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Description of five new species of Leptoceridae (Trichoptera) from Sulawesi

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Abstract

Five new caddisfly species of the family Leptoceridae LEACH, 1815; *Setodes garislandae* sp. nov., *Oecetis matamata* sp. nov., *Oecetis volkmanni* sp. nov., *Oecetis armuliki* sp. nov., and *Adicella hampa* sp. nov. are described from Sulawesi, Indonesia.

Keywords: Leptoceridae, *Oecetis*, *Adicella*, *Setodes*, new species, Sulawesi

Introduction

Fourteen species of Leptoceridae are known from Sulawesi (MORSE 2021), nine of them are so far only known from the island, i.e. considered as endemic. Here we describe five new species in three genera: *Setodes*, *Oecetis* and *Adicella*. Male genital structures show significant inter-species diversity, and are the basis for the species level taxonomy (MALICKY 2010).

Material and methods

All the specimens were collected using light traps, on different expeditions between 2015 and 2020 by Marko Jaakkola and Allan Selin. The type specimens were stored in 80% alcohol, except the pinned paratype of *Oecetis armuliki* sp. nov. All abdomens were cleared in 10% NaOH, the genital structures were drawn by Hans Malicky and digitized by Juha Salokannel. The type specimens are deposited in the research collection of Hans Malicky in Lunz Am See, Austria, except for paratypes of *Setodes garislandae* nov. sp. and *Oecetis armuliki* which are deposited in the Finnish Museum of Natural History (FMNH) in Helsinki, Finland.

Systematics

The abbreviations in the text and figures are the following: D = Dorsal view, L = Lateral view, V = Ventral view, SA = Superior Appendages, IA = Inferior Appendages, Ph = Phallic apparatus.

Setodes garislandae SALOKANNEL & MALICKY sp. nov.

Diagnosis: The new species belongs to the large group of species with very long, curved parameres, but is different for example in the shapes of IA. The IA are rather similar in *S. fluviatilis* KIMMINS, 1963 (Thailand) which, however, is different in Ph and parameres.

Description: Forewing length 4,5 – 4,8 mm. Body and appendages yellowish. Two white, longitudinal stripes continue dorsolaterally from the head and thorax to the base of the forewings (in rest position). Forewings of the type specimens are very faint in colour due to alcohol storage, but a yellow-brownish base colour and multiple whitish longitudinal stripes are suggested. Male genitalia: Segment IX posteroventrally rounded, very large. Segment X rounded, posterior edge notched in dorsal view; dorsum divided, with a short central protrusion and two very narrow

parameres; in lateral view parameres curved down, reaching all the way from dorsum to ventrum. SA finger-like, extended almost to the posterior edge of segment X. Ventral branch of IA long, tapering to a pointed tip; dorsal branch divided into a pointed lateral part and blunt inner part. Phallic apparatus sub-basally thick, distal half narrow, bent steep down.

Holotype: INDONESIA, South Sulawesi, Rantepao, Alang-Alang, 3°00'23.4"S, 119°52'18.8"E, alt. 793 m., 1st Mar 2019. Specimen code: JSLK-SULA-T077-3. Paratypes: 1) a male from the same sample as the holotype, specimen code: JSLK-SULA-T077-2. FMNH reference <http://id.luomus.fi/GZ.515742>; 2) Second paratype: INDONESIA, South Sulawesi, Danau Limbong, 2°57'54.1"S 119°52'51.6"E, alt. 847 m., 22nd Dec 2019. FMNH reference <http://id.luomus.fi/GZ.515743>. All three specimens collected by M. Jaakkola.

Etymology: The first part, Indonesian word *garis* means stripe, that refers both to the narrow appearance of the species in rest position and the striped body and forewings. Lande is the name of the respected local family whose lands the holotype specimen was found on.

Oecetis matamata SALOKANNEL & MALICKY sp. nov.

