

A SYSTEMATIC REVIEW OF EUROPEAN *STEMPELLINA* THIENEMANN ET BAUSE, 1913 (DIPTERA: CHIRONOMIDAE) WITH DESCRIPTION OF A NEW SPECIES FROM FENNOSCANDIA

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Abstract.— *Stempellina tervolae* sp. nov. from Finland and Sweden is described and illustrated. A verified diagnosis of the genus *Stempellina* Thienemann et Bause, 1913 is presented and the systematic position discussed. Two species are removed from *Stempellina* and placed into the genus *Neozavrelia* Goetghebuer, 1941 as new combinations: *N. bicoliocula* (Tokunaga, 1938) and *N. okadai* (Tokunaga, 1939). Diagnoses for adult males of European species and a key are also given.



Key words.— Diptera, Chironomidae, Tanytarsini, *Stempellina*, taxonomy, new species.

INTRODUCTION

Stempellina Thienemann et Bause, 1913 is a relatively small, worldwide distributed genus. There are 22 specific names described in *Stempellina* in the world and 14 in the Holarctic region (Cranston 2000). However, only 8 species of this genus known in the Holarctic are recognized as valid at present. A new species is the fifth in the Palaearctic region and Europe.

During less than a century, the taxonomic status of *Stempellina* underwent a number of changes, from the level of a group of species within a subgenus of that name (Edwards 1929) to separate subgenus (e.g. Tokunaga 1938, 1939) to genus (Brundin 1947). Originally, *Stempellina* comprised the species that are at present classified within genera described later, e.g., *Stempellinella* Brundin, 1947 and *Neozavrelia* Goetghebuer, 1941. This has so far been an impediment in formulating an unambiguous generic diagnosis.

Saether (1977) and Saether and Andersen (1998) analysed relationships between the genera included into the subtribe Zavreliina, in which *Stempellina* and *Constempellina* Brundin, 1947 are grouped together and differ from the opposite group of sibling genera: *Stempellinella*, *Friederia* Saether et Andersen, 1998, *Zavrelia* Kieffer, 1913 and *Neostempellina* Reiss, 1984. The species described here presents an interesting com-

bination of characters new for the genus *Stempellina* and close to those of *Stempellinella* and *Constempellina*, consolidating the subtribe Zavreliina.

MATERIAL AND METHODS

Most of specimens examined were collected with an entomological net during expeditions to Fennoscandia in 2002–2004. Specimens were preserved in 70% ethanol. The preparation method follows Wirth and Marston (1968). Illustrated descriptions and measurements were taken from slide-mounted specimens. Morphological terminology and abbreviations follow Saether (1980). The material studied is deposited in the Department of Invertebrate Zoology, University of Gdańsk, Poland.

TAXONOMY

Stempellina Thienemann et Bause, 1913

Type species. *Tanytarsus (Calopsectra) bausei* Kieffer, 1911.

Diagnosis. Males. 12-segmented antennal flagellum, presence of at least one spur on mid and hind tibiae, small cylindrical superior volsella and lack of

digitus create an unique combination of characters distinguishing adult males of *Stempellina* from other genera of the tribe Tanytarsini.

Redescription. Males. Small species – wing length: 1.05–2.1 mm. Eyes bare. Antennal flagellum consisted of 12 distinct segments. Wing membrane sparsely covered with macrotrichia in distal half, squama bare. Combs of mid and hind tibiae separated, at least one comb bearing spur. Gonostylus straight, slender, longer than gonocoxite; anal tergite with elongated tip (anal point), usually bearing long stout median setae (Figs 1, 5, 8, 12); 3 pairs of appendages (volsellae) of hypopygium – digitus absent; superior volsella small, cylindrical, armed with 3 setae in anteromedian position (Figs 1, 3, 6, 9, 14); median volsella with simple setae and spindle- or leaf-shaped lamellae (Figs 4, 7, 10, 11, 15).

