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First record and new species of the genus *Prosopistoma* Latreille, 1833 (Ephemeroptera, Prosopistomatidae) from Borneo (East Kalimantan, Indonesia)

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A new species, *Prosopistoma olympus* sp. n., is described based on larvae collected in East Kalimantan (Borneo, Indonesia). This represents the first report of the Prosopistomatidae from the Island. Affinities and ecology are discussed.

Keywords: Ephemeroptera, *Prosopistoma*, new species, Borneo, East Kalimantan, Indonesia

INTRODUCTION

The genus *Prosopistoma* is the only extant member of the atypical and derived family Prosopistomatidae which nymphs are easily recognisable by their beetle-like shape. Nowadays, 16 species are known, mostly only at the larval stage: they are distributed in Europe (1 species), Near East (1), Africa (4), Australia (1) and above all Asia (9).

Within the framework of a study on the impact of logging activities on macroinvertebrates in East Kalimantan, Borneo, Indonesia (Derleth 2003), several thousands of mayfly nymphs have been collected. The study site is located in a lowland Dipterocarpaceae forest in the Malinau District. With more than 40 mayfly genera found for an area of 85 km², it is probably the area in which the group is the more diversified in the world (Sartori et al. 2003).

Table1: Oriental and Australasian species of *Prosopistoma* with their distribution and the state of the distinctive features.

Species	Authors	Distribution	Tibia : nb of setae	Mandibles: nb of setae	Antenna Sgt 2 vs 3-5	Inner canine ¹	Abdominal sgs 7-9: posterolateral projection
<i>P. annamense</i>	Soldán & Braasch, 1984	Vietnam	4-5	3	>	shorter	pointed
<i>P. boreus</i>	Peters, 1967	Philippines	4-6	6-9	<	shorter	pointed
<i>P. funanense</i>	Soldán & Braasch, 1984	Vietnam	8	3	<	subequal	pointed
<i>P. indicum</i>	Peters, 1967	India	6	3	>	subequal	pointed
<i>P. lieftincki</i>	Peters, 1967	Sri Lanka	2	12-13	=	shorter	pointed
<i>P. olympus</i>	Sartori & Gattolliat, n.sp.	Borneo	3-4	2-3	<	subequal	broad
<i>P. palawana</i>	Peters, 1967	Philippines	6	3	=	subequal	pointed
<i>P. pearsonorum</i>	Campbell & Hubbard, 1998	Australia	2-3	4	=	subequal	broad
<i>P. sedlaceki</i>	Peters, 1967	New Guinea	2-4	7	=	shorter	broad
<i>P. sinense</i>	Tong & Dudgeon, 2000	China	6-8	4-6	>	shorter	pointed
<i>P. wouterae</i>	Lieftinck, 1932	Sunda Islands	8	3	<	subequal	pointed

¹In comparison to the outer canine

Among the collected material were very few nymphs of *Prosopistoma*. This is the first record of the genus for Borneo. Moreover, these nymphs present intermediate characters when compared to other Oriental species and belong to a new species described here below.

The type material is deposited in the Museum of zoology, Lausanne, Switzerland.

TAXONOMY

Prosopistoma olympus sp. n.

Holotype (nymph): Indonesia, East Kalimantan, Malinau watershed, Temalat (Sungai Guang) stream, tributary of the Seturan river, 116°33'29"E, 2°59'29"N (0821P) 21.VI.2000, P. Derleth & J.-L. Gattolliat leg.

Paratypes (2): Indonesia, East Kalimantan, Malinau watershed, Tamalang stream, tributary of the Seturan river, 116°30'29"E, 2°59'22"N (0521P) 19.VII.2000, P. Derleth & F. Béboux leg., 1 larva (partly mounted); Indonesia, East Kalimantan, Malinau watershed, Bengahau stream, tributary of the Seturan river, 116°30'46"E, 2°59'22"N (0531C) 8.VIII.2000, P. Derleth leg., 1 larva.

Nymph

Body length: 2.8mm

General colour light brown, darker brown markings on head around the central ocellus and on mesonotum as in Fig. 1b. Width of head 3.5 x length. Antennae 5-segmented, segment 2 0.8x length of segments 3-5, apical segment long and nar-

