

**An intraspecific morphological variability of *Zavrelia pentatoma* KIEFFER  
(Diptera: Chironomidae)**

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**ABSTRACT.** Adult male of *Zavrelia pentatoma* KIEFFER, 1913 is redescribed and illustrated. Intraspecific morphological variation of the species, manifested as differences in coloration, size of individual body parts and most important diagnostic hypopygial structures is discussed.

**KEY WORDS:** Diptera, Chironomidae, *Zavrelia*, variability, systematics

### INTRODUCTION

Chironomids (Chironomidae) are a large dipteran family known to be represented by over 5000 species, in many cases very difficult to diagnose and identify from morphological characteristics. Deformations of individual specimens or anomalies in the morphology of entire populations, may be decisive in making erroneous diagnoses when imparting a rank of a separate taxon upon non-typical specimens. The intraspecific morphological variability in adult chironomids, may be manifested as differences in coloration and size of individual body parts, chaetotaxy and structures concentrating the major diagnostic characters, i.e. head appendages, wings, legs and the hypopygium.

The study on *Z. pentatoma* KIEFFER, 1913 redescribed below was triggered by examining materials from the collection of Dr. L. PAASIVIRTA (Salo, Finland). All the specimens of adult males examined, particularly those collected in the Finnish Lapland, showed an unusual variability in the structure of diagnostic characters, as presented below.

*Zavrelia* KIEFFER, 1913 is a small genus of the tribe Tanytarsini, represented by a few species only, recorded in the northern hemisphere (EKREM & STUR, *in press*). *Z. pentatoma* KIEFFER, 1913 has the Palaearctic distribution, and presently is the only valid species known from Europe.

### ACKNOWLEDGEMENTS

I am indebted to Dr. LAURI PAASIVIRTA for the loan of materials collected from the Finnish Lapland.

### METHODS

The materials examined were collected in Poland and Finland. Specimens were dissected

and mounted on microscope slides in Canada balsam or Euparal. Illustrations, descriptions and measurements were taken from the slide-mounted individuals. The wing was measured from the arculus to the tip; lengths of legs segments are rounded off to nearest 5  $\mu\text{m}$ ; lengths of palpomeres II–V, tibial spurs and combs - to 1  $\mu\text{m}$ , antennal and leg ratios (AR, LR) - to 0.01. The measurements are given as ranges, followed by the mean (in parentheses). The morphological terminology with abbreviations follows SÆTHER (1980). Illustrations were prepared using the technique described by GIŁKA (2008).

## RESULTS

### *Zavrelia pentatoma* KIEFFER, 1913

#### Material examined

Finland. Kittilä, Vasanvuoma, 12.08.2007, netting, 9 males, coll. L. Paasivirta. Pohjois-Ii near Oulu, Ii river, 13.07.2002, netting, 2 males, leg. W. Giłka. Poland. Bajory Wielkie near Kętrzyn, gravel-pit, 05.06.1999, netting, 2 males, leg. W. Giłka. Przysiań near Węgorzewo, Mamry Lake, 12.07.1981, netting, 2 males, leg. R. Szadziewski.

#### Diagnostic description.

Adult male (n = 15 unless otherwise stated). Body length 1.5–2.1 mm; wing length 1.05–1.35 (1.20) mm. Coloration. Brown to dark brown, with pedicel, tentorium, scutal stripes, postnotum and sternum dark brown to black.

Head. Antennal flagellum consisted of 10 well separated articles; AR 1.00–1.11 (1.04, n = 6). Frontal tubercles minute, 3–12  $\mu\text{m}$  long. Length of palpomeres II–IV ( $\mu\text{m}$ ): 32–48 (39), 87–127 (111), 79–95 (88), 110–121 (116); usually 3<sup>rd</sup> palpomere longer than 4<sup>th</sup> (Fig. 1). Clypeus short and wide, bearing 7–10 setae.

Thorax chaetotaxy. Ac 8–17, Dc 4–11, Pa 1, Scts 6–8 (placed in regular row).

Wing. Membrane covered with dense macrotrichia excepting base of wing and cells above veins M and R<sub>4+5</sub>. Veins Sc, M, RM, R<sub>2+3</sub> and short proximal section of M<sub>1+2</sub> bare, other veins with macrotrichia. R<sub>4+5</sub> ending well proximal of M<sub>3+4</sub>, M<sub>1+2</sub> reaching tip of wing, FCu placed under tip of Sc and distinctly distal of RM, R<sub>1</sub> and Cu<sub>1</sub> ending at the same distance from wing base, An ending slightly distal of RM.

