

Two New Species of Hydropsychidae (Insecta: Trichoptera) from the Philippines

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ABSTRACT

Two new Hydropsychidae (Insecta: Trichoptera) species from the Philippines are described. *Hydropsyche philippinensis*, n. sp., differs from other congeners in the structure of the phallic apparatus. *Diplectronea lagunensis*, n. sp., can be distinguished from other congeners by its distinct white band pattern in the forewings and by the structure of the phallus. Both new species were collected from a high mountain stream in the northern part of the Philippines. Paratype materials were barcoded to make the sequences readily available in the GenBank.

Keywords: *Hydropsyche philippinensis*, *Diplectronea lagunensis*, Hydropsychidae, Trichoptera, new species, Philippines

INTRODUCTION

The Philippines, consisting of 7,107 islands, is considered one of the megadiverse countries in the world with high rates of endemism due to its geographical isolation and diverse habitats. Insects are among the faunal group showing relatively higher endemism. So far, 20,940 insect species were recorded in the Philippines wherein 70% was endemic to the country (DENR, 2014).

The insect order Trichoptera, containing approximately 14,600 species in the world, occurs in all biogeographic regions, but relatively more diverse in the tropical regions including Southeast Asia (Morse, 1997). The family Hydropsychidae is well known as fixed-retreat makers and filter feeders in their larval stage. They are often abundant in streams and rivers and they utilize wide range of habitats, making them a major component of freshwater biomonitoring programs.

Studies of Trichoptera in the Philippines began in the early 1800s. Since the first record of the hydropsychid species *Macrostemum fastosum* (Walker, 1852), 67 species of Hydropsychidae have been recorded from the country (Mey, 1990, 1997, 1998a, 1998b, 2002). The aim of this study is to describe additional species of Hydropsychidae from the Philippines.

MATERIALS AND METHODS

Adult caddisfly materials were collected from the following locations: Apr 30–May 1, 2013 in Mt. Maluyon, Pantabangan, Nueva Ecija; 3 May 2013 in Molawin creek located inside University of the Philippines Los Banos, Laguna; 14–15 Jan 2014 in Mt. Imugan, Nueva Vizcaya. Sampling was conducted from 18:00 to 24:00 using light traps (black and white lights). Collected insects were preserved initially in 80% ethanol and changed to 100% ethanol in the laboratory.

Male and female genitalia were dissected and submerged overnight in 10% KOH to clear and remove the tissues. Cleared genitalia were transferred to a concave glass slide with glycerine and examined under the compound microscope (Carl Zeiss Axio Lab A1, Germany). Genitalia were illustrated by tracing the pictures using Adobe Illustrator CS6 version (Adobe Systems Incorporated, USA). Right forewing and hindwing of a selected paratype per species were dissected and mounted on a slide glass and measured under microscope.

Holotypes and paratypes were deposited in the Museum of Natural History, University of the Philippines Los Banos (UPLB), Los Banos, Laguna, Philippines, and some paratypes were deposited in the Invertebrate Museum of the

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Institute of Biology, University of the Philippines Diliman, Quezon City, Philippines (UPD) and Korea University Entomological Museum, Seoul, South Korea (KU).

SYSTEMATIC ACCOUNTS

Order Trichoptera
 Family Hydropsychidae
 Genus *Hydropsyche* Pictet, 1834
 Type species: *Hydropsyche cinerea* Pictet (= *Hydropsyche instabilis* Curtis, 1834).

***Hydropsyche philippinensis*, n. sp.**

Material examined. Holotype, ♂, Imugan, Nueva Vizcaya,

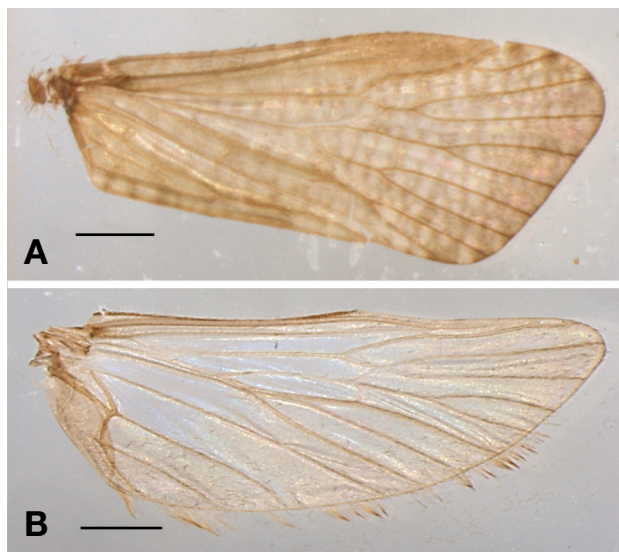


Fig. 1. Right wings of *Hydropsyche philippinensis*, n. sp. A, Forewing; B, Hindwing. Scale bars: A, B=1 mm.