Diagnosis: The species belongs to *O. lacustris* PICTET group (MALICKY 2005), but in particular the form of segment IX in lateral view is unusual. The species is most closely related to *O. kodros* MALICKY, 2005 (Malaysia), but is different in the shape of the genital characters; smooth caudal edge of segment IX, notched tip of the segment X, wider distal part of IA in ventral view and the evenly narrow internal sclerite of the phallus.

Description. Body and appendages yellowish brown. Holotype forewing length 7,2 mm, forewings with an eye-pattern; several larger “eyes” located from the base to the anastomosis at the vein joints, smaller “eyes” mostly at the vein apices on the distal edge. Paratype immature and therefore without wing pattern. Male genitalia: Segment IX evenly short, caudal edge gently sloping. SA short, rounded in both lateral and dorsal view, populated with long bristles. Segment X laterally narrow, reaching about two times longer than superior appendages. Tip of segment X notched in dorsal view. IA with a dorsal hump in lateral view. Distal half of IA parallel, about a third narrower than the base, populated with inwards turned, spine-like setae in ventral view. Phallus dorsally rounded, ventrocaudally pointed, internal structure elongate, basally rounded.

Holotype: INDONESIA, Central Sulawesi, Peleng island, North Tinankung, Tembang Luk Sagu waterfalls, 1°16'42.3"S 123°25'35.3"E, alt. 76 m., 9th Feb 2020. M. Jaakkola leg. Specimen code: JSLK-PELE-T009. Paratype: INDONESIA, Central Sulawesi, Banggai regency, Salodik waterfalls, 0°49'50.8"S, 122°52'11.5"E, alt. 473 m., 14th Feb 2020. M. Jaakkola leg. Specimen code: JSLK-SULA-T281.

Etymology: The species is named after the eye-pattern of the forewings, in the Indonesian language.

Oecetis volkmanni SALOKANNEL & MALICKY sp. nov.

Diagnosis: The new species is considered to belong to the *O. eburnea* SCHMID, 1961 group (MALICKY 2005), but is different from the others in the shape of the segment X and inferior appendages.

Description: Forewing length 5,5 – 6,5 mm. Forewings unicolorously brownish, anastomosis veins almost coherent, darkened. Body yellowish brown, appendages lighter yellow, antennal joints shortly dark. Male genitalia: Segment IX in lateral view broad ventrally, narrowed until widened again close to the dorsum. Segment X in lateral view large, apically diagonal. SA finger-like in dorsal view, thicker in lateral view, not reaching the tip of segment X. IA caudal branch curved dorsad, apically widened; basal branch narrow, finger-like, pointing up. Phallobase tapering in the apical third, curved down, reaching longer than the other appendages.

Holotype: INDONESIA, South Sulawesi, Taripa, 1°53'08.0"S 120°48'48.0"E, alt. 436 m., 21st Jan 2015. A. Selin leg. Specimen code: JSLK-SULA-T541. **Paratype:** INDONESIA, Central Sulawesi, Saluopa waterfalls, 1°44'59.6"S, 120°32'29.2"E, alt. 563 m., 17th Feb 2020. M. Jaakkola leg. Specimen code: JSLK-SULA-T326.

Etymology: The species is named after Mr. Jaak Volkmann, a good friend and travel companion of the holotype's collector.

Oecetis armuliki SALOKANNEL & MALICKY sp. nov.

Diagnosis: The species is closely related to *O. ausani* MEY & FREITAG, 2019 (Palawan), *O. husam* MALICKY & PROMMI, 2008 (Thailand) and *O. idas* MALICKY, 2005 (Sumatra), but is different especially in the characters of tergite X.

Description: Forewing length 9,0 – 9,5 mm. Forewings brownish, anterior portion of the basal half darkened; front edge in the proximal half with dark grey hairs, longer than the hairs in the distal half. Body brownish, appendages yellowish. Basal segments of maxillary palps with long, dense hairs. Male genitalia: Segment IX in lateral view very broad ventrally, strongly narrowed in the middle. Segment X is asymmetrical in dorsal view, in the middle divided into two narrow branches; the right side branch apically widened, tricuspidate, curved left and down, reaching twice as long as the straight left branch. SA long and evenly narrow, only slightly curved down. IA with a short rounded branch ventrad, finger-like caudal branch and a knobby dorsal branch. Phallic apparatus thick and long, evenly curved down, apically widened.

