

Notes on the systematics of East Asian *Neozavrelia* Goetghebuer (Diptera, Chironomidae, Tanytarsini)

К систематике рода *Neozavrelia* Goetghebuer (Diptera, Chironomidae, Tanytarsini) Восточной Азии

W. Gilka
В. Гилка

Department of Invertebrate Zoology and Parasitology, University of Gdańsk, Wita Stwosza 59, 80–308 Gdańsk, Poland. E-mail: scorpio@ocean.univ.gda.pl or w.gilka@wp.pl.

Отделение зоологии беспозвоночных и паразитологии, Гданьский Университет, Гданьск, Польша.

Key words: Diptera, Chironomidae, Tanytarsini, *Neozavrelia*, systematics, East Asia.

Ключевые слова: Diptera, Chironomidae, Tanytarsini, *Neozavrelia*, систематика, Восточная Азия.

Abstract. Diagnostic characters and the systematic position of selected Asian species of the genus *Neozavrelia* Goetghebuer, 1941 are discussed. Amended descriptions of *Neozavrelia fengchengensis* Wang et Wang, 1996 and *N. tamanona* (Sasa, 1980) based of new records from North Korea are given. Five specific names published from Japan and originally ascribed to *Cladotanytarsus* Kieffer, 1921 are transferred to *Neozavrelia* as new combinations: *N. simantolemea* (Sasa, Suzuki et Sakai, 1998), *N. simantomeneae* (Sasa, Suzuki et Sakai, 1998), *N. tusimajekeae* (Sasa et Suzuki, 1999), *N. yakuefeae* (Sasa et Suzuki, 2000) and *N. yakufegeae* (Sasa et Suzuki, 2000).

Резюме. Обсуждаются диагностические характеристики и систематическое положение некоторых азиатских видов рода *Neozavrelia* Goetghebuer, 1941. По материалу из Северной Кореи даны дополненные переписания видов *Neozavrelia fengchengensis* Wang et Wang, 1996 и *N. tamanona* (Sasa, 1980). Пять видов, описанных первоначально из Японии и помещённых в род *Cladotanytarsus* Kieffer, 1921, переведены в род *Neozavrelia* — *N. simantolemea* (Sasa, Suzuki et Sakai, 1998), *N. simantomeneae* (Sasa, Suzuki et Sakai, 1998), *N. tusimajekeae* (Sasa et Suzuki, 1999), *N. yakuefeae* (Sasa et Suzuki, 2000) и *N. yakufegeae* (Sasa et Suzuki, 2000).

Introduction

The paper is a part of a faunistic survey of North Korean chironomids, based on material collected by members of the Polish Academy of Sciences, Krakow, during a 1981 expedition. Among a number of chironomid specimens sampled, two species of the genus *Neozavrelia* Goetghebuer were found, and their identification has triggered the foregoing verification of some data published from the region. As a result, two species are redescribed, and five other names, originally incorrectly combined, are transferred to *Neozavrelia*. The number of specific names in the genus, reported worldwide and recently inventoried, has thus increased to 29, including 23 recorded from Asia and 21 from

East Asia [Makarchenko et al., 2005; Guo, Wang, 2005; Ekrem, 2006]. This unexpectedly high number of East Asian *Neozavrelia*, however, may decrease after re-examination of several of them and exclusion of potential synonyms.

Materials and methods

Materials were collected with a sweep net and slide-mounted in Canada balsam. The morphological terminology and abbreviations follow O.A. Sæther [1980]. The illustrations were prepared using the technique of W. Gilka [2008]. The wing was measured from the arculus to the tip. Descriptions of metric and meristic characters are given in brackets when compiled with those taken from literature. The material studied is deposited at the Department of Invertebrate Zoology and Parasitology, University of Gdańsk, Poland.

Systematics

Neozavrelia fengchengensis Wang et Wang, 1996

Neozavrelia fengchengensis Wang et Wang, 1996 (China; male, fig. 1); Guo, Wang, 2005: 189 (China; male, in key); Makarchenko et al., 2005: 414 (Russia; distribution).

Material. North Korea: Mjohjang-san, 22–25.VI.1981, leg. W. Krzemiński — 2♂♂.