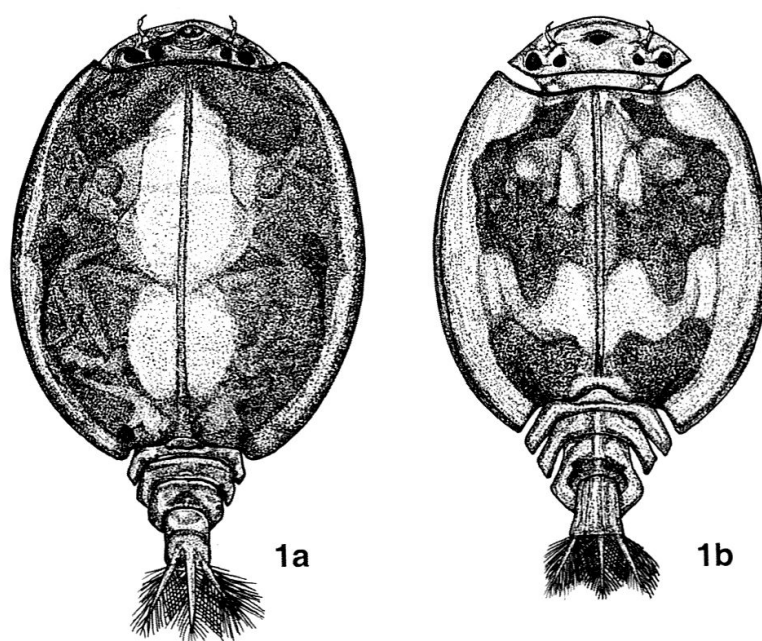
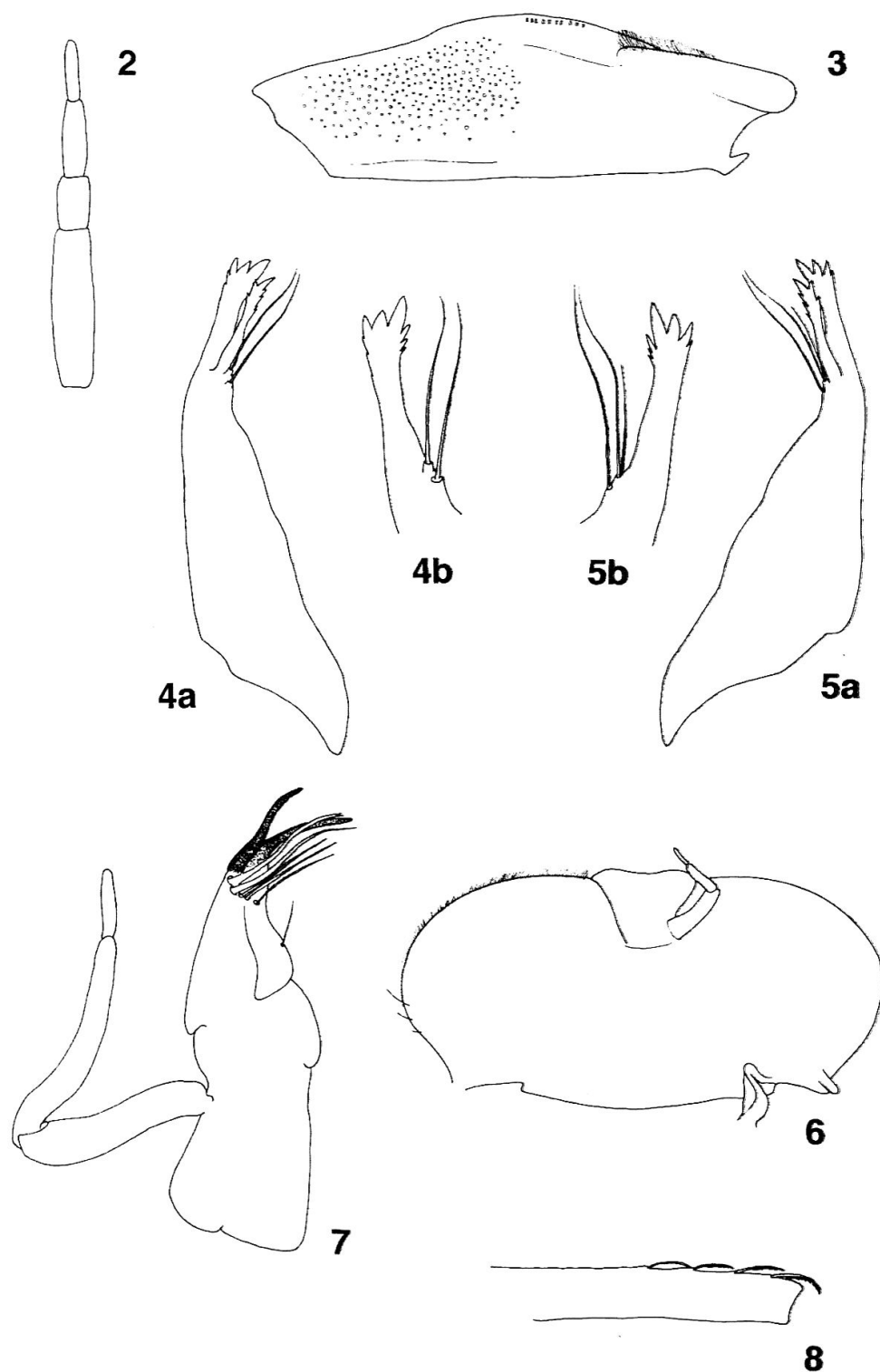