Holotype: INDONESIA, South Sulawesi, Malino, 5°15'11.5"S 119°51'12.4"E, alt. 1032 m., 14th Jan 2015. A. Selin leg. Specimen code: JSLK-SULA-T525. **Paratype:** INDONESIA, South Sulawesi, SE Makale, Uluway village, 3°17'05.7"S 119°59'06.0"E, 1060 m., 19th Jan 2020. M. Jaakkola leg. Specimen code: JSLK-SULA-T395.

Etymology: The species is named after Mr. Toomas Armulik, a good friend and travel companion of the holotype collector and a biologist in the university of Tartu.

Adicella hampa SALOKANNEL & MALICKY sp. nov.

Diagnosis: The new species seems closely related with *A. kalypso* MALICKY, 2002 (Vietnam, Thailand), but the details of all appendages are different and *kalypso* lacks a central protrusion of segment X. The new species differs clearly from the only previously known Sulawesi representative of the genus, *A. samla* MALICKY & MEY, 2010, e.g. because of the branchless IA.

Description: Forewing length 6,5 mm, colouring uniformly brownish. Body and appendages yellowish, antennal joints shortly dark. Male genitalia: Segment IX in lateral view broad ventrally, anterior edge straight, narrowing all the way to the dorsum, except for two humps in the middle of the posterior edge. Segment X large, extending from the mid of segment IX to the dorsum in lateral view; comprising, in addition to SA, five protrusions; in dorsal view the lateral pair of protrusions rounded, short; the inner pair about twice longer, pointed, rounded laterally; the central protrusion on the top tapering towards the tip, not quite reaching the inner lateral protrusions. SA oval in dorsal view, bearing long bristles. IA moderately narrow, incised in the middle in lateral view, reaching further than the segment X.

Holotype: INDONESIA, Central Sulawesi, Saluopa waterfalls, 1°44'59.6"S, 120°32'29.2"E, alt. 563 m., 17th Feb 2020. M. Jaakkola leg. Specimen code: JSLK-SULA-T325.

Etymology: Indonesien word *hampa* (empty) refers to the moderate appearance of the species' unicolorous forewings.

