

A New Species of Poorly Known Mayfly Genus *Paegniodes* Eaton (Ephemeroptera: Heptageniidae) from Vietnam

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ABSTRACT A heptageniid mayfly species *Paegniodes dao* sp. nov. (Ephemeroptera: Heptageniidae) is described from Vietnam. The larva is distinguished by round anterolateral margins of pronotum, triangular-shaped labrum, rudimentary lamella and well developed fibrillae of gills 1, and light brown body that lacks distinct markings. Diagnosis, line drawings, material, and habitat data are provided.

Key words : Description, New species, *Paegniodes dao*, Tropical stream

Introduction

Eaton (1881) established the genus *Paegniodes* based on the type species *P. cupulatus* (Eaton), which was described from male and female adults collected from Hong Kong, China. Eaton (1885) and Ulmer (1925) dealt with the genus and type species. Hsu (1931) redescribed the genus and described the male adult of the second species, *P. fukiensis* Hsu, from Southern China. Tshernova (1976) firstly described the larva of *P. cupulatus* (Eaton). No other species has been reported in the genus. The genus *Paegniodes* is characterized by deeply cleft lobes of penes and widely separated titillators (Hsu, 1931; Tshernova, 1976). Wang and McCafferty (2004) considered *Paegniodes* as sister group of *Rhithrogena*–*Cinygmula* lineage.

In a series of systematic study of Vietnamese mayflies, we describe a new species of *Paegniodes* based on larval specimens collected from Vietnam in 2000–2001. All the materials are preserved in 80% ethyl alcohol and deposited in the Aquatic Insect Collection of Seoul Women's University (SWU–AIC). In the future, the holotype material will be housed at an authorized institution in Vietnam where it originated (e.g., Hanoi University of Science).

Description

Paegniodes dao sp. nov. (Fig. 1)

Diagnosis. The larva of *Paegniodes dao* can be distinguished by the combination of round anterolateral margins of pronotum (Fig. 1A), triangular-shaped labrum that has fields of long hairs on anterior margin (Fig. 1B), gills 1 that have rudimentary lamella and well developed fibrillae (Fig. 1G), and light brown to light purplish brown body that lacks distinct markings.

Description.

Mature larva. Holotype female body length 13.5 mm; caudal filaments 16.5 mm. Body light brown to light purplish brown, without distinct markings. HEAD: Head (Fig. 1A) ovoid and flattened, 2.40 mm in length, 3.30 mm in width, light brown, without distinct markings. Compound eyes black in alcohol. Antennae 3.5 mm in length; pedicel brown; flagellum light brown. Labrum (Fig. 1B) laterally narrower, triangular in shape, anteriorly notched; each side of anterior margin with field of long hairlike setae; dorsal surface with hairlike setae. Mandibles (Fig. 1C) with dense hairlike setal field on lateral margin; outer incisor serrate, laterally expanded; inner incisor reduced, terminally acute. Maxillae (Fig. 1D) with row of dense hairlike setae on mesial margin, with scattered hairlike setae on ventral surface; basal segment of palp 0.80 mm, with dense hairlike setal fields on

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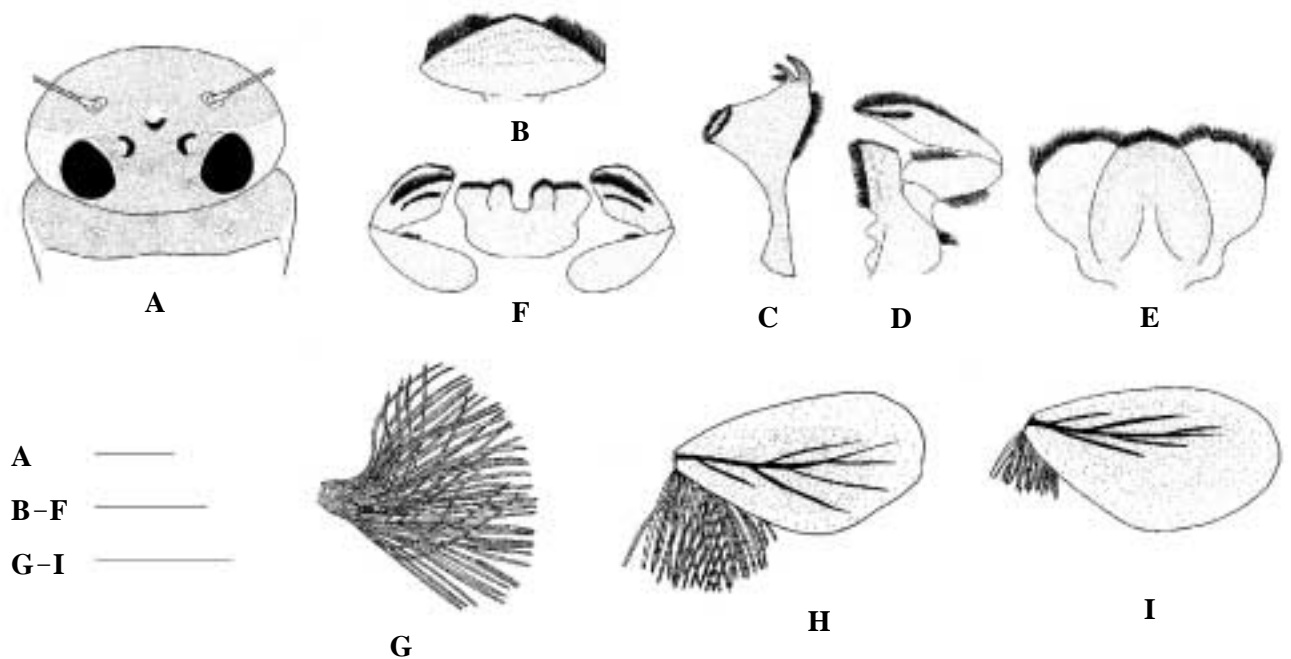