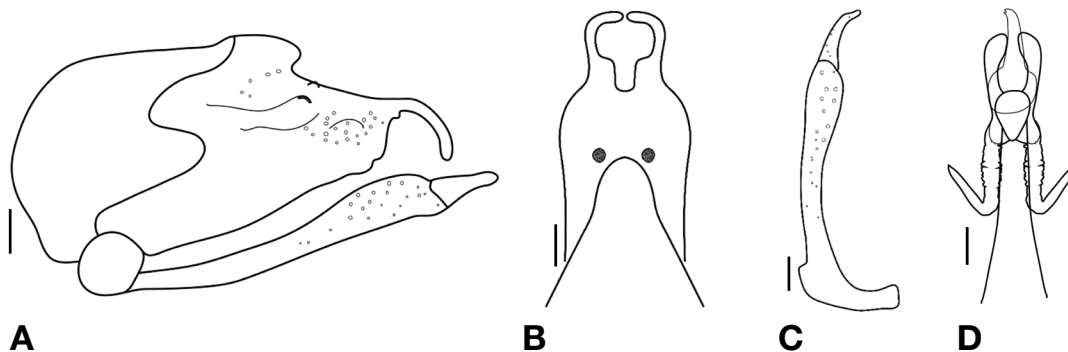


Fig. 2. *Hydropsyche philippinensis*, n. sp., male genitalia. A, Lateral view; B, Dorsal view; C, Inferior appendage; D, Phallus. Scale bars: A-D=0.02 mm.

13 Jan 2014, Uy CJC (UPLB). Paratype, 1♂, Same locality as holotype, 14 Jan 2014, Uy CJC (KU).

Description. Male (holotype): Body length (measured from the base of antenna to the edge of forewing) 23.0 mm; forewing (Fig. 1A) length 10.0 mm with lighter brown spot markings; hindwing (Fig. 1B) length 8.0 mm. Body and wings yellow to brown. Maxillary palp yellow to brown with segment I shortest, segment II longer, segments III and IV equally long, segment V as long as segments I to IV combined. Head dorsum yellow to brown with eight pale yellow setal warts. Posterior wart largest, mesolateral wart large, medioantennal setal wart divided into two small warts, lateroantennal setal wart small and very pale. Proepisternum with swollen setal warts. Legs uniformly yellow to brown. Tibial spurs 2.4.4.

Male genitalia (Fig. 2A-D): Apical segment of inferior appendages, harpagones, slightly bent (Fig. 2C). Coxopodites slightly exceeding segment X (Fig. 2A). Segment IX fused annularly blunt and protruding apically in dorsal view; when viewed laterally dorsocaudal lobe broad, quadrangular, directed posteriorly (Fig. 2B). Apical lobe laterally bluntly protruding. Body of segment X roundedly quadrangular in dorsal view (Fig. 2B). Lateral setose areas located centrally, bearing very evident a few scattered setae. Apicoventral setose lobes modified into a pair of long and slender process curving anteriorly. Dorsal interlobular gap deeply curved forming a U-shaped area. Phallic apparatus slightly bend (Fig. 2D). Phallotremal tongue long and pointed, bifurcating to apex, protruding to lateral side of phallosome tip. Dorsolateral membrane with only two pairs of appendages, smaller pair with minute spines and longer pair with a bent spur without evident serrations.

Etymology. The specific epithet, *philippinensis*, was named after the country of type locality.

Remarks. This new species is somewhat similar to *Hydropsyche luzonensis* (Mey, 1990) in having long and slender phallotremal tongue bifurcating to the apex, but it

lacks longer dorsal process in the segment IX. The two species also differ each other in the dorsolateral membrane structure of the spines. One leg of the holotype was dissected for DNA sequencing: GenBank accession No. KT725855.

Female. Unknown.



Fig. 3. Right wings of *Diplectrona lagunensis*, n. sp. A, Forewing; B, Hindwing. Scale bars: A, B=1 mm.

Genus *Diplectrona* Westwood, 1839

Type species: *Diplectrona felix* McLachlan, 1978

***Diplectrona lagunensis*, n. sp.**

Material examined. Holotype, ♂, Molawin creek, University of the Philippines, Los Banos, Laguna, 29 Jan 2014, Uy CJ and Orlando Eusebio (UPLB). Paratypes, 3♂, 1♀, same data as holotype (UPD and KU); 2♀, Imugan, Nueva Vizcaya (UPLB); 1♀, Mt. Maluyon, Pantabangan, Nueva Ecija (UPLB).

