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Indonesian species of *Dilatognathus* Kluge 2012 (Ephemeroptera, Leptophlebiidae, *Choroterpes* s.l.) and species-specific sexual dimorphism in development of maxilla

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Abstract

Larvae, subimagoes and imagoes of both sexes reared from larvae of a new species *Choroterpes* (*Dilatognathus*) *bogori* sp.n. from Java are described. Formerly this species was described by Ulmer (1939) under the wrong name "*Choroterpides exiguus* (Eaton 1884)". In all species of *Dilatognathus*, maxilla of last instar larva has the same structure, but in *Ch. (D.) cataractae* its structure is different in previous instars, being different in males and females.

Key words: Indonesia, Java, mayflies, Ephemeroptera, Leptophlebiidae, systematics, new species, ontogenesis

Introduction

Ulmer (1939) established a new genus *Choroterpides* for Oriental leptophlebiids with highly modified mouth apparatus, and designated *Choroterpides exiguus* (Eaton 1884) as its type species. Under this species name Ulmer described larvae and imagoes from Sumatra and Java. Actually, the species *Thraulius exiguus* Eaton 1884 was originally described as imagoes, which are not conspecific with imagoes described by Ulmer. Judging by genitals figured by Eaton (Figs 25, 26; Eaton 1884: Pl. 13, Fig. 20*2), the species *exiguus* [*Thraulius*] most probably belongs to *Euthraulius* s.str. Basing on the fact, that the type species of *Choroterpides* does not belong to the genus described under this name, I gave a new name *Dilatognathus* Kluge 2012 for this taxon. As the type species of the genus group name *Dilatognathus*, I have designated *Choroterpes* (*Dilatognathus*) *cataractae* Kluge 2012 from Lombok Island, because at that moment this species was the single one, for which imagoes and larvae had been reliably associated by rearing. After this, in September 2012, I was able to collect larvae and rear male and female imagoes of another species of *Dilatognathus* from Bogor in Java. Ulmer's description of his "*Choroterpides exiguus*" at least partly is based on this species. In my paper (Kluge 2012) imagoes of this species, collected at light in 2008 by V. Ivanov, are mentioned as "*Dilatognathus/g(1) sp.2*". Imagoes of *Dilatognathus* are hardly distinguishable from other *Choroterpini*, so at that time I was not completely sure that this species belongs to *Dilatognathus*. Below, this species is described as *Choroterpes* (*Dilatognathus*) *bogori* sp. n.

Material and methods

Subimagoes were reared from larvae in field cages of original construction; imagoes were reared from subimagoes in glass tubes. Larval instars are determined by size and proportions of mesonotum and fore prothorax, as shown for *Ch. (D.) cataractae* (Figs. 2–5). These features allow to divide all examined specimens into discrete groups; this means that in *Dilatognathus* at least later instars are determined (unlike some other mayflies). Where possible, sequence of instars have been determined by study of larvae fixed just before molt to the next instar, when details of the next instar are visible through the old cuticle (e.g., Figs 14, 15, 18). Terms ultimolarva (for L_n) and penultimolarva (for L_{n-1}) are used according to the terminology suggested in the previous paper (Kluge 2010).

same as in ultimolarva: with long tusk bearing 3 vestiges of ventral pectinate setae, without ventro-apical flange and without dentiseta.

Imago. Unknown.

Egg. Described by Kang & Yang (1994).

Dimension. Length of ultimolarva 6–10 mm.

Distribution. Indochina Peninsula (Thailand), Hainan and Taiwan Islands.

Discussion. Kang & Yang (1994) described *Choroterpides nigella* based on larvae and eggs. They did not compare *Ch. nigella* with *Ch. minor*. As characters distinguishing *Ch. nigella* from *Ch. major*, only two ones are named: (1) transversal curved row of long setae on labrum and (2) tooth-like maxillary tusk with three comb-like setae at its base. Actually, both characters are present in all *Dilatognathus*, including *Ch. (D.) major* (Ulmer 1939: Figs 262, 265).

Key to species of *Dilatognathus*

Imago (imagoes of *Ch. (D.) minor* and *Ch. (D.) nigella* unknown).

- 1(2) Fore wing with darkened proximal half of subcostal area (Kluge 2012: Fig. 134). *Ch. (D.) cataractae*
2(1) Fore wing entirely colorless or evenly colored.
3(4) Each femur with contrasting transverse dark band at middle (Fig. 31). Abdominal terga medially light (Fig. 29).
. *Ch. (D.) bogori sp. n.*
4(3) Each femur entirely dark or with longitudinal stripes, without transverse band (as in Fig. 33). Abdominal terga medially dark, with pair of small submedian blanks close to anterior margin (as in Fig. 30). *Ch. (D.) major*

Larva of last instar

- 1(2) Median incision of labrum wide and deep, semicircular, bordered by sharp semicircular impression on dorsal surface (Kang & Yang 1994: Fig. 3A). *Ch. (D.) nigella*
2(1) Median incision of labrum shallow, with median convexity, or non-expressed (Fig. 24; Kluge 2012: Fig. 133; Ulmer 1939: Abb. 259, 262).
3(4) Tergalii elongate (Fig. 28). *Ch. (D.) minor*.
4(3) Tergalii shorter (Figs 23, 27; Kluge 2012: Figs 138, 140, 141).
5(6) Apical processes of tergalii wider and longer, gradually narrowing toward apex (Fig. 23). Posterior margins of abdominal terga I and II without regular row of denticles (Fig. 34); denticles on posterior margins of abdominal terga III–VII small (Fig. 35). Femora light, with large dark brown spot or band at middle (as in Fig. 31). *Ch. (D.) bogori sp. n.*
6(5) Apical processes of tergalii small and thread-like (Fig. 27; Kluge 2012: Figs 138, 140, 141). Posterior margins of abdominal tergum II with regular row of small denticles (Fig. 36); denticles on posterior margins of abdominal terga III–VII larger (Fig. 37).
7(8) Femora entirely dark brown (hypodermal coloration) (Fig. 33). *Ch. (D.) major*
8(7) Femora with brown band at middle and lighter proximal and distal parts (as in Fig. 32) *Ch. (D.) cataractae*.

Larva of penultimate or previous instars.

- 1(2) In male, dentiseta present in penultimate and previous instars; in female, dentiseta present in pen-penultimate and previous instars (Figs 6–13). *Ch. (D.) cataractae*.
2(1) Dentiseta absent.
3(4) Median incision of labrum wide and deep, semicircular (Kang & Yang 1994: Fig. 3A). *Ch. (D.) nigella*
4(5) Median incision of labrum shallow, with median convexity, or non-expressed (Kluge 2012: Fig. 133; Ulmer 1939: Abb. 259, 262).
5(6) Tergalii elongate (Fig. 28). *Ch. (D.) minor*.
6(5) Tergalii shorter (Figs 23, 27; Kluge 2012: Figs 138, 140, 141).
7(8) Femora light, with large dark brown spot or band at middle (hypodermal coloration) (as in Fig. 31). Apical processes of tergalii wider and longer, gradually narrowing toward apex (Fig. 23). Maxilla of pen-pen-penultimolarva with small ventro-apical flange (Figs 19, 20). *Ch. (D.) bogori sp. n.*
8(7) Femora entirely dark brown (hypodermal coloration) (Fig. 33). Apical processes of tergalii small and thread-like (Fig. 27). Maxilla of pen-pen-penultimolarva without ventro-apical flange *Ch. (D.) major*

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