



## CAROPERLA LONGISETA (PLECOPTERA: PERLIDAE), A NEW STONEFLY SPECIES FROM THAILAND

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### ABSTRACT

*Caroperla longiseta* sp. nov., is described from adult and larval specimens collected in Chiang Mai Province, Thailand. The new species is compared to *C. pacifica* Kohno, the only previously known member of the genus.

**Keywords:** *Caroperla*, Plecoptera, Perlidae, Thailand, New species

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### INTRODUCTION

*Caroperla*, proposed by Kohno (1946) for her new species *C. pacifica*, has remained a monotypic and enigmatic genus known only from Japan. The genus is unique among Perlidae in having an elongate modified male basal cercal segment (Kohno 1946; Kawai 1967), reminiscent of *Cryptoperla* (Peltoperlidae) and *Cerconychia* or *Styloperla* (Styloperlidae) (Uchida & Isobe 1989; Stark 1989; Stark & Sivec 2007). Males are also unusual in displaying prominent abdominal hair brushes, a feature common among Chloroperlidae; in addition, a recurved male epiproct of the type found in *Caroperla* is more common among peltoperlids, chloroperlids and perlodids than among perlids. Larvae have well developed, highly branched thoracic and anal gills but also have a reduced terminal palpal segment similar to those of chloroperlids; this character is also retained in the adult stage. Thus, *Caroperla* is perhaps the most atypical of perlid genera, but has consistently been placed in Acroneuriinae (Illies 1966) and is apparently most closely related to the *Kiotina* complex of genera as suggested by Uchida (1990).

This study was initiated after the senior author collected two specimens in Thailand representing the

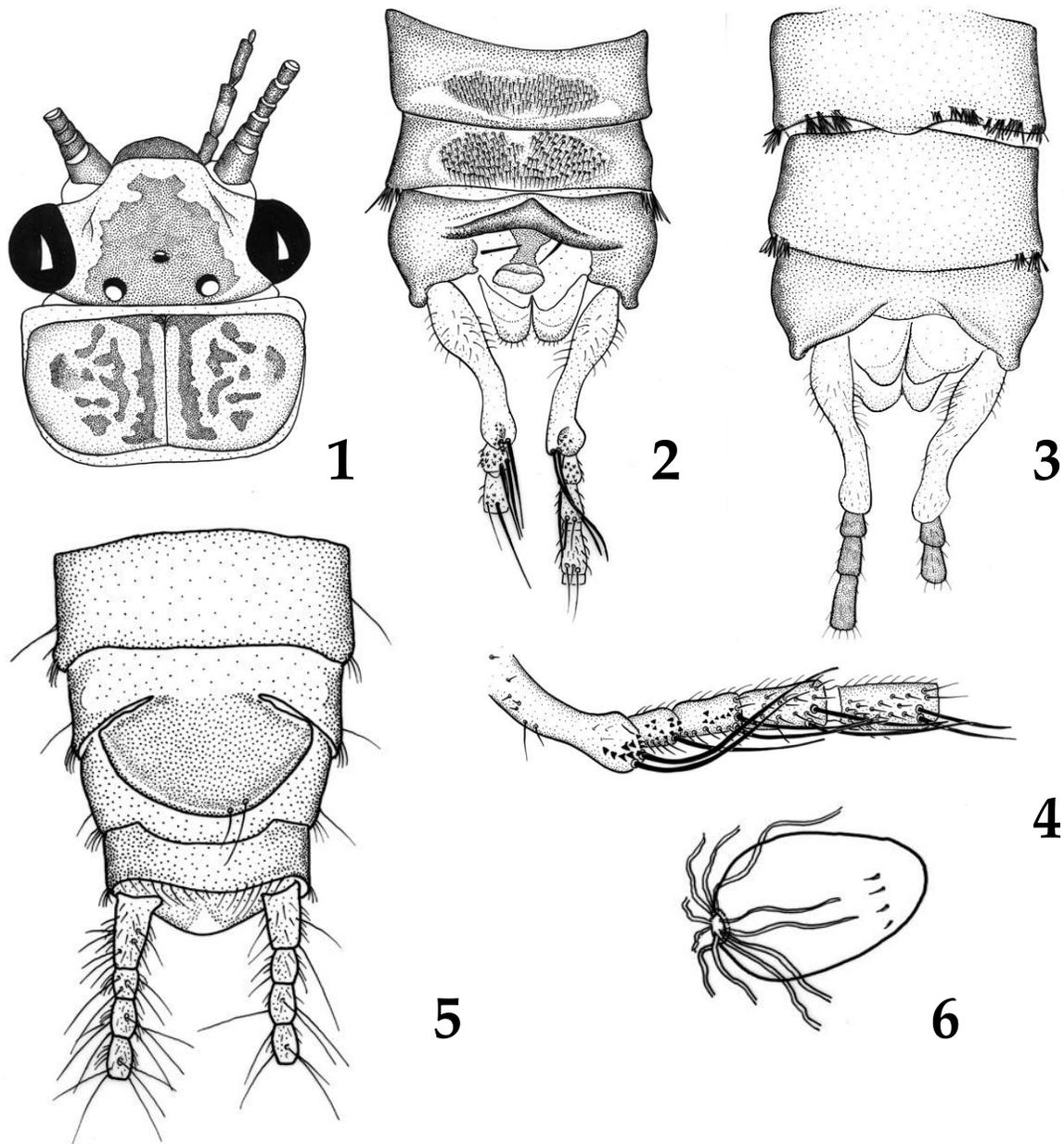
second known species of *Caroperla* and the first example of the genus from mainland Asia. Subsequent collecting at the type locality by the Chiang Mai University team produced an adult female as part of a National Science Foundation sponsored project awarded to Dr. G. Courtney of Iowa State University. All specimens are deposited in the Slovenian Museum of Natural History, Ljubljana, Slovenia (PMSL).