Diagnostic description. Wing length 1.30–1.35 mm (1.30–1.78). Antenna with 10 flagellomeres; AR 0.75 (0.75–1.0). Frontal tubercles minute, c. 2 µm long, visible as tiny swellings placed on apices of large frontal lobes. Third and fourth palpomeres of similar length, 75–83 µm (75–90). Clypeals 17–19. Ac 11–13 (10–13), Dc 6–7 (6–8), Pa 1–2, Scts 6–8. Wing veins ending as follows (in order from base to tip): RM and An, FCu, Sc, Cu₁, R₁, R₂₊₃, M₃₊₄, R₄₊₅, M₁₊₂. Each tibia bearing single, straight, 20–25 µm long spur; tibial combs separated, teeth 10–12 µm long. For lengths of leg segments and leg ratios see J. Wang, X. Wang [1996] and Y. Guo, X. Wang [2005]. Gonostylus 80–85 µm long (113–115), variable in shape as shown in Figs 1 and 2,

robust, broadly rounded apically or tapering to blunt apex. Anal tergite with distinct posterolateral lobes and separated broad bands fading in median position; median setae absent. Anal point stout, parallel-sided or swollen subapically, with apex widely rounded, transversally cut or slightly concave, bearing several small spinulae dorsally; 11–12 strong setae on each side of anal point. Superior volsella bilobed: anterior lobe pear-shaped, covered with dense microtrichia, bearing 4–5 dorsal and 3 (2–3) apical setae, posterior extension large, hook-like, bearing long digitus (Fig. 1). Stem of median volsella stout, 28–32 μm long, directed medially, swollen in mid length, with slender spindle-shaped lamellae (Fig. 3). Inferior volsella slightly curved, with distal part directed medially, bearing apical protuberance (Figs 1, 4).

Notes. The hypopygial anal point with dorsal keel bearing lateral setae is the only character given in diagnosis for *Neozavrelia fengchengensis*, and the shape of gonostylus was additionally used as a key feature [Wang, Wang, 1996; Guo, Wang, 2005]. However, both characters are doubtful and depend rather on a technique of slide-mounting or/and are intraspecific morphological variations. The superior volsella, with the anterior pear-shaped lobe covered with dense microtrichia and the large posterior hook-like extension, as well as the stout stem of median volsella swollen in mid length form a unique set of characters for *N. fengchengensis* (Figs 1, 3). The species was recorded from China (Liaoning) [l.c.] and the Russian Far East (Sea of Japan and Amur River basins) [Makarchenko et al., 2005].

Neozavrelia tamanona (Sasa, 1980)

Tanytarsus tamanonus Sasa, 1980: 25 (Japan; male, figs 26a–e, 27a–h);

Neozavrelia tamanona (Sasa, 1980): Sasa, Kawai, 1987: 30 (Japan, combination); Guo, Wang, 2005: 195 (China; male, figs 10–11, in key).

Material. North Korea: Kymgang-san, 28.VI–2.VII.1981, leg. W. Krzemiński — 1♂.

Diagnostic description. Wing length 1.15mm (0.86–1.80). Antenna with 10 flagellomeres, ultimate flagellomere distinctly swollen apically, AR 0.33 (0.33–0.67). Frontal tubercles minute, c. 2 μm long, visible as tiny swellings placed on apices of frontal lobes. Third palpomere, 60 μm long (45–95), shorter than fourth, 80 μm (60–93). Clypeals 16 (11–16). Ac 13 (6–15), Dc 6 (6–9), Pa 1, Scts 6 (0–6). Wing veins ending as follows (in order from base to tip): RM, An, FCu, Sc (fading near R₁), R₁ and Cu₁, R₂₊₃, M₃₊₄, R₄₊₅, M₁₊₂. Tibial spur of fore leg c. 30 μm long (20–35), apically curved; tibial combs of mid and hind leg separated, composed of teeth 9–12 μm long, each comb with spur: 20 and 22 μm long (18–20 and 15–28) (mid leg), 28 and 32 μm long (20–30 and 23–30) (hind leg). For length of leg segments and leg ratios see Sasa [1980] and Guo, Wang [2005]. Gonostylus c. 70 μm long (58–85), tapering to narrow apex. Anal tergite with small posterolateral lobes and Y-shaped (Y- or V-shaped) bands; median setae absent. Anal point stout, constricted at base, apically rounded, bearing several small spinulae dorsally and 6 (5–9) setae on each side of anal point. Superior volsella pear-shaped or somewhat rhomboid, with posterior part slightly expanded, covered with sparse microtrichia at base, bearing 5 (3–5) dorsal and 3 (2–4) apical setae. Digitus stout, distinctly bent in mid length (Fig. 5). Stem of median volsella straight and slender, parallel-sided, c. 25 μm long (25–50), directed medially or posteromedially, with several spindle-shaped lamellae placed on distal half (Fig. 6). Inferior volsella curved and directed medially, with round apex.