Acknowledgements

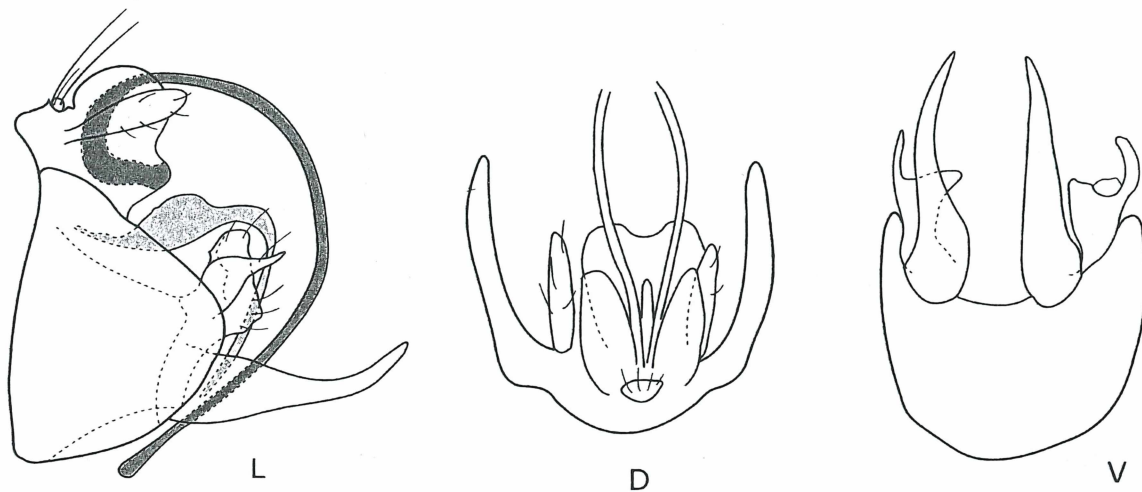
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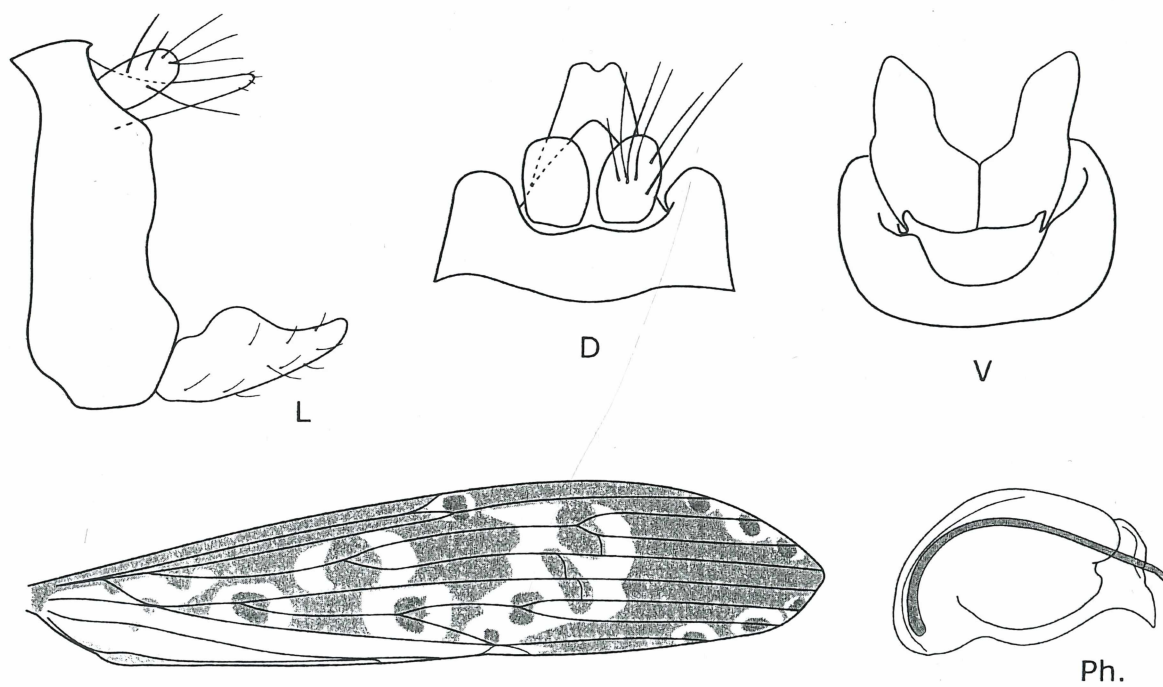
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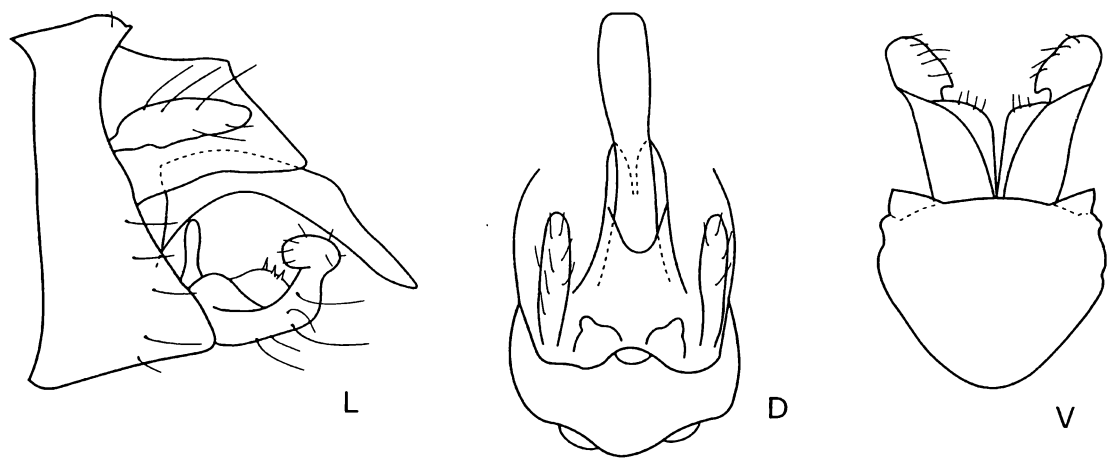
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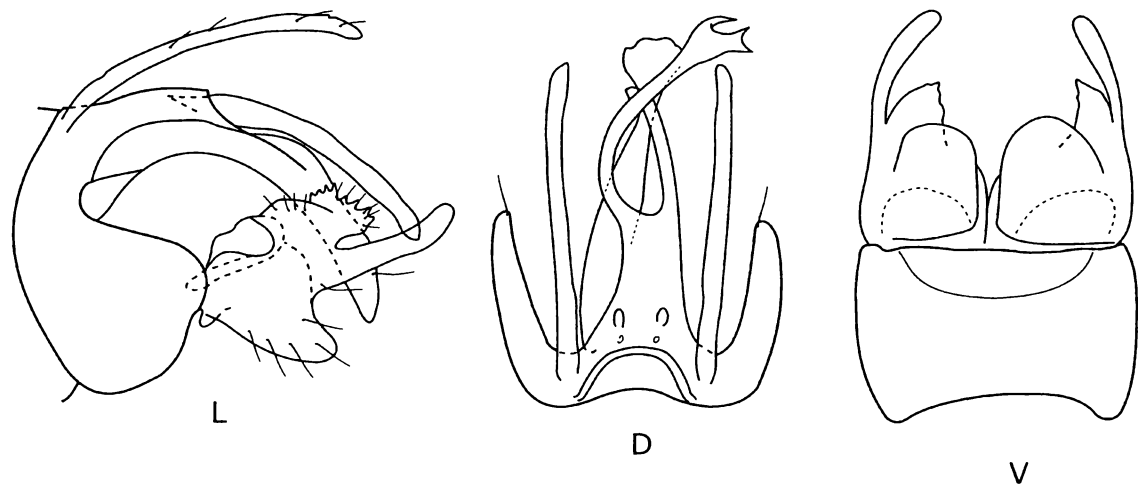
Oecetis matamata