### RESULTS AND DISCUSSION

#### *Caroperla longiseta* sp. n.

Figs. 1-10

**Material examined.** Holotype ♂ from Thailand, Chiang Mai Province, Doi Inthanon National Park, Huai Sai Lueng, 1280 m, 98° 27' N, 18° 31' E, 18 May 2001, I. Sivec (PMSL). Paratypes: Thailand: Chiang Mai Province, Doi Inthanon National Park, Huai Sai Lueng, 8-9 June 2003, blacklight, Chiang Mai University team, 1♀ (PMSL). Additional specimens: Thailand: Chiang Mai Province, Doi Inthanon National Park, Namtok Siriphum, 18 May 2001, I. Sivec, 1 larva (PMSL).

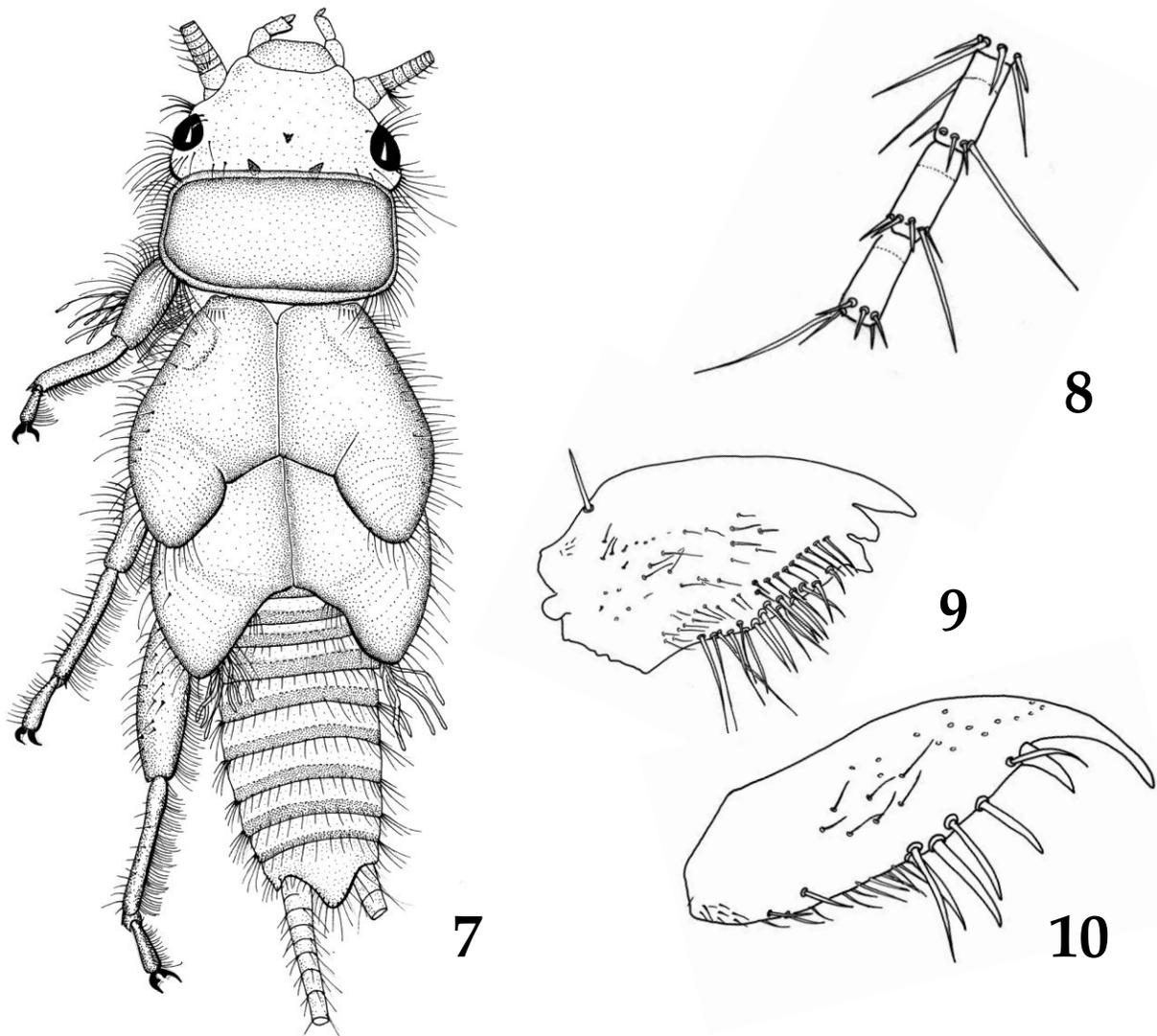


Figs. 1-6. *Caroperla longiseta* adult features. 1. Head and pronotum. 2. Male terminalia, dorsal. 3. Male terminalia, ventral. 4. Male right cercus, dorsolateral. 5. Female terminalia, ventral. 6. Egg.

**Adult habitus.** Triocellate. General color pale brown with dark brown markings. Head with dark brown patch covering ocelli and extending forward to level of antennal bases; patch constricted near anterior margin (Fig. 1). Pronotum pale brown with obscure darker markings; largest markings form narrow bands adjacent to median suture, other variably shaped markings clustered midlaterally. Wings pale

amber, veins darker. Legs pale brown without banding. Terminal palpal segments small and nipple shaped.

**Male.** Forewing length 8 mm. Epiproct small but recurved, anterior margin sclerotized, posterior margin membranous, upturned apex appearing globular (Fig. 2). Paraprocts recurved in basal half, directed upward, but apical half flattened, triangular



Figs. 7-10. *Caroperla longiseta* nymphal features. 7. Habitus. 8. Cercal segments. 9. Right mandible, ventral. 10. Right lacinia, ventral.

in outline, with tips bent and projecting caudad (Fig. 2). Basal cercal segment about four times long as wide with small terminal swelling on inner margin at base of second segment (Figs. 2-4); basal swelling of segment 1 and segments 2-3 bear patches of enlarged sensilla basiconica, pairs of very long thickened setae occur on basal swelling and additional cercomeres through at least segment 5; setae on basal swelling extend beyond apex of 4<sup>th</sup> cercal segment. Abdominal tergum 10 with dark brown mesal area; abdominal