Notes. The wing venation pattern and the shape of anal tergite bands observed in the examined specimen slightly differ from those previously described and discussed [Sasa, 1980; Guo, Wang, 2005]. The length of veins An and Sc and the anal tergite bands, with fading distal sections, are apparently variable characters, whereas differences in descriptions of the shape of inferior volsella depend rather on methods of slide preparation. The shape of superior volsella, its setation pattern and the digitus bent in mid length seem the best diagnostic character combination for the species (Fig. 5). *Neozavrelia tamanona* and *N. fuldensis* Fittkau, both highly variable (cf. Fittkau [1954], descriptions of *N. fuldensis* and synonymous *N. pyrenaica*), should be compared on the basis of larger series of specimens in order to exclude synonymy (see also notes on *N. tusimajekae* given below). *N. tamanona* was so far recorded from Japan (Kyushu, Honshu) and China (Shanxi, Shandong, Sichuan, Ningxia) [Sasa, 1980; Guo, Wang, 2005]; *N. fuldensis* is known from Sakhalin and nearby Moneron island [Makarchenko et al., 2005].

Neozavrelia simantolemea (Sasa, Suzuki et Sakai, 1998), **comb.n.**

Cladotanytarsus simantolemeus Sasa, Suzuki et Sakai, 1998: 60 (Japan; male, fig. 13a–k, m).

Notes. The species has the antenna composed of 10 flagellomeres, hypopygial anal point with small dispersed spinulae dorsally, superior volsella and long digitus characteristically arranged relative to each other, inferior volsella long, reaching over half length of gonostylus, and median volsella with simple or slender spindle-shaped lamellae. This set of characters clearly shows that the species should be placed in *Neozavrelia*. The long and acute anal point and the shape of hypopygial volsellae form a unique combination of characters for *N. simantolemea*.

Neozavrelia simantomenea (Sasa, Suzuki et Sakai, 1998), **comb.n.**

Cladotanytarsus simantomeneus Sasa, Suzuki et Sakai, 1998: 61 (Japan; male, fig. 14a–i).

Notes. The species well corresponds to the set of generic diagnostic characters listed for *N. simantolemea*. The short and broad hypopygial anal point and specific arrangement of the strongly reduced superior volsella with the large digitus allow identification of the species.