A review of European species

Stempellina tervolae sp. nov. (Figs 1, 12–15)

Etymology. The first specimen of this species has been sampled in the Finnish town Tervola.

Diagnosis. Male. Minute species – wing length: 1.05–1.28 mm. Anal point of hypopygium with 6–20 fine, densely placed groups of spinules, anal crests present, thin (Figs 1, 12, 13); stem of median volsella short, bulb-shaped, armed with bunch of simple setae and a few leaf-shaped lamellae (Fig. 15).

Description. Male. Wing length (arculus-tip): 1.05–1.28 mm (1.15 mm). Colour (in alcohol): tentorium and pedicellum dark brown; thorax brown, scutal stripes (whole lateral and median in fore half) somewhat darker; legs, abdomen and halter light, yellowish-green; wing, including veins, very slightly pigmented. Head: antennal flagellum 12-segmented; AR = 0.59–0.72 (0.63); frontal tubercles small (3–10 μm); length of palpomeres II–V (μm): 32–40 (38), 71–83 (80), 67–83 (76), 103–119 (112); clypeus with 11–16 setae. Thorax chaetotaxy: Ac 6–8, Dc 4–6 (usually 5 setae on each side), Pa 1, Scts 2 (pair of setae placed medially). Wing: squama bare, anal lobe reduced, cell m_{3+4} , distal part of cells m_{1+2} and r_{4+5} with macrotrichia, cell r_{4+5} with a single row of macrotrichia in $\frac{3}{4}$ distal part; veins C, R, R_1 , R_{4+5} (distal $\frac{1}{4}$ – $\frac{1}{2}$ part), M_{1+2} (distal $\frac{3}{4}$ part), Cu_1 and false vein above M_{3+4} always with macrotrichia; An and false vein under Cu_1 (distal part) usually with some macrotrichia, other veins bare; M_{3+4} ending distinctly distal of R_{4+5} . Legs: fore tibia with long straight spur; combs of mid and hind tibiae fine, usually one comb bearing short spur or both combs with spurs of unequal length, rarely combs

	Fe	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	LR
P ₁	405–450 (425)	285–340 (310)	390–465 (430)	245–300 (275)	175–220 (195)	120–145 (130)	65–80 (75)	1.33–1.48 (1.39)
P ₂	410–480 (455)	330–390 (365)	190–230 (210)	105–130 (115)	80–105 (95)	60–65 (65)	50–60 (55)	0.54–0.60 (0.57)
P ₃	490–590 (550)	410–500 (460)	285–345 (315)	155–185 (165)	120–140 (125)	65–80 (75)	60–65 (60)	0.65–0.70 (0.68)

Table 1. Length of legs segments (μm) and legs ratios (LR) of examined adult males of *Stempellina tervolae* sp. nov. Length values rounded off to nearest 5 μm , ratio values – to 0.01.

very short and spurs poorly or not developed; Ta₁ of P₂ bearing 1 or 2 hook-shaped sensilla chaetica; pulvilli well developed. For length of legs segments and legs ratios see table.

Hypopygium: gonostylus (90–110 μm) longer than gonocoxite; anal tergite usually bearing 1–3 long stout median setae (setae lack in single examined specimen), anal point elongated, with 6–20 fine densely placed groups of spinules (anal papillae), anal crests thin but well-defined, 9–13 lateral setae on each side of the anal point (Figs 1, 12, 13); superior volsella small cylindrical with rounded apex and 3 setae in anteromedian position (Figs 1, 14); digitus absent; inferior volsella robust with swollen distal part (Fig. 1); stem of median volsella short (10–12 μm), bulb-shaped, armed with bunch of simple setae and a few leaf-shaped lamellae (Fig. 15).