terga 8 and 9 with mesal patches of thickened setae. Abdominal terga and sterna with setal brushes; those on lateral margins of tergum 9 most prominent. Sternum 9 with a small mesal lobe on posterior margin (Fig. 3).

**Female.** Forewing length 9 mm. Subgenital plate parabolic, extending over ca. 2/3 of sternum 9 (Fig. 5). Posterior margin of sternum 9 slightly produced over base of sternum 10. Basal cercal segment about 2 times long as wide; segments armed with fine long setae.

**Egg.** Spindle shaped, collar obscure with anchor composed of several long filaments (Fig. 6). Chorionic detail not determined.

**Larva.** General color almost uniformly pale brown. Body relatively hairy; pronotum with complete lateral fringe of long setae (Fig. 7). Anal gills present. Cercal segments with apical whorls of large bristles (Fig. 8); longest bristles exceed length of following segment. Mandibles with three teeth; inner margins of mandible with row of ca. 16 prominent bristles and a submarginal row of smaller ones (Fig. 9); outer margin with a single large bristle near base. Laciniae bidentate, outer tooth about twice as long as inner; inner lacinial margins with about six large bristles followed by a row of about ten smaller ones (Fig. 10).

**Etymology.** The species name is based on the exceptionally long setae located in a terminal tuft, or in pairs, on the basal cercal segment.

**Diagnosis.** Males of *C. longiseta* are easily distinguished from males of *C. pacifica* by the process on the basal cercal segment. In *C. pacifica* this structure is prolonged over the second segment as a curved spine whereas in *C. longiseta* it terminates in a rounded swelling around the base of the second segment. Female *C. pacifica* have a larger subgenital plate which projects beyond the posterior margin of sternum 9 (Kohno 1946; Kawai 1967). The eggs of the two species are apparently very similar; those of *C. pacifica* studied by Isobe (1988; 1997) with scanning electron microscopy are similar to those of *C. longiseta* in shape and in the cluster of anchor filaments. The chorion of the Japanese species is covered with small diameter, shallow pits, unfortunately we were unable to examine egg specimens of the new species with SEM so we are unsure if the two species differ in this respect.

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