Neozavrelia tusimajekae (Sasa et Suzuki, 1999), **comb.n.**

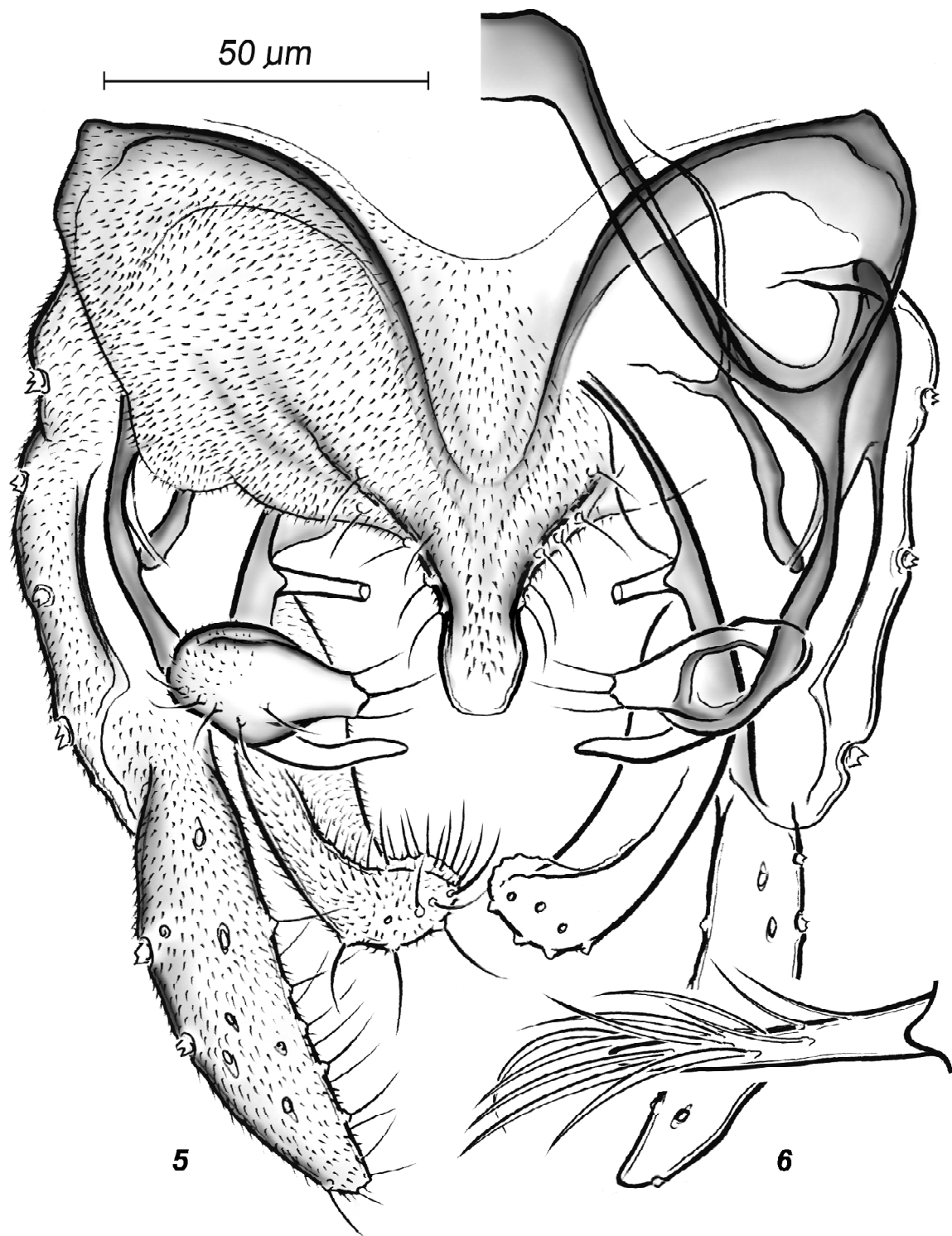
Cladotanytarsus tusimajekus Sasa et Suzuki, 1999a: 13 (Japan; male, fig. 14a–h); ? Sasa, Suzuki 1999b: 148 (Japan; male, figs 3a–k, m, n, p; questionable determination).

Notes. Generic diagnostic characters as for *N. simantolemea*. Regarding morphological variations discussed above, certain separation of *Neozavrelia tusimajekae* and *N. tamanona* / *N. fuldensis* is impossible on the basis of original descriptions. Only slight differences in shape of anal tergite bands, hypopygial volsellae and in measurements indicate that the names should be checked in order to exclude synonymy. Unfortunately, a source of confusion may be also description of a species presented under the same name *C. tusimajekus*, where the illustrated anal point and superior volsella differ distinctly from those given in the original description [cf. Sasa, Suzuki, 1999a, b]. The high number of specific names in the genus *Neozavrelia*



Figs 1–4. *Neozavrelia fengchengensis* Wang et Wang, male from North Korea. 1 — hypopygium; 2 — gonostylus (variation); 3 — median volsella (variation); 4 — inferior volsella (variation).

Рис. 1–4. *Neozavrelia fengchengensis* Wang et Wang, самец из Северной Кореи. 1 — гипопигий; 2 — гоностиль (вариация); 3 — срединный придаток гонокосита (вариации); 4 — нижний придаток гонокосита (вариации).



Figs 5–6. *Neozavrelia tamanona* (Sasa), male from North Korea. 5 — hypopygium; 6 — median volsella (magnified x 2 relative to hypopygium).

Рис. 5–6. *Neozavrelia tamanona* (Sasa), самец из Северной Кореи. 5 — гипопигий; 6 — срединный придаток гонококситы (увеличен в 2 раза по отношению к гонококситу).

known from Japan is expected to be decreased also after comparison the three names with *N. bicoliocula* Tokunaga, 1938 (Kobayashi, pers. comm.; see also Gilka [2005], remarks on species excluded from *Stempellina*).

Neozavrelia yakuefea
(Sasa et Suzuki, 2000), **comb.n.**

Cladotanytarsus yakuefeus Sasa et Suzuki, 2000: 60 (Japan; male, fig. 12a–k, m).