Type material. Holotype. Adult male, dissected and slide-mounted in Canada balsam, labelled: *Stempellina tervolae* sp. n., Finland, Tervola, Paakontie road (N66°05'03" E24°47'28"), 22.07.2003, netting on Kemijoki, leg. W. Giłka. Paratypes. Prepared as holotype; Tervola, 13.07.2002, 1 male, 22.07.2003, 1 male, 08.08.2003, 6 males; Sweden, Lake Råktjärv, 15 km S of Överkalix (N66°12'17" E22°48'33"), 22.07.2003, netting, 3 males, leg. W. Giłka.

Distribution and biology. *S. tervolae* was found over a slowly flowing section of the Kemijoki, about 40 km upstream of the discharge site. The river there is about 0.5 km wide, its shallow bays having detritus-poor sandy bottom. Adult males were caught also at the flow-through lake Råktjärv, an oligotrophic water body of stony-sandy bottom, about 1.5 km wide and 8 km long, formed by a natural widening of the Kalix älv bed about 50 km upstream of the discharge site. *S. tervolae* is rare. It was recorded at 2 out of 100 sites distributed across the Fennoscandia and visited from July until September in 2002–2004.

Discussion. *S. tervolae* shows an interesting combination of characters: 12-segmented antennal flagellum, presence of anal point spinulae, well-defined anal point crests, small cylindrical superior volsella and short bulb-shaped stem of the median volsella bearing leaf-shaped lamellae. According to the presently re-arranged generic diagnosis the superior volsella of that shape and 12-segmented antennal flagellum create the typical combination in *Stempellina*, whereas the anal point armed with crests and spinulae is an unique character in the genus.

