A New Species of the Genus Dryopomorphus HINTON (Coleoptera, Elmidae, Larainae) from Laos

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Abstract A new species of the genus Dryopomorphus, D. laosensis sp. nov., is described from Laos. This species is similar to the Japanese species D. extraneus HINTON, and differs from it in the short median lobe and parameres. The function of the cavities on sternite III is discussed. All the species of this genus are listed with Zoobank LSID in the appendix.

Introduction

The genus Dryopomorphus HINTON, 1936 is represented by 13 species from Japan, Malaysia, and Thailand (see appendix). No species of the genus has been recorded from the Indochina region.

In the present paper, we describe a new species of the genus from northern Laos. The function of the cavities on sternite III, which is thought to be a synapomorphy of the genus, is discussed based on SEM observation. In addition, all the species of this genus are listed with Zoobank LSID in the appendix.

Materials and Methods

General observation and dissection were made under a stereoscopic microscope (Leica MZ95). Microstructures were observed, under a microscope (Olympus BH-2), of the dissected part mounted on hollow slides with pure glycerine. After observation, the dissected parts were mounted on slides with Canada Balsam. Some structures were observed with an SEM (Hitachi S-225) after coating with gold.

Morphological abbreviations used in measurement are as follows: PL—length of pronotum; PW—width of pronotum; EL—length of elytra; EW—width of elytra; TL = PL + EL. The average is given in parentheses after the range.

The holotype and some paratypes designated in this paper will be preserved in the Ehime University Museum, Matsuyama (EUMJ), and other paratypes in the Naturhistrisches Museum, Wien (NMW) and National Museum of Natural Science, Taiwan.

Technical terms of the genitalia follow KODADA and JÄCH (2005).
**Taxonomy**

*Dryopomorphus laosensis* sp. nov.

(Figs. 1–4)


*Description.* Male (Fig. 1). Body elongate, slightly convex dorsally; dorsal surface densely covered with short adpressed yellowish setae and longer suberect black setae. Coloration of body blackish brown, but antennae, anterior corners of pronotum and legs reddish brown.

Head slightly convex dorsally. Eyes large, semicircular; the distance between eyes about 2.4 times as long as eye’s diameter. Antennae (Fig. 3A) short; approximate ratio of each antennomeres \(n=1\) as 16.7 : 7.7 : 2.0 : 1.3 : 2.0 : 1.3 : 1.0 : 2.0 : 2.0 : 2.0 : 2.7. Maxillary palpi (Fig. 4A) cylindrical, truncate at apices. Labial palpi (Fig. 4B) short, shallowly concave in apical margin. Pronotum trapezoidal, straight in lateral margin; anterior corners projecting anteriorly, depressed dorsally; median sulcus reaching about basal 1/2 of PL; sublateral sulci reaching about basal 1/3; disc gently convex.

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Fig. 1. Holotype of *Dryopomorphus laosensis* sp. nov. in dorsal (A) and lateral (B) views. Scale = 1.0 mm.
A New *Dryopomorphus* from Laos

Dorsally; PW/PL 1.41–1.55 (1.46). Scutellum semicircular. Elytra oblong, subparallel-sided near base to apical 1/3; disc gently convex dorsally, with ten striae in each elytron; intervals flat; humeri feebly projecting; EL/EW 1.53–1.62 (1.56); EL/PL 2.55–3.00 (2.70); EW/PW 1.14–1.23 (1.18); TL/EW 2.11–2.18 (2.14).

Sternite IX (Fig. 2A) moderately sclerotized, oval, bearing short setae in apical part. Aedeagus (Fig. 2B–D) about 0.6 mm; phallobase slightly asymmetrical, wide, gently tapered basally, about 0.94 times as long as parameres; parameres symmetrical, evenly tapered posteriorly, rather pointed at apex; median lobe a little longer than parameres, slender, evenly tapered apically, rounded at apex; endophallus membranous, cylindrical, closely covered with minute furrows.

**Female.** Sexual dimorphism indistinct in external feature; PW/PL 1.42; EL/EW 1.51; EL/PL 2.58; EW/PW 1.21; TL/EW 2.10. Sternite VIII (Fig. 3B) well sclerotized, trapezoidal, with a long and stout median strut. Ovipositor (Fig. 3C) relatively short; stylus oblong, relatively small; apical parts of coxite long and slender; approximate ratio of stylus, coxite and valvifer \((n=1)\) as 1.0 : 10.0 : 14.7.

**Measurements.** Male \((n=9)\): TL 3.90–4.15 (4.02) mm; PW 1.55–1.68 (1.59) mm; PL 1.00–1.10 (1.09) mm; EL 2.80–3.05 (2.93) mm; EW 1.80–1.95 (1.87) mm. Female \((n=1)\): TL 4.30 mm; PW 1.70 mm; PL 1.20 mm; EL 3.10 mm; EW 2.05 mm.