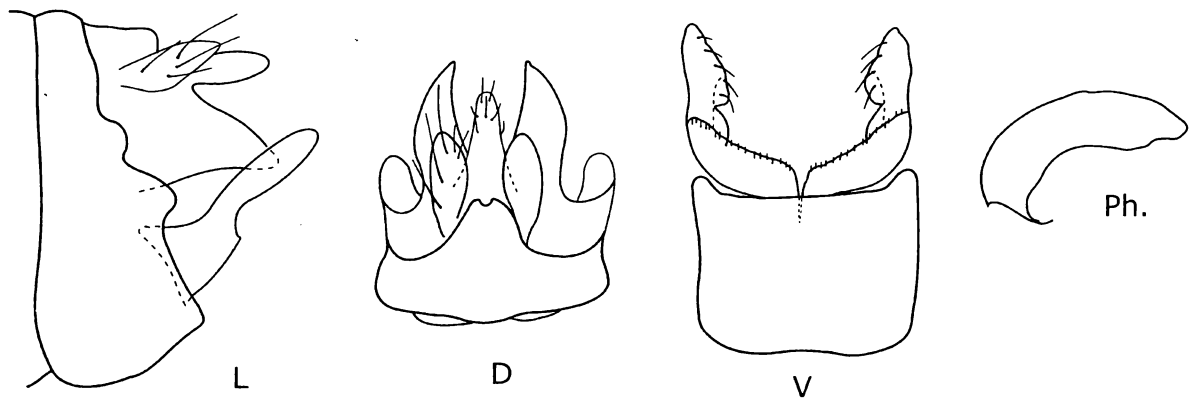
Oecetis volkmanni



Oecetis armuliki



Adicella hampa



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