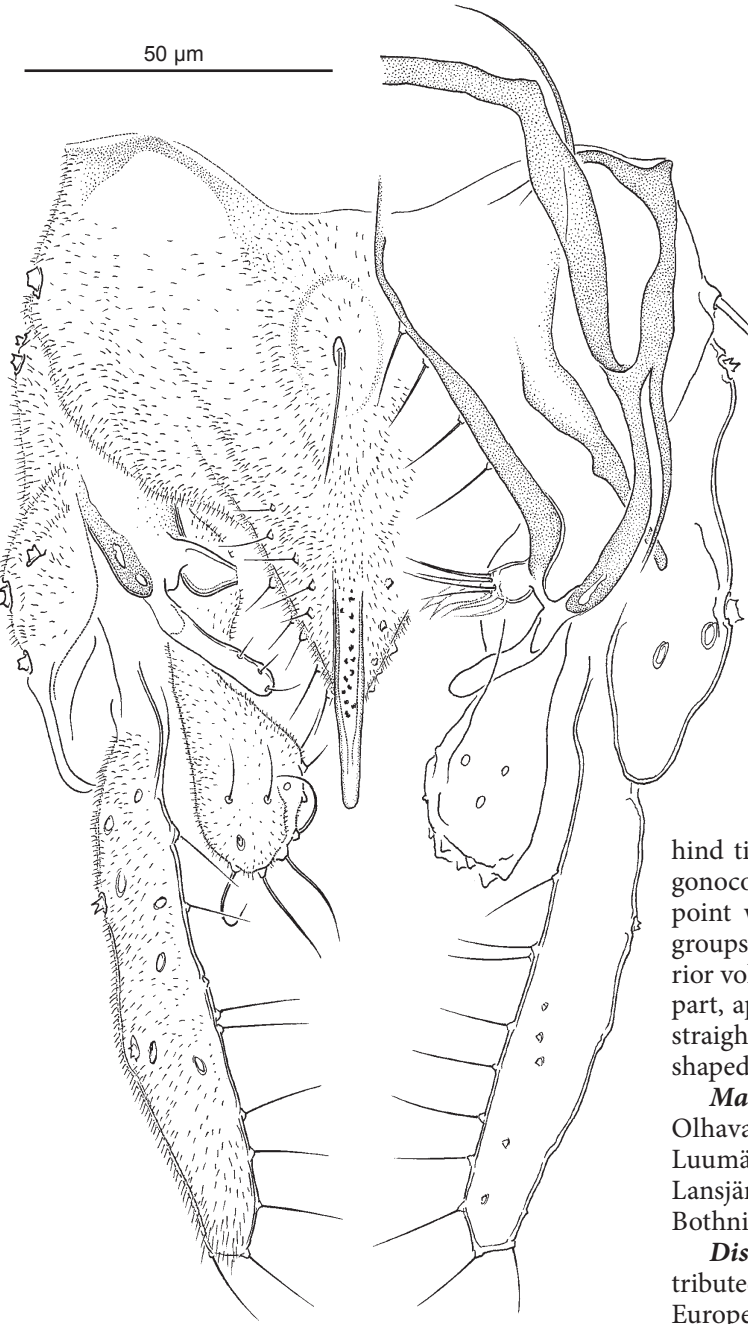
50 μ m

Figure 1. *Stempellina tervolae* sp. nov. – hypopygium.

This pattern usually occurs in *Stempellinella*. The latter genus, however, is well separable from *Stempellina* having 10-segmented antennal flagellum, short gonostylus and widened, usually oval or ellipse-shaped superior volsella. Short, broadened or strongly reduced stem of the median volsella is known in *Friederia*, *Zavrelia*, *Neostempellina* and *Stempellinella* (i.e. *S. reissi* Casas et Vilchez-Quero, 1991) but was unknown in *Stempellina* hitherto. Moreover, at least one not described species of the genus *Stempellina* that also has a median volsella of similar shape but having

a simple anal point inhabits the Nearctic region (Sublette, pers. comm.).

In accordance with the conception by Saether and Andersen (1998) the genera listed above, though excepting *Stempellina*, form a group of sibling taxa within the subtribe *Zavreliina*. The position of *Stempellina* was annotated as highly variable in the presented analyses and the genus was grouped with *Constempellina* finally. Reduction of spurs of mid and hind tibiae observed in some specimens of *S. tervolae* apparently confirms that hypothesis, for that absence of these structures is the specific character in *Constempellina*.

The new species is tentatively included into the genus *Stempellina* and intermediate characters found in *S. tervolae* are interpreted as indicative of close relations between *Stempellina*, *Stempellinella* and *Constempellina*.

***Stempellina almi* Brundin, 1947**

(Figs 2–4)

Stempellina almi Brundin, 1947: 86 (adult male, Sweden).

Diagnosis. One of two combs of mid and hind tibiae bearing spur; gonostylus twice longer than gonocoxite; anal tergite without stout median setae; anal point with apex curved ventrally, tip finely rounded, groups of spinules and anal crests absent (Fig. 2); superior volsella relatively short, slightly distorted in median part, apically rounded (Fig. 3); stem of median volsella straight, armed with simple setae and slender spindle-shaped lamellae placed latero-apically (Fig. 4).

Material examined. Finland. Bothnian Gulf nr. Olhava, 13.07.2002, 17 males; Lake Kivijärvi nr. Luumäki, 05.08.2002, 1 male. Sweden. Lake Övre Lansjärv, 21.07.2003, 26 males; Rånefjärden nr. Råneå, Bothnian Gulf, 09.08.2003, 1 male. Leg. W. Giřka.

Distribution and biology. *S. almi* is a widely distributed species in the Holarctic region – recorded in Europe, northern Africa, eastern Palaearctic and the Nearctic region. Larvae are eurythermic. They inhabit freshwater reservoirs and brackish marine habitats.

