



## Article

urn:lsid:zoobank.org:pub:E6E8C734-C7D5-4DB5-8012-7AEC44D1CC5F

### A new species of *Neoperla* (Plecoptera: Perlidae) from the southern region of the Russian Far East

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#### Abstract

A new species of Plecoptera, *Neoperla zhiltzovae* sp. n., from the southern region of the Russian Far East is described and illustrated.

**Key words:** Plecoptera, Perlidae, *Neoperla*, new species, Russian Far East

#### Introduction

*Neoperla* (Needham 1905) is one of the most species-rich and widely distributed perlid stonefly genera. About 212 recognized species occur worldwide (DeWalt *et al.* 2012). The highest diversity of *Neoperla* is found in the Oriental Region, especially in the tropics of Southeast Asia (Zwick 1983, 1986, 1988, 2000; Stark & Sivec 2007, 2008a, 2008b; Stark & Sheldon 2009; Sivec & Stark 2011), including China and Taiwan with 66 described species (Chu 1929, Wu & Claassen 1934, Wu 1935, 1938, 1948, 1962, 1973; Sivec & Zwick 1987, Yang & Yang 1990, 1991, 1993a & b, Yang & Yang 1995a & b, 1996, 1998; Du 1999, 2000a & 2000b; Du & Sivec 2004, 2005; Du & Wang 2005, 2007; Du *et al.* 1999a, 2001; Li *et al.* 2011), and the Afrotropical realm (Zwick 1973b, 1976a & 1976b; Sivec *et al.* 1988). Fifteen species occur in the Nearctic Region (Stark 2004). The number of *Neoperla* species in the Palaearctic is still unknown. According to a preliminary study, from two to four *Neoperla* species may inhabit Palaearctic China (Du *et al.* 1999). Eight *Neoperla* species are recognized with certainty from Honshu (Japan) (Uchida 1990). In addition, *N. quadrata* Wu & Claassen, 1934, *N. coreensis* Ra, Kim, Kang & Ham, 1994 and *N. ussurica* Sivec & Zhiltzova, 1996 are recorded in Korea (Zwick 1973a, Ra *et al.* 1994, Stark 2010). The last-named species is known from the Amur River Basin, in the Russian Far East (Sivec & Zhiltzova 1996). This paper presents a description and illustrations of *N. zhiltzovae*, a new species, from the southern region of the Russian Far East.

#### Material and methods

The material consists of alcohol preserved specimens collected in June 2001 from the mouth of the lower Third Ilistaya River, Khanka Lake Basin in the southern region of the Russian Far East. Male genitalia were prepared for study with the cold maceration technique of Zwick (1983). All specimens are deposited in the collection of the Institute of Biology & Soil Science, Far Eastern Branch of the Russian Academy of Sciences (IBSS FEB RAS, Vladivostok).

***Neoperla zhiltzovae* Teslenko, sp. n.**

(Figs 1–10).

**Description.** The general body color of alcohol-preserved specimens collected more than 10 years ago is pale yellow brown. Biocellate. The head is mostly pale yellow with indistinct red brownish spots: one semicircular spot is in front of the ocelli; the second V-shaped spot projects onto the clypeus in front of the M-line; two short horizontal stripes present below the M-line (Fig. 1). The lateral margins of the frons are pale, widened, rounded, and turned up slightly. The palpi and middle antennal segments are pale yellow; the basal and apical antennal segments are brown. The pronotum is pale yellow, with thin brown stripes posteriolaterally and obscure brownish median band and rugosities (Fig. 1). The meso- and metascuta are pale, with brownish pattern. The abdomen is pale yellow with brown pattern dorso-laterally, more pronounced in males than in females on segments 1–6; the abdominal segments 9–10 of females are of uniform brownish color. The cerci are brownish basally, their middle parts are pale, and the apical cercal segments are brown. Legs are pale yellow, tibia with brownish basal band, the tarsi are brown. Wings are transparent, veins and costal areas are pale amber.

**Male.** Body length 10.0–10.5 mm, forewing 11.0–12.5 mm, wing span 23.2–26.2 mm. The posterior margin of the abdominal tergum 7 extends into a rounded and elevated process armed with numerous reddish sensilla basiconica (Fig. 2). Tergum 8 possesses an erect, triangular mesal sclerite narrowed to the base, curved forward and upward, darkly sclerotized ventrally; the distal margin of the mesal sclerite with rounded angles which bear sparse patches of ca. 7 sensilla basiconica (Fig. 3). Tergum 9 is short, without sensilla patches, covered with long fine hairs. On tergum 10, each hemitergal lobe has an oval patch of numerous sensilla basiconica meso-posteriorly (Fig. 3). The hemitergal process resembles the letter S, with relatively deep obtuse notch at midlength; the top is narrowed and rounded, directed inward, reaching the mesal sclerite (Figs 2 & 3). The aedeagal tube is plump, angled dorsally near midlength; the base of tube bent dorsad at a blunt angle near midlength, the dorsal side with unpaired hump in the distal third, the distal margin is oblique (Fig. 4). The everted aedeagal sac is curved, fingerlike, approximately 1.5 times as long as the tube, the entire surface armed with fine spines and with spines of different size and shape: slender spines grouped dorsomedially in an irregular double row from the base along almost half of the sac length with ca. 20 spines in each row; a patch of the largest spines covers the dorsodistal margin of the sac; two rows of stout spines with rounded apex occur laterally with 15–17 spines in each row; a double row of hook-like spines extends ventromedially near the apex of the sac with ca. 10 spines in each row (Figs 4–6). Probably the sac is not fully everted, but the inverted part lacks an armature (Fig. 4).