Legs. Spur of fore tibia usually present, apically curved, 12–16  $\mu\text{m}$  long. Combs of mid and hind tibiae separated if present, consisted of 4–6 teeth 8–12  $\mu\text{m}$  long (mid tibia) and 7–10 teeth 10–14  $\mu\text{m}$  long (hind tibia) respectively. Usually each comb bearing spur, 10–20  $\mu\text{m}$  (mid tibia) to 16–20  $\mu\text{m}$  long (hind tibia); sometimes inner spur not developed or spurs absent. Sensilla chaetica on basitarsus of mid leg absent. Length of legs segments and ratios in table.

	fe	ti	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>	ta <sub>5</sub>	LR
P <sub>1</sub>	480–610 (545)	325–400 (355)	490–560 (525, n=4)	300–315 (310, n=4)	220–240 (235, n=4)	145–160 (155, n=4)	80–90 (85, n=4)	1.33–1.46 (1.39, n=4)
P <sub>2</sub>	505–615 (560)	395–500 (445)	265–280 (270, n=4)	145–155 (150, n=4)	110–120 (115, n=4)	80–90 (85, n=4)	65–75 (70, n=4)	0.55–0.60 (0.56, n=4)
P <sub>3</sub>	605–730 (665)	490–625 (555)	355–380 (360, n=4)	205–225 (215, n=4)	160–185 (170, n=4)	110–120 (115, n=4)	70–80 (75, n=4)	0.57–0.62 (0.60, n=4)

**Table.** Length ( $\mu\text{m}$ ) of leg segments and leg ratios of male *Zavrelia pentatoma* KIEFFER, 1913.

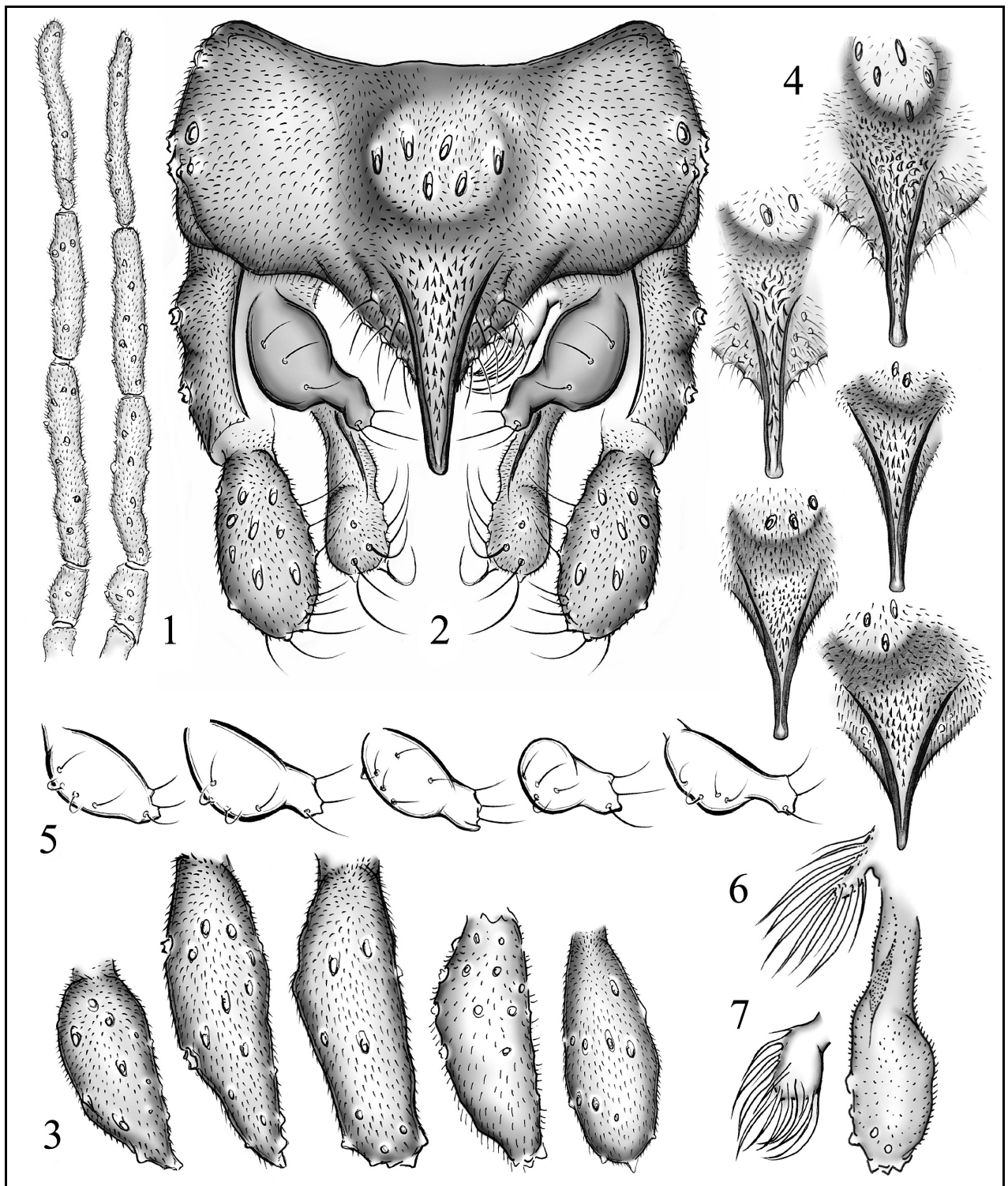
Hypopygium. Gonostylus variable in shape, elongated or bulb-shaped, with tip pointed or widely rounded, 45–80 µm long, usually shorter than gonocoxite (Figs 2, 3). Anal tergite relatively wide and short, bearing 5–11 strong median setae placed in light field surrounded with O-shaped dark tergite bands. Basilateral setae of anal tergite strong if present (observed in 9 examined specimens). Lateral teeth not developed. Anal point variable in shape, as shown in Fig. 4, tapering to tip, apically blunt or transversally cut, armed with 15–55 (usually c. 35) thorn-shaped spinulae placed between well developed crests, spinulae variable in size and shape; small microtrichia-free area at base of anal point sometimes present; 5–8 lateral setae placed on each side of anal point (Figs 2, 4). Superior volsella elongated and directed medially, usually ellipse-shaped in dorsal view, but strongly variable (Figs 2, 5), bearing 3–6 dorsal setae and 3–4 setae on apex. Digitus absent. Stem of median volsella short (12–20 µm), simple or bulb-shaped, bearing bunch of simple and subuliform lamellae (Figs 6, 7). Inferior volsella directed posteriorly, with well developed dorsomedian ridge, apically swollen, reaching at least mid length of gonostylus (Figs 2, 6).