Fig. 1: larval habitus of *Prosopistoma olympus* sp. n. a) holotype (mature nymph); b) half-grown nymph (paratype).

row (Fig. 2). Dorsal face of labrum covered with micropores, lateral margin concave; ventral face of the labrum apico-medially with a row of tiny stout setae, lateral half of the distal margin with a row of thin setae longer medially, lateral margin rounded (Fig. 3).



Figs 2–8: nymph of *Prosopistoma olympus* sp. n. 2) antenna (segments 2–5); 3) labrum (left, dorsal; right, ventral); 4a) right mandible; 4b) right outer canine; 5a) left mandible; 5b) left outer canine; 7) maxilla; 6) labium (left, dorsal; right, ventral); 8) apex of the fore tibia.

Outer canine of the right mandible (Fig. 4b) with 3 apical teeth, inner tooth larger, inner margin with 3 subapical small teeth, outer margin serrated; inner canine of the right mandible (Fig. 4a) slightly shorter than the outer, with 2 apical teeth, inner margin with 4 subapical small teeth, outer margin with 1 subapical small tooth. Two bristles as long as the outer canine, arising from the base of the inner canine.

Left mandible similar to the right except for 3 bristles at the base of the inner canine: two as long as the outer canine and one shorter than the inner canine (Figs 5a, b).

Maxillae relatively stout, crown with 2 long teeth and 5 long bristles; maxillary palp 3-segmented, segment 2 1.1x length of segment 1, segment 3 0.3x length of segment 2 (Fig. 7).

Labium as in fig. 6.

Shape of mesonotum as in figure 1; maximum width 1.1x length measured along the median suture.

Apex of the inner margin of prothoracic tibiae with 3 or 4 spines equal in length, feathered on the inner face (Fig. 8).

Postero-lateral projection on abdominal segments 7 to 9 broad and truncate.

Adult

Unknown

Comments

The nymph of *Prosopistoma olympus* sp. n. can be distinguished from all other Oriental and Oceanian species by the following combination of characters: inner canine only slightly shorter than the outer, two or three bristles at the basis of the inner canine, segment 2 of the antenna shorter than segments 3-5, small number of feathered setae on foretibiae and postero-lateral projection on abdominal segments 7 to 9 broad and truncate. All the other Oriental and Oceanian species of *Prosopistoma* possess in common with *P. olympus* at most only three of the five mentioned characters (see Tab. 1). These characters are considered as the most relevant for the identification of the different species at the nymphal stages (Gillies 1954, Peters 1967, Soldán & Braasch 1984). The colour pattern of the mesonotum can be also relatively useful to distinguish the different species. However, in *P. olympus* as in other species (Peters 1967), the pattern can thoroughly change between the different stages: from light brown with dark brown markings (Fig. 1b), the mesonotum becomes uniformly middle brown in the last stage (Fig. 1a). The shape of the labrum, especially the lateral margin, was also pointed out to separate the different species (Campbell & Hubbard 1998). According to our observations, the shape of the lateral margin mainly changes according to which face it is viewed from.

BIOGEOGRAPHY

Prosopistoma wouterae is the only species that was previously reported from the Sunda Islands (Java and Sumatra). *Prosopistoma olympus* present no clear affinities with it and is morphologically as close to other species such as those from Vietnam (*P. funanense*) or Australia (*P. pearsonorum*). Any phylogenetic or biogeographical clarification is very difficult at the moment since the winged stage of *Prosopistoma* species is only known for two of the 17 known species. Moreover, several species await description in South Africa (Barber-James 2003) and Madagascar (Elouard & Gibon 2001). It is then too early to confirm Koch's hypothesis on the origin and the historical dispersion of Prosopistomatidae to explain its distribution (Koch 1988).

ECOLOGY

Prosopistoma olympus has been found in three tributaries of the Seturan river. These localities share in common the fact that they are situated in primary, non-degraded rain forests. Stream width was comprised between 3 and 8 m., water temperature between 23.9 °C and 26.3 °C, flow was rather important (0.8-0.9 m/s) and the substrate composed of boulders and cobbles, with little gravel and no sand. Among all the mayflies collected, *P. olympus* was one of the rarest and has never been found in places where logging activities have been carried out, even 5 years after the exploitation (Derleth 2003), suggesting that this species is especially sensitive to rapid environmental changes.

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