**Female.** Body length 11.0–11.5 mm, forewing 13.4–14.0 mm, wing span 28.3–29.6 mm. The subgenital plate is wide, short, and extends over sternum 9 slightly (Fig. 7). The posterior margin of the subgenital plate is straight with a median weakly sclerotized and rounded process, expanded at the base and apex and narrowed mesolaterally (Figs 7 & 8). Vagina horseshoe-shaped ventrally, formed by numerous membranous papillate folds; its dorsal part comblike (Figs 8 & 9); each side of the comb bears a row of strong sclerotized pectinate semi-oval bands, attached to the membranous folded part laterally and anteriorly, each row with ca. 5 bands (Figs 8 & 10). A heart-shaped unarmed sclerite underlies the spermathecal base (Fig. 10); spermathecal stalk is short and slender; spermatheca sausage U-shaped, curved in the first third of the length and widened basally and apically (Figs 8–10), entire surface armed with fine, sharp spinules.

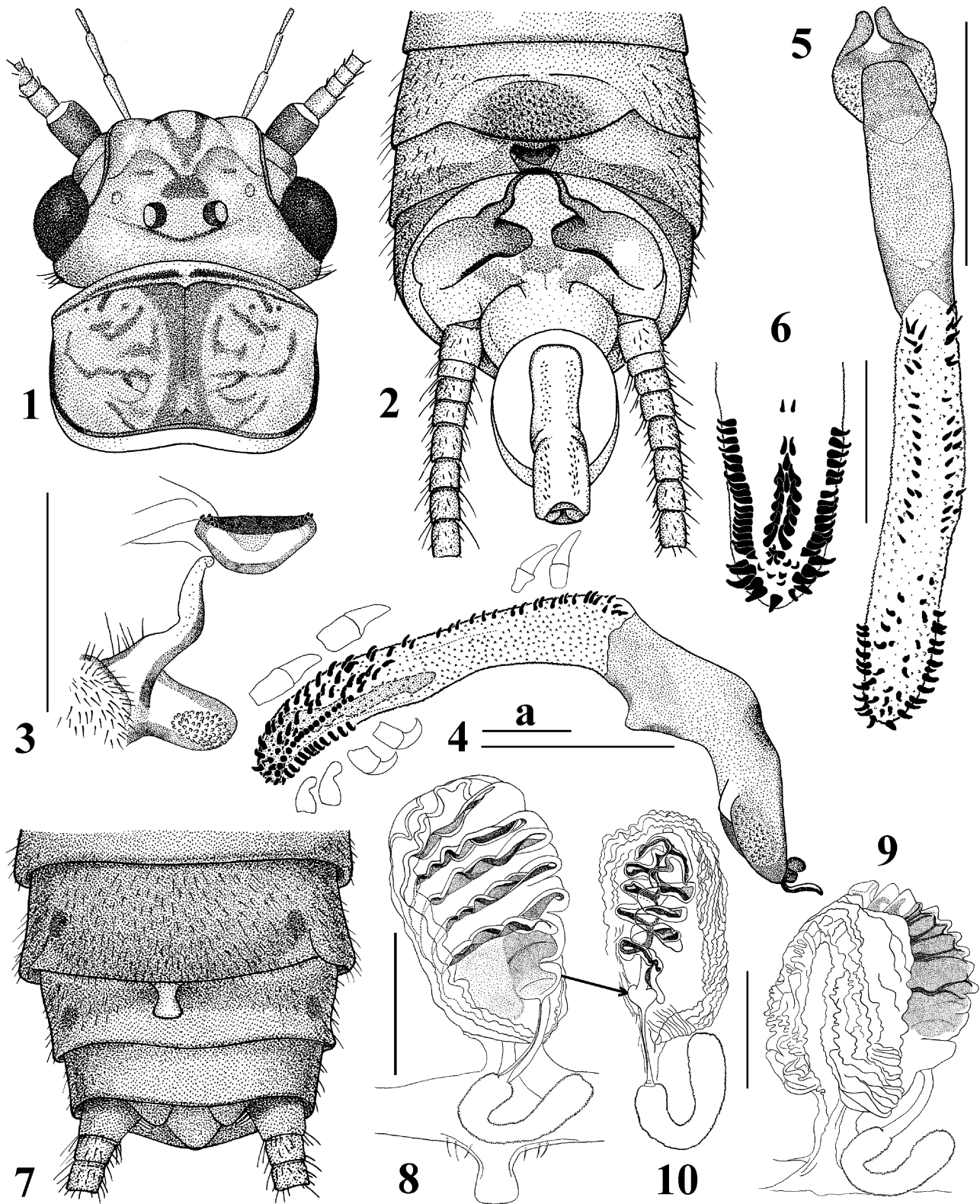
**Egg.** No mature egg available.