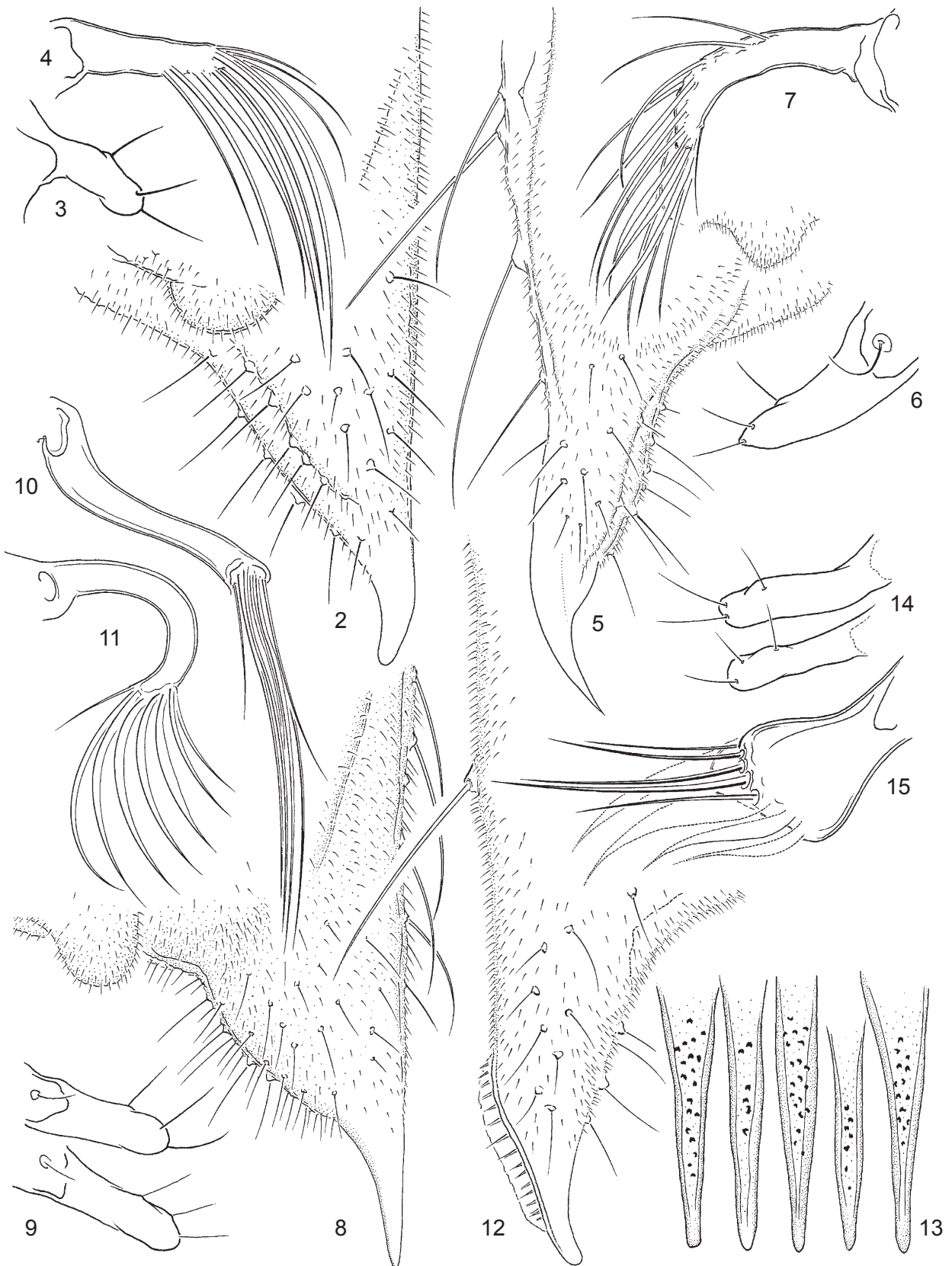
***Stempellina bausei* (Kieffer, 1911)**

(Figs 5–7)

Tanytarsus (Calopsectra) bausei Kieffer, 1911: 46 (adult male, Germany), originally *bauri*, typography error.

Stempellina bausei: Brundin 1947: 86 (adult male, Sweden).