Notes. Generic diagnostic characters as for *N. simantolemea*. The peculiar hypopygial anal point presented in the original description should apparently be treated as a prior diagnostic character for the species. Formulation of a reliable diagnosis requires re-examination of the type material.

Neozavrelia yakufegea
(Sasa et Suzuki, 2000), **comb.n.**

Cladotanytarsus yakufegeus Sasa et Suzuki, 2000: 61 (Japan; male, fig. 13a–k, m).

Notes. Generic diagnostic characters as above, with exception of the anal point, that according to the original description is «slightly longer than wide and rounded, with marginal setae», but without spinulae. Unfortunately, the anal point is absent (broken?) in holotype (Kobayashi, pers. comm.). The broad superior volsella and the stem of median volsella with distinctly swollen apex seem to be the best diagnostic character combination for the species.

Acknowledgements

I wish to thank the legator, Professor Wiesław Krzemiński (Polish Academy of Sciences, Krakow, Poland), and Dr. Tadashi Kobayashi (Mita, Japan) for supplying the literature and information on type materials.

References

Ekrem T. 2006. A redescription of *Neozavrelia cuneipennis* (Edwards) comb. nov., with a checklist of *Neozavrelia* species of the world (Diptera: Chironomidae) // *Zootaxa*. Vol.1153. P.1–16.

- Fittkau E.J. 1954. Die Gattung *Neozavrelia* Goetghebuer (Dipt. Chironomidae) // *Chironomidenstudien II. Deutsche Entomologische Zeitschrift*. Bd.1. S.161–179.
- Gilka W. 2005. A systematic review of European *Stempellina* Thienemann et Bause (Diptera: Chironomidae) with description of a new species from Fennoscandia // *Annales Zoologici*. Vol.55. P.413–419.
- Gilka W. 2008. A rapid technique of producing spatial colour illustrations of diagnostic structures in small dipterans // *Dipteron*, Bulletin of the Dipterological Section of the Polish Entomological Society. Vol.24. P.8–10.
- Guo Y., Wang X. 2005. A review of the genus *Neozavrelia* Goetghebuer from China (Diptera: Chironomidae: Chironominae: Tanytarsini) // *Oriental Insects*. Vol.39. P.187–202.
- Makarchenko E.A., Makarchenko M.A., Zorina O.V., Sergeeva L.V. 2005. Preliminary data on fauna and taxonomy of Chironomids (Diptera, Chironomidae) of the Russian Far East // Vladimir Ya. Levanidov's Biennial Memorial Meetings. Vol.3. P.394–420. [In Russian].
- Sæther O.A. 1980. Glossary of chironomid morphology terminology (Diptera: Chironomidae) // *Entomologica Scandinavica*. Suppl.14. P.1–51.
- Sasa M. 1980. Studies on chironomid midges of the Tama River. Part 2. Description of 20 new species of Chironominae recovered from a tributary // *Research Report from the National Institute for Environmental Studies*. Vol.13. P.9–107.
- Sasa M., Kawai K. 1987. Studies on chironomid midges of Lake Biwa (Diptera, Chironomidae) // *Lake Biwa Study Monograph*. Vol.3. P.1–119.
- Sasa M., Suzuki H. 1999a. Studies on the Chironomid midges of Tsushima and Iki islands, Western Japan. Part 1. Species of Chironominae collected on Tsushima // *Tropical Medicine*. Vol.41. P.1–53.
- Sasa M., Suzuki H. 1999b. Studies on the chironomid midges of Tsushima and Iki islands, Western Japan. Part 3. The chironomid species collected on Iki island // *Tropical Medicine*. Vol.41. P.143–179.
- Sasa M., Suzuki H. 2000. Studies on the chironomid midges collected on Yakushima island, Southwestern Japan // *Tropical Medicine*. Vol.42. P.53–134.
- Sasa M., Suzuki H., Sakai T. 1998. Studies on the chironomid midges collected on the shore of Shimanto river in April, 1998. Part 1. Description of species of the subfamily Chironominae // *Tropical Medicine*. Vol.40. P.47–89.
- Wang J., Wang X. 1996. Two new species of Chironomidae from Liaoning Province, China (Diptera: Chironomidae) // *Zoological Research*. Vol.17. P.121–124. [In Chinese].

Поступила в редакцию 20.06.2012