**Remarks.** Judging from the characteristics of male genitalia (symmetrical and slender parameres) and the setae of the dorsal surface (densely covered with longer suberected setae), this species seems to be more related to Japanese species than to Malaysian and Thailand species. In particular, this species is similar to *Dryopomorphus extraneus* HINTON in body size and similar shape of body outline and male genitalia, but differs from it in the following characteristics: phallobase long, about...
0.9 times the length of parameres (short in extraneus, about 0.7 times the length of parameres); median lobe short and slender with rounded apex (long and robust with pointed apex in extraneus); sternite IX oval (elongate in extraneus).

Discussion

The cavities on abdominal sternite III in both sexes are exclusively present in all Dryopomorphus species, and were thought to be synapomorphic to the genus (Spangler, 1985). None of the other members of Elmidae or even of Dascilloidea has been reported possessing such peculiar cavities (Grebenikov & Leschen, 2010). The function of the structure, however, was not clearly understood. Hinton (1971) suspected they were the openings of some as yet confirmed defensive glands or pheromonal organs, whereas Crowson (1981) inferred that the specialized cavities may function as mycangia, an adaptation for a symbiotic relationship with algae.

We observed the cavities on sternite III of Dryopomorphus extraneus Hinton and D. laosensis sp. nov. in detail by SEM. It appears that the cavities are not likely to be mycangia, as evidenced by the total absence of any fungal spores in the cavities. In addition, the openings of the cavities are covered with long and irregularly arranged setae which hide the entrance (Fig. 4C, E) and thus obstruct any spores getting in and out of the cavities.

The occurrence of mycangia has been documented in many beetle lineages, but most of the cases, except those in Curculionidae and Attelabidae, were not supported by solid evidence but only on inference based on the fungus-feeding habits (Grebenikov & Leschen, 2010). Exoskeletal pits with uncertain function, termed “pseudomycangia” by these authors, were rarely reported in water beetles, with two exceptions of hydraenid Nucleotops in South Africa and elmid Dryopomorphus in East and

Fig. 3. Male antenna (A) and female genitalia (B, C) of Dryopomorphus laosensis sp. nov. —— B, Sternite VIII; C, ovipositor.
Southeast Asia. The latter mainly dwell in submerged accumulations of plant debris or mud with roots along the stream bank, or on submerged wood in shaded forest streams (Yoshitomi & Satô, 2005; Čiampor et al., 2012). Whether they are mycophagous, xylophagous or algophagous is not clear. Ac-
Accordingly, it is premature to conclude *Dryopomorphus* is a fungus-feeder and then further infer the pits on their abdominal ventrites are mycangia. Though our study primarily ruled out the mycangial function of the cavities, the true function remains unanswered and requires future investigation.

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**References**


**Appendix: Species List of the Genus Dryopomorphus with ZooBank LSID**

*Dryopomorphus* HINTON, 1936

urn:lsid:zoobank.org:act:DA3C08C4-E8D2-4405-B36E-EB9678521A10

*Dryopomorphus amami* YOSHITOMI et M. SATÔ, 2005


*Dryopomorphus bishopi* HINTON, 1971


*Dryopomorphus extraneus* HINTON, 1936

urn:lsid:zoobank.org:act:C139EB91-9E2B-439E-BB1E-B2456FBEA204

*Dryopomorphus grandis* ČIAMPOR, ČIAMPOROVÁ-ZATOVIČOVÁ et KODADA, 2012

urn:lsid:zoobank.org:act:10E85D6F-3FA2-475A-BC7C-4D001230A1E9
A New Dryopomorphus from Laos

Dryopomorphus hendrichi ČIAMPOR et KODADA, 2006
urn:lsid:zoobank.org:act:84BF1422-F97C-4772-B7E9-06130B64C7AD

Dryopomorphus jaechi ČIAMPOR, ČIAMPOROVÁ-ZAŤOVIČOVÁ et KODADA, 2012
urn:lsid:zoobank.org:act:A55CF4BA-38E3-45A7-A3E5-80190914CFD6

Dryopomorphus laosensis sp. nov.
urn:lsid:zoobank.org:act:D11B3540-8845-429C-BA66-22D8AA86F413

Dryopomorphus memei ČIAMPOR, ČIAMPOROVÁ-ZAŤOVIČOVÁ et KODADA, 2012
urn:lsid:zoobank.org:act:420BA3D7-46CC-4ADF-BD97-551F75535A58

Dryopomorphus nakanei Nomura, 1958

Dryopomorphus pekariki ČIAMPOR, ČIAMPOROVÁ-ZAŤOVIČOVÁ et KODADA, 2012
urn:lsid:zoobank.org:act:62177612-1434-4EED-9DFF-1F9BA31779E6

Dryopomorphus sarawacensis ČIAMPOR, ČIAMPOROVÁ-ZAŤOVIČOVÁ et KODADA, 2012
urn:lsid:zoobank.org:act:58DF38DF-997B-4F76-BFB0-9672A61ABC34

Dryopomorphus satoi Spangler, 1985

Dryopomorphus siamensis Kodada, 1993
urn:lsid:zoobank.org:act:BC213C1C-3F1E-4984-9E9C-25413EE8CA01

Dryopomorphus yaku Yoshitomi et M. Satô, 2005

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