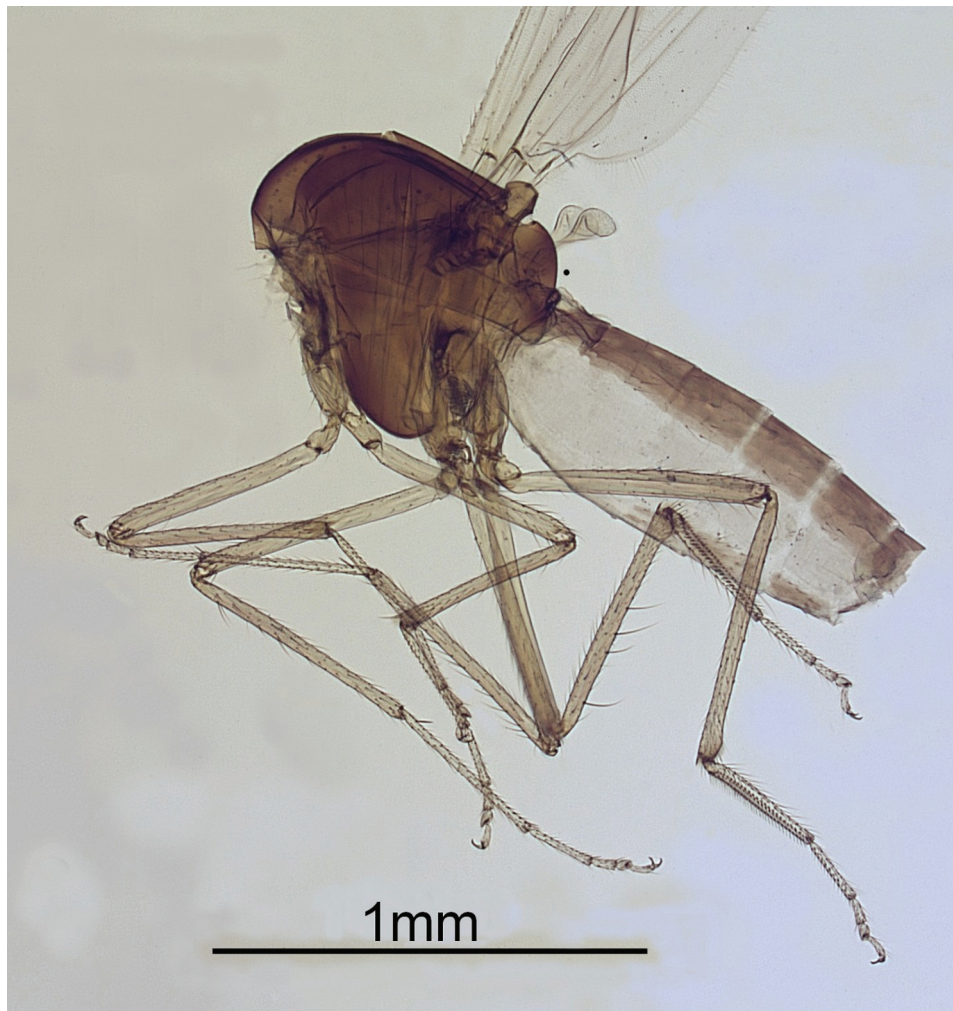
Genitalia as in Fig. 9. Tergite IX long and slender, caudal margin with V-shaped incision. Cerci long and massive. Gonocoxite at midlength of inner side bearing 2 small tubercles (Figs 9a, c), each one with one small apical seta. Aedeagus with sinuate lateral sclerites. Paramere stout, straight, base broad; apical portion with short tooth inside of transparent tube (Fig. 9b).

Female. Similar to male with the usual sexual differences. Antenna pale brown, length 1.0-1.1 mm. Antennal ratio 1.20-1.42. Third segment 0.07-0.08 mm long, 1.5-2.0 times longer than fourth; PR 3.0-3.3. Scutellum with four bristles. Wing length 1.70-1.94 mm,

CR 0.70-0.75. Second radial cell 2.0-2.3 times longer than first one. Claws as long as fifth tarsomeres, single, with basal tooth. TR(I) 1.8-2.1, TR(II) 2.4-2.7, TR(III) 1.9-2.3. Two functional seminal capsules (0.07-0.08 x 0.04-0.05 mm and 0.05-0.07 x 0.04-0.05 mm), third one reduced.



**Fig. 7.** Male genitalia of *Stilobezzia gracilis*: a – ventral aspect without parameres, b – parameres and aedeagus, c – photo of ventral aspect.