Fig. 1. *Paegniodes dao*, larva (scales = 1 mm): (A) head and prothorax, (B) labrum, (C) right mandible, (D) right maxilla, (E) hypopharynx, (F) labium, (G) gill 1, (H) gill 3, (I) gill 7.

anterior and posterior margins; apical segment of palp 1.35 mm, with dense hairlike setal field on outer margin and ventroapical surface. Hypopharynx (Fig. 1E) lingua relatively narrow, with dense hairlike setae apically; superlinguae round, not expanded laterally, with dense hairlike setae apically. Labium (Fig. 1F) glossae moderately separated, with dense apical setae; paraglossae expanded laterally, with dense apical setae; basal segment of palp 1.10 mm; apical segment of palp 1.20 mm, with rows of dense hairlike setae on ventral surface and outer margin. **THORAX:** Prothoracic notum (Fig. 1A) 3.6 mm in width; anterolateral margins round; lateral margins somewhat expanded; posterolateral margins not clearly demarcated to mesonotum. Legs pale yellow, with light brown to purplish brown markings; forefemora 2.80 mm, foretibiae 3.10 mm, foretarsi 0.90 mm, and foreclaws 0.20 mm; midfemora 3.00 mm, midtibiae 2.80 mm, midtarsi 0.70 mm, and midclaws 0.20 mm; hindfemora 3.40 mm, hindtibiae 3.10 mm, hindtarsi 0.70 mm, and hindclaws 0.20 mm. Forefemora light brown, with stout setae on dorsal surface; foretibiae with long hairlike setae on outer margin; foretarsi with sparse hairlike setae on outer margin. **ABDOMEN:** Terga 1–10 light brown to purplish brown, with paired small submedian white

spots, without distinct darker markings; posterior margin of each segment with 1–2 smaller spines alternating with 1 larger spine. Gills 1 (Fig. 1G) lamella rudimentary; fibrillae dark purplish brown, greatly developed. Gills 2–6 lamella well developed; tracheae on gill lamellae moderately branched, purplish brown; fibrillae more or less developed (Fig. 1H). Gills 7 (Fig. 1I) fibrillae relatively weakly developed. Caudal filaments 3, relatively long, basally light yellow and apically white.

Adult. Unknown.

Materials examined. Holotype: Female larva (SWU-EPH-3653), VIETNAM, Lao Cai Prov., Sa Pa, Muong Hoa (1500 m), 20-X-2000, V. V. Nguyen. Paratypes: 5 L: same data as holotype. Other materials: 1L: Cao Bang Prov., Doc Lap, Ha Quang, 18-XII-2000, V. V. Nguyen; 1L: Ha Tay Prov., Ba Vi N.P., Tien Cr., 23-XII-2000, V. V. Nguyen; 3L: Vinh Phuc Prov., Tam Dao N.P., Thac Bac Cr. (700 m), 15-II-2000, V. V. Nguyen; 5L & 1 female subimago (reared, with larval cast skin), Da Nang Prov., Bana, Nui Chua, Tuy Loan, An Loi Cr., 210 m, 2-IV-2002, V. V. Nguyen & D. H. Hoang.

Etymology. The specific name “dao” (noun) is in honor of the Vietnamese ethnic minority “Dao” peo-

ple who live around the holotype locality in Lao Cai Province where the land mostly consists of high mountain areas.

Distribution. Vietnam.

Habitat and biology. The larvae of *P. dao* are found in tropical mountain streams ranging 300–1500 m in altitude. The streams are 15–20 m wide and 10–30 cm deep in the dry season (February–April). The water temperature ranges 18–24°C and pH ranges 7.5–7.8. The larvae are found underneath stones in flowing areas of the streams where the substrate is mostly stony and sandy.

Remarks. One reared female subimago from Da Nang Province has a purple median stripe and a pair of arched sublateral stripes on each segment of dorsal abdomen, which are also found in adults of *P. cupulatus* (Eaton, 1881, 1885) and *P. fukiensis* (Hsu, 1931). This character may be in common in adults of *Paegniodes*. Since the subimago was dead during emergence with poor material condition, we were unable to observe other useful characters. The larva of *P. cupulatus* possesses the typical abdominal stripes mentioned above (Tshernova, 1976), but the mature larva of *P. dao* lacks such stripes.

Acknowledgements

We thank Dr. X.Q. Nguyen (Hanoi University of

Science, Hanoi) for his general help and Mr. D.H. Hoang (SWU) and Ms. T.K.T Cao (IEBR, Hanoi) for their field trip assistance. This work was supported by the grant No. R01–2001–000–00086–0 from the Basic Research Program of the Korea Science & Engineering Foundation. VVN was supported by the BK 21 Fellowship and by Asia Research Center of Vietnam National University in Hanoi.

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(Received 23 November 2004; Accepted 3 December 2004)