**Larva.** Unknown.

**Material examined.** Holotype, male. Russia. Third Ilistaya River, Khanka Lake Basin, near Vadimovka Settlement, 44°21.5'N 132°24.50'E, 17.06.2001, coll. Lyubarets V. Paratypes: 2 males (dissected in vial), 2 females, the same locality and data as holotype.

**Etymology.** The species is named in honour of Lidia Andrejevna Zhiltzova (St. Petersburg), in recognition of her outstanding contributions to the knowledge of stoneflies in the Russian Far East.

**Distribution.** The species is known from the mouth of the Third Ilistaya River, which flows down to the Ilistaya River in the Khanka Lake Basin in the Primorsky Region of the southern Russian Far East. The lake belongs to the Ussuri River system which itself is part of the Amur River system. Lake Khanka (Xingkai in Chinese) is the largest lake in Northeast Asia and is located on the border of China and Russia. It is probable that the distribution of *N. zhiltzovae* is not restricted to the Russian part of the Khanka Lake Basin, but this hypothesis requires confirmation.



**FIGURES 1–10.** *Neoperla zhiltzovae* sp. n.: 1. Head and pronotum of female. 2. Male abdominal tip, dorsal. 3. Male left hemitergal lobe and mesal sclerite of T9, dorsal. 4. Aedeagus everted, lateral. 5. The same, dorsal. 6. Apex of aedeagus, ventral. 7. Female abdominal tip, ventral. 8. Vagina, dorsolateral. 9. The same, ventrolateral. 10. The same, dorsal. Scale (mm): 3–5 = 1.0; 6, 8–10 = 0.5; 4a = 0.1.

**Diagnosis.** *Neoperla zhiltzovae* is associated with *N. montivaga* group (Zwick 1983), where there are a few East Asian species in which the shape of hemitergal process, aedeagus, and aedeagal armature on the sac are

similar to *N. zhiltzovae*. Thus male of *N. lii* Du from Fujian Province of China has straight, long hemitergal process, and many large black triangular spines on the sac on the ventral and dorsal surfaces, unfortunately no detail of the spines arrangement is given (Du, 1999). The aedeagal sac of *N. idella* Stark & Sivec from Vietnam is armed along dorsoapical margin with a double row of 4–7 cultriform spines; most of apical half of the sac covered with smaller spines. The hemitergal processes strongly bent and upturned at midlength (Stark & Sivec 2008). The aedeagal armature of *N. laotica* Zwick also from Vietnam consists of many minute spines on convex face and two rows of very strong curved hook like spines on the venter of sac. The anterior part of the hemitergal process is straight, very short, and blunt (Zwick 1988). *Neoperla zhiltzovae* can be easily separated from three above species by the aedeagal armature dorsomedially, with slender spines arranged in an irregular double row with ca. 20 spines in each row; the largest spines covered the dorsodistal margin of the sac; two rows of stout spines with rounded apex occurred laterally, with 15–17 spines in each row; a double row of hooklike spines extended ventromedially near apex of sac, with ca. 10 spines in each row (Figs 4–6). The hemitergal processes of *N. zhiltzovae* is distinctive resembling a letter S with deep obtuse notch at midlength and the top directed inward, narrowed, and rounded (Figs 2 & 3). The female subgenital plate of *N. zhiltzovae* is distinguished from other *Neoperla* species by weakly sclerotized and rounded process slightly expanded at the base and apex, and narrowed mesolaterally (Figs 7 & 8). Usually the females of other *Neoperla* species have unmodified or bilobed with notch of different depth subgenital plates. The dorsal part of *N. zhiltzovae* vagina is also very specific. It is comb-shaped and has a double row of strong sclerotized pectinate semi-oval bands with ca. 5 bands in each row (Figs 8–10).

## Acknowledgments

The author thanks T.A. Eroshenko, (IBSS FEB RAS, Vladivostok) for the illustrations; V. F. Lyubaretz (IBSS FEB RAS, Vladivostok) for help during additional collecting efforts; Dr. Li W. (Henan Institute of Science and Technology, Xinxiang, Henan, China) for references on Chinese *Neoperla*. I am very much grateful to Prof. Peter Zwick (Schlitz, Germany) and Prof. Bill Stark (Clinton, Mississippi, USA) for their valuable comments and that greatly improved the original manuscript, and also to Prof. Boris Kondratieff (Fort Collins Colorado, USA) for linguistic revision. The present work was supported in part by CBS RAS, Grant N. 12-I-P30-01.

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