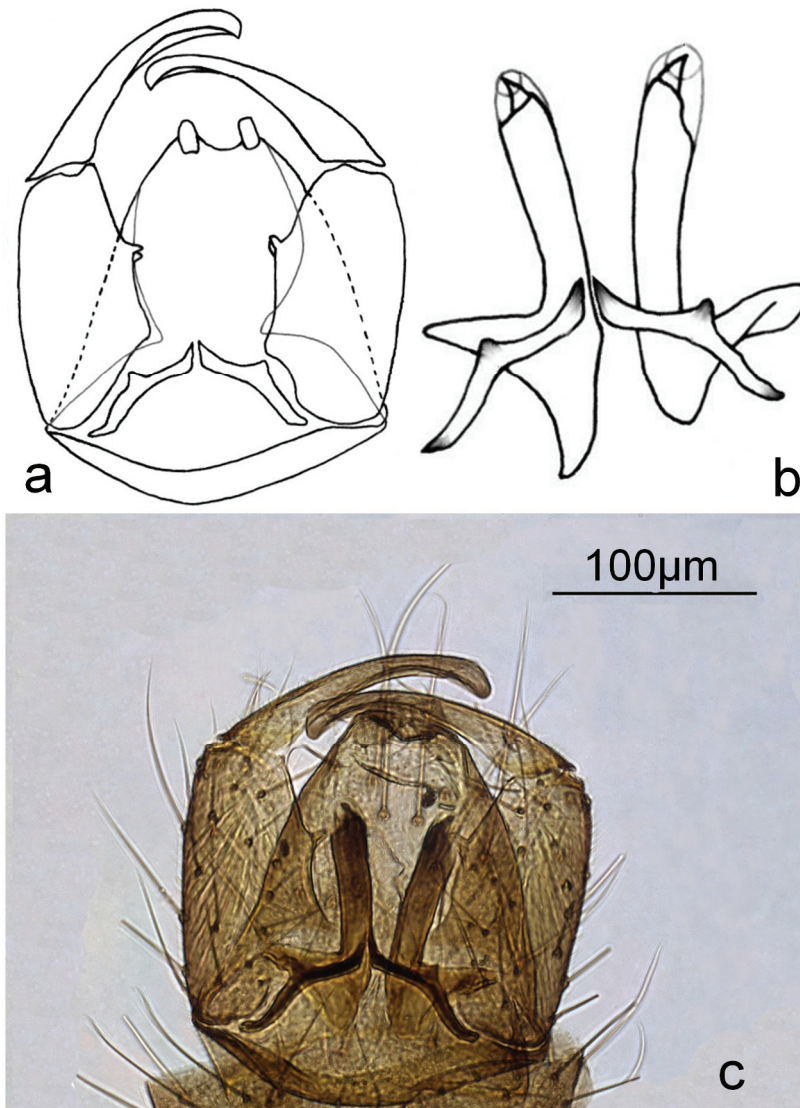
**Fig. 8.** Male legs of *Stilobezzia ochracea*.

**Material examined**

**Poland:** Godętowo n. Gdańsk, 22.06.1978, 1 male, 2 females, leg. R. Szadziewski; Gdańsk, 06.07.1980, 1 female, leg. R. Szadziewski; Karkonosze, Sosnówka, 12.08.1982, 1 male, leg. R. Szadziewski; Kotlina Orawsko-Nowotarska, 26.06.2006, 2 females, leg. P. Dominiak; Piotrków Trybunalski, 20.07.1980, 2 females, leg. M.L. Soszyński; Szczebra n. Augustów, 20-28.06.1990, 9 males, 10 females, leg. D. Anuszkiewicz; Zakopane, 06.08.1981, 1 female, leg. R. Szadziewski; Zawoja-Czatoża, 03.07.1989, 2 females, leg. R. Szadziewski. **Bulgaria:** Pancharevo n. Sofia, 06-08. 06.1984, 2 males, leg. W. Krzemiński.

**Distribution and biology**

Females prey on other small insects of their own size, which are captured in flight. DOWNES (1978) reported *S. ochracea* hunting for *Culicoides pallidicornis* in male swarms. Recorded from Belgium, the Czech Republic, Estonia, France, Germany, Great Britain, Hungary, Lithuania, Poland, Slovakia and Spain.



**Fig. 9.** Male genitalia of *Stilobezzia ochracea*: a – ventral aspect without parameres, b – parameres and aedeagus, c – photo of ventral aspect.

### Key for determination of Central European species of *Stilobezzia*

#### Females

1. Wing membrane bare. Fifth tarsomere of fore and mid leg with pair of long ventral batonnets (Fig. 3); seminal capsules very unequal (subg. *Stilobezzia*) .....2
- Wing membrane with macrotrichia. Fifth tarsomere of fore and mid leg without batonnets; seminal capsules slightly unequal (subg. *Acanthohelea*) .....3
2. Third palpomere 1.5-1.6 times longer than fourth. Wing length 1.5- 1.8 mm. Second radial cell 4.5- 5.0 times longer than first one .....*S. antennalis*
- Third palpomere 1.8-1.9 times longer than fourth. Wing length 2.1- 2.2 mm. Second radial cell 4.2- 4.3 times longer than first one .....*S. flavirostris*
3. Femur and tibia of hind leg dark brown. Scutellum with 6 long setae .....*S. gracilis*
- Femur and tibia of hind leg yellow. Scutellum with 4 setae .....*S. ochracea*

#### Males

1. Wing membrane without macrotrichia. Paramere S-shaped. Lateral sclerites of aedeagus straight (subg. *Stilobezzia*) (Figs 2, 5) .....2
- Wing membrane with some macrotrichia on apical portion. Paramere straight. Lateral sclerites of aedeagus sinuate (subg. *Acanthohelea*) (Figs 9, 11) .....3
2. Distal portion of paramere slender and pointed (Fig. 2) .....*S. antennalis*
- Distal portion of paramere stout and blunt (Fig. 5) .....*S. flavirostris*
3. Ventral surface of gonocoxite without tubercles. Base of paramere slender (Figs 8, 9). Scutellum with 6-10 bristles .....*S. gracilis*
- Ventral surface of gonocoxite with two small tubercles. Base of paramere broad (Figs 10, 11). Scutellum with 4 bristles .....*S. ochracea*

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