## DISCUSSION

*Zavrelia pentatoma* is a type species of the genus, and was described from adults. Males of *Zavrelia* are relatively small, with wing c. 1.0–1.5 mm long. They have hairy eyes, 10 articles of the antennal flagellum, and the hypopygium with a short gonostylus, strong median setae and three pairs of vosellae (digitus absent).

The adult males of *Z. pentatoma* examined in this work belong to geographically distant populations, and show a distinct variability of structures important in the specific and generic diagnoses. The variability in the major diagnostic characters was observed both in individuals from different populations and those representing one population. The specimens examined are clearly different in their size, as well as in colour, ranging from brown (walnut) to black. Palp segment ratios are clearly variable, particularly with respect to palpomere II and III (Fig. 1). Tibial spurs and combs are differently developed or altogether absent. Most variable, however, is the structure of the hypopygium, which in adult males of all the Tanytarsini species, contains major key characters. The variability is well demonstrated in the length and shape of the gonostylus (Fig. 3), as well as in the shape of the anal tergite point, armed with spinulae occurring in a varying number, configuration and size (Fig. 4). Variable is also the shape of the superior (Fig. 5), inferior (Figs 2, 6) and median volsella (Figs 6, 7).

The morphological variability demonstrated as differences in the most important hypopygial structures, indicate that their diagnostic value should be treated with a great caution. Introducing of at least two junior synonyms of *Z. pentatoma*, i.e., *Z. nigrifulva* GOETGHEBUER, 1921 and *Z. atrofasciata* KIEFFER, 1921 resulted most probably from erroneously interpreted individual variability of the species, as mentioned earlier by GILKA (2000, 2002). The last of the names listed above was reported only from Silesia (KIEFFER 1921, *locus typicus*) and from Finland, contained in an unpublished list of species compiled by Lindeberg (FITTKAU & REISS 1978; PAASIVIRTA, *pers. comm.*).



**Figs 1–7.** Variation in adult male of *Zavrelia pentatoma* KIEFFER, 1913. 1 - palp, 2 - hypopygium, 3 - gonostylus, 4 - anal point, 5 - superior volsella, 6 - inferior and median volsellae, 7 - median volsella. [Zmienność dorosłego samca *Zavrelia pentatoma* KIEFFER, 1913. 1 - głaszczek, 2 - hypopygium, 3 - gonostylus, 4 - wierzchołek tergitu analnego, 5 - górna wolsella, 6 - dolna i środkowa wolsella, 7 - środkowa wolsella].

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## STRESZCZENIE

### **Wewnątrzgatunkowa zmienność morfologiczna *Zavrelia pentatoma* KIEFFER (Diptera: Chironomidae)**

Zbadane dorosłe samce *Zavrelia pentatoma* KIEFFER, 1913, należące do kilku odległych geograficznie populacji, wykazały niespotykaną dotychczas zmienność budowy struktur uwzględnianych w diagnozie tego gatunku. Odmienność stanu najważniejszych cech diagnostycznych dotyczyła zarówno osobników należących do różnych populacji, jak również okazów z tych samych populacji. Osobniki wyraźnie różniły się wymiarami oraz barwą ciała, proporcjami długości członów głaszczka szczękowego, budową ostróg i grzebieni goleni oraz aparatu genitalnego - kształtem gonostyla, wierzchołka tergitu analnego oraz wszystkich przydatków czyli wolselli współtworzących hypopygium.

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