Formosan Entomologist
Journal Homepage: entsocjournal.yabee.com.tw

A New Species of Laricobius (Coleoptera: Derodontidae) from Taiwan 【Research report】

台灣產偽郭公蟲科 (Coleoptera: Derodontidae) 一新種【研究報告】

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Received: 2007/09/29 Accepted: 2008/01/04 Available online: 2007/12/01

Abstract

Laricobius taiwanensis Yu and Montgomery sp. nov. collected from Adelges tsugae Annand on Tsuga chinensis (Franch.) Pritzel is described. Members of the genus are predators of Adelgidae. The genus has not been reported previously from Taiwan.

摘要

本文描述台灣產偽郭公蟲科 (Coleoptera: Derodontidae) 一新種：Laricobius taiwanensis Yu and Montgomery sp. nov.。此新種捕食以台灣鐵杉 (Tsuga chinensis) 為寄主植物之鐵杉球蚜 (Adelges tsugae)。本屬 (Laricobius) 為球蚜科 (Adelgidae) 之捕食性天敵，在台灣地區為首度紀錄。

Key words: Derodontidae, Laricobius, new species, taxonomy
關鍵詞: 偽郭公蟲科、Laricobius、新種、分類。

Full Text: PDF(0.57 MB)

台灣昆蟲 27: 341-347 (2007)
Formosan Entomol. 27: 341-347 (2007)

A New Species of *Laricobius* (Coleoptera: Derodontidae) from Taiwan

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ABSTRACT

Laricobius taiwanensis Yu and Montgomery sp. nov. collected from *Adelges tsugae* Annand on *Tsuga chinensis* (Franch.) Pritzel is described. Members of the genus are predators of Adelgidae. The genus has not been reported previously from Taiwan.

Key words: Derodontidae, *Laricobius*, new species, taxonomy

Introduction

The family Derodontidae comprises four genera of small beetles that feed on fungus, except for the genus *Laricobius* Rosenhauer, 1846 (Lawrence and Hlavac, 1979). All *Laricobius* species, with known biology, prey on adelgids (Franz, 1958; Clark and Brown, 1960; Lawrence and Hlavac, 1979). The genus likely occurs throughout the northern hemisphere wherever conifers and associated adelgids occur. The endemic distributions of known species are North America (3 species); Europe (1) and Asia (9) (Háva, 2006; Zilahi-Balogh *et al*., 2007).

The family Adelgidae is unusual in that it has no known parasites and predators are its only significant natural enemies. Because the members of the genus *Laricobius* specialize on members of the family Adelgidae, they are often considered as biological control agents of this group. Two species have been introduced to control adelgids in North America: *L. erichsonii* Rosenhauer was imported from Europe to control the balsam woolly adelgid, *Adelges piceae* (Ratzeburg) (Clark and Brown, 1958) and *L. nigrinus* Fender was imported from western North America to eastern North America to control the hemlock woolly adelgid, *Adelges tsugae* Annand (Zilahi-Balogh *et al*., 2002).

Adelges tsugae occurs on all the worldwide species of hemlock (*