Diagnosis. One of two combs of mid and hind tibiae bearing spur; anal tergite with some stout median setae;



Figures 2–15. (2–4) *Stempellina almi* Brundin; (5–7) *S. bausei* (Kieffer), (8–11) *S. subglabripennis* (Brundin); (12–15) *S. tervolae* sp. nov. (2, 5, 8, 12) anal point in lateral view; (13) anal point in dorsal view – variability; (3, 6, 9, 14) superior volsella; (4, 7, 10, 15) median volsella in dorsal view; (11) median volsella in lateral view.

anal point curved ventrally, claw-shaped in lateral view, acute, groups of spinules and anal crests absent (Fig. 5); superior volsella relatively stout, cylindrical or somewhat conical, apex blunt (Fig. 6); stem of median volsella long, curved and directed caudally, bearing simple setae and spindle-shaped lamellae placed latero-apically (Fig. 7).

Material examined. Finland. Äänekoski at Lake Keitele, 12.07.2002, 1 male; Kenesjärvi canyon nr. Utsjoki, 26.07.2003, 2 males; Kesälahti at Lake Puruvesi, 05.08.2002, 1 male; Lake Kevojärvi nr. Utsjoki, 26.07.2003, 1 male; Korettoja, River Utsjoki, 26.07.2003, 2 males; Pohjois-Ii, River Ii nr. Oulu, 13.07.2002, 1 male; leg. W. Gilka. Poland. River Radońka in Podkasztorze nr. Sulejów, 06.05.1978, ex cult. 5 males, leg. J. Siciński; Przystań nr. Węgorzewo at Lake Mamry, 19.06.1998, 26 males, leg. W. Gilka; Silec nr. Srokowo, on stream, 08.06.1980, 1 male, 16.08.1980, 2 males, leg. R. Szadziewski; Sosnówka Dolna nr. Karpacz, at fish-ponds 07.08.1982, 1 male, leg. R. Szadziewski. Sweden. River Ångermanälven nr. Meselefors, 20.07.2003, 12 males; Bureå nr. Skellefteå, Bothnian Gulf, 09.08.2003, 1 male; Lake Hammerdalsjön nr. Hammerdall, 20.07.2003, 4 males; lake in Idbyn nr. Örnköldsvik, 10.08.2003, 1 male; River Ljusnan nr. Sveg, 19.07.2003, 1 male; Nedre Dalälven, 11.08.2003, 3 males; Ore Älv nr. Hansjö, at fish pond and mill waterfall, 18.07.2003, 2 males; Lake Övre Lansjärv, 21.07.2003, 40 males; Pite Älv mouth, Bothnian Gulf, 09.08.2003, 1 male; Lake Råktjärv nr. Överkalix, 22.07.2003, 3 males; Lake Stora Lulevatten nr. Lusepbryggan, 21.07.2003, 5 males; leg. W. Gilka.

Distribution and biology. Up to now *S. bausei* has been recorded in Euro-Asian part of the Palaearctic region. Larvae are considered as eurytopic, known from different types of lotic habitats, lakes, natural and artificial temporary reservoirs, marshes and brackish marine habitats.

Stempellina cornuta Kieffer, 1922

Stempellina bausei var. *cornuta* Kieffer, 1922: 114 (adults, Germany).

Stempellina montivaga Goetghebuer, 1934: 347 (adult male, Germany).

Discussion. *S. cornuta* and *S. montivaga* have so far been recognised as doubtful names and recently restored and synonymised (Saether & Spies 2004). However, *S. cornuta* and its sister species – *S. bausei* are treated jointly in the present key, until type materials formally have not been re-designated (Spies, pers. comm.) and adult males with associated immature stages have not been compared in all necessary details. Author suggests, that shape of anal point (claw-shaped in lateral view) and superior volsella of hypopygium (somewhat conical) are specific characters in *S. bausei* (Figs. 5, 6) adequate in determination.

S. cornuta is known from a spring (Slesvig-Holstein) and a mountain brook (Upper Bavaria, 1000 m a.s.l.; as *S. montivaga*).

Stempellina subglabripennis (Brundin, 1947) (Figs 8–11)

Parastempellina subglabripennis Brundin, 1947: 85 (adult male, Sweden).

Diagnosis. Each comb of mid and hind tibiae bearing short spur; anal tergite with stout median setae, anal point straight, groups of spinules and anal crests absent (Fig. 8); superior volsella cylindrical, apically rounded (Fig. 9); stem of median volsella long, characteristically distorted at its base, strongly curved, C-shaped in lateral view, bearing bunch of long spindle-shaped lamellae placed apically (Figs 10, 11).

Material examined. Finland. Kesälahti at Lake Puruvesi, 05.08.2002, 31 males; Lake Kiantajärvi nr. Kuortola, 03.08.2002, 7 males; Lake Kivijärvi nr. Luumäki, 05.08.2002, 6 males; Pohjois-Ii, River Ii nr. Oulu, 13.07.2002, 4 males; River Kemijoki nr. Rovaniemi, 13.07.2002, 12 males; leg. W. Gilka. Poland. Kwiatki forestry nr. Osie, July 1979, 3 males, leg. R. Szadziewski; Żakowo nr. Kartuzy, at Lake Martwe, 17.07.1994, 4 males, 08.07.1995, 2 males, leg. E. Kaczorowska. Sweden. Lake Mälaren nr. Strängnäs, 11.08.2003, 1 male; Lake Iggsjön nr. Iggesund, 10.08.2003, 12 males; Lake Råktjärv nr. Överkalix, 22.07.2003, 2 males; Lake Rätanssjön nr. Rätansbyn, 19.07.2003, 1 male; Lake Viksjön nr. Hamrånge, 11.08.2003, 4 males; leg. W. Gilka.

Distribution and biology. This species has so far been recorded in Euro-Asian part in the West Palaearctic and the Nearctic region. Immature stages of *S. subglabripennis* inhabit lakes and slowly flowing rivers.

Key to males of European species of the genus *Stempellina*

1. Anal point of hypopygium with fine, densely placed groups of spinules, anal crests present (Figs 1, 12, 13); stem of median volsella short, bulb-shaped, bearing leaf-shaped lamellae (Fig. 15) *Stempellina tervolae* sp. nov.
- Anal point of hypopygium without groups of spinules, anal crests absent (Figs 2, 5, 8); stem of median volsella elongated, straight or curved, bearing slender spindle-shaped lamellae (Figs 4, 7, 10, 11) 2
2. Each comb of mid and hind tibiae bearing spur. Stem of median volsella strongly curved, characteristically distorted at its base, with bunch of lamellae placed apically (Figs 10, 11) . . . *Stempellina subglabripennis* (Brundin)
- One of two combs of mid and hind tibiae without spur. Stem of median volsella straight or slightly curved, with lamellae placed latero-apically (Figs 4, 7) 3
3. Gonostylus twice longer than gonocoxite. Anal tergite without stout median setae (Fig. 2); superior volsella slightly distorted in median part (Fig. 3); stem of median volsella straight (Fig. 4) *Stempellina almi* Brundin

–. Gonostylus somewhat longer than gonocoxite. Anal tergite with stout median setae (Fig. 5); superior volsella straight (Fig. 6); stem of median volsella curved (Fig. 7) *Stempellina bausei* (Kieffer), *Stempellina cornuta* Kieffer

Doubtful names and species excluded from the genus *Stempellina* (Holarctic region)

Stempellina ciliaris Goetghebuer, 1944

Stempellina ciliaris Goetghebuer, 1944: 35 (adults, Austria).

Present status: doubtful name in *Zavreliina*.

Thienemann recognised the name as a synonym of *Stempellinella brevis* (Edwards, 1929) basing on the specimens received from Gouin (deposited in the Zoologische Staatssammlung Muenchen, who also served the material for the original description of *S. ciliaris*. However, the specimens of the Thienemann's collection are probably not typical (Spies, pers. comm.). In fact, the original description includes a combination of characters known from *Stempellinella* (e.g. oval superior volsella) and *Stempellina* (e.g. 12-segmented antennal flagellum). It may suggest that the description of *S. ciliaris* was based on a series of specimens representing more than one species. Wing venation and chaetotaxy seem to be conspicuous characters (vein M_{3+4} ending under R_{4+5} , wing covered with macrotrichia apically; Goetghebuer l.c.: fig. 2a), adequate for an eventual re-designation of the name *ciliaris*.

Stempellina bausei var. *fasciata* Kieffer, 1922

Stempellina bausei var. *fasciata* Kieffer, 1922: 113 (adult male, Czech Rep.).

Present status: doubtful name in *Stempellina*.

The original description fits *Stempellina* but does not allow to delimit a species. An existence of the source material in the Zavřel's collection was not confirmed (Spies, pers. comm.).

Stempellina paludosa Goetghebuer, 1931

Stempellina paludosa Goetghebuer, 1931: 114 (adults, Belgium).

Present status: doubtful name in *Zavreliina*.

Up to now this name has been considered as doubtful in *Stempellina*. Described adult male is apparently not *Stempellina* having 10-segmented antennal flagellum and stout, broadened superior volsella.

Stempellinella leptocelloides (Webb, 1969)

Stempellinella leptocelloides Webb, 1969: 94 (adults, Canada).

The species was originally described as *Stempellina* but annotated as very close to *Stempellinella edwardsi* Spies et Saether, 2004 (= *S. minor* Edwards, 1929). Both are placed into *Stempellinella* and distinguishable in the genus having wing vein R_{4+5} ending well proximal of M_{3+4} . This character is also known in *Stempellina*, thus it has so far been incorrectly used in diagnosing both genera.

Neozavrelia bicoliocula (Tokunaga, 1938) comb. nov.

Tanytarsus (*Stempellina*) *bicolioculus* Tokunaga, 1938: 371 (adults, Japan).

This species is considered as a member of the genus *Neozavrelia* (close to *N. fuldensis* Fittkau, 1954 and *N. luteola* Goetghebuer, 1941) due to following combination of characters: antennal flagellum 10-segmented, AR = 0.55–0.59 (*N. luteola*: AR = 0.55–0.60, *N. fuldensis*: AR = 0.45–0.60), gonostylus shorter than gonocoxite, anal point short and rounded with fine pubescence, specific co-arrangement of superior volsella with stout digitus, shape of inferior volsella with its distal part directed medially (Tokunaga l.c.: fig. 41). Eyes colouration and arrangement of setae on the median volsella (dense and placed on almost whole length of its stem) are characters differing male of *N. bicoliocula* and *N. fuldensis*. *N. bicoliocula* is easily separable from *N. luteola* by having bare eyes.

Neozavrelia okadai (Tokunaga, 1939) comb. nov.

Tanytarsus (*Stempellina*) *okadai* Tokunaga, 1939: 337 (adult male, Japan).

Male of this species has an ellipse-shaped superior volsella, long digitus and short, widely rounded, setigerous or pubescent anal point of hypopygium (Tokunaga l.c.: fig. 44). Detailed original description including colouration of the body, wing venation and chaetotaxy, thorax chaetotaxy, structure of legs and hypopygium fits the male of *Neozavrelia bernensis* Reiss, 1968. Frontal tubercles represented only by swellings of integument and the obscure segmentation of antennal flagellum (indistinctly separated distal flagellomeres) were also found as greatly specific characters (Reiss 1968, Tokunaga l.c.). Both names are considered as potential synonyms.

ACKNOWLEDGEMENTS

I wish to thank Prof. James E. Sublette (Tucson, USA), Prof. Bruno Rossaro (Milano, Italy) and Dr. Lauri Paasivirta (Salo, Finland) for precious information and comments. Special thanks to Dr. Martin Spies (Munich, Germany) for help in completing literature and information on museum materials. A project in Scandinavia

was financially supported by University of Gdańsk (No.1130-5-0158-3, 1130-5-0004-4).

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Received: January 3, 2005

Accepted: May 20, 2005