Description. Male (holotype): Body length (measured from the base of antenna to the edge of forewing) 17.0 mm; forewing (Fig. 3A) length 9.0 mm with white band pattern across the middle area; hindwing (Fig. 3B) length 5.0 mm. Body and wings dark brown. Maxillary palp dark brown with segment I shortest, segment II longer, segment III slightly shorter than segment II, segment IV slightly shorter than segment III, segment V as long as segments III to IV combined. Head dorsum yellow with 7 pale yellow setal warts. Posterior wart largest and other warts almost similar in size. Medioantennal setal wart not divided. Proepisternum with swollen setal warts. Legs yellow to light brown in femura area and dark brown in tibia and tarsus areas. Tibial spurs 2.4.4. in both sexes.

Male genitalia (Fig. 4A–D): Apical segment of inferior

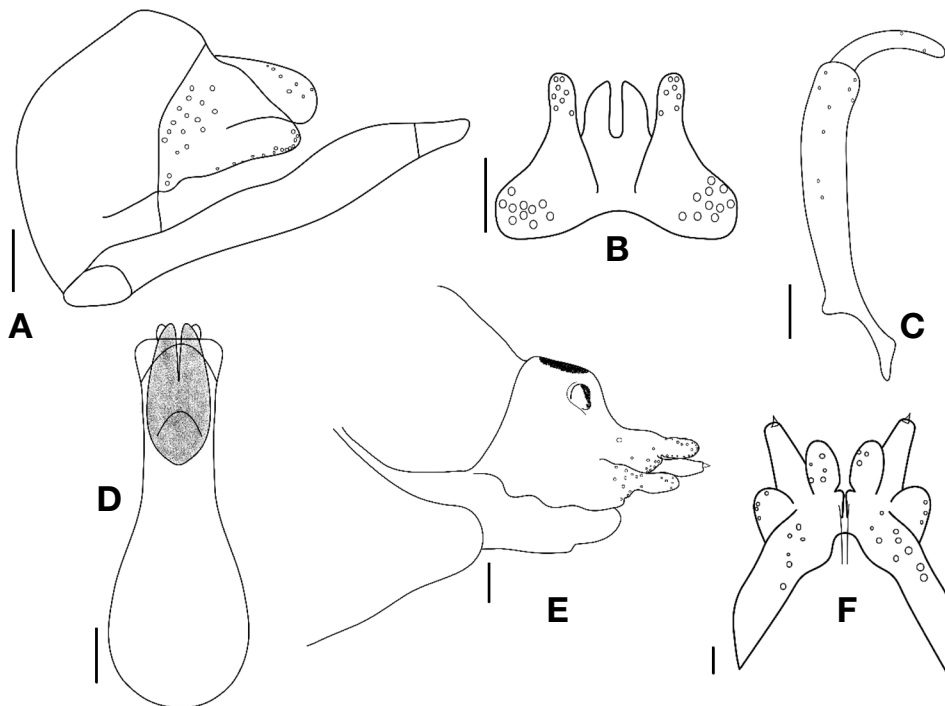


Fig. 4. *Diplectrona lagunensis*, n. sp., male genitalia: A, Lateral view; B, Dorsal view; C, Inferior appendage; D, Phallus. Female genitalia: E, Lateral view; F, Dorsal view. Scale bars: A–F=0.02 mm.

appendages, harpagones, bluntly curved apically (Fig. 4C). Coxopodites exceeding twice length of segment X (Fig. 4A). Segment IX longer than segment X, convex anteriorly (Fig. 4B). Segment X fused to segment IX, dorsoapical setose lobes well-developed, round and broad in lateral view. Phallus with down-curving and broad basal section, with slightly longer, horizontal tubular apical half, with elongate ventral lobe in lateral view (Fig. 4D). Endothecae with two pairs of triangular process.

Female genitalia (Fig. 4E, F): Segment IX annular when viewed dorsally (Fig. 4F). Segment X with dorsal papillary lobe close to cerci (as in the genus *Hydropsyche*, except that *Diplectrona* species have more protruded segment X) (Fig. 4E).

Etymology. The specific epithet, *lagunensis*, was named after the type locality.

Remarks. The peculiar wing pattern of this new species can easily distinguish it from other congeners. Examined female individuals do not show large variations in genitalia. Available specimens were dissected and sequenced to verify the species. The sequence from a dissected paratype was submitted to the GenBank (GenBank accession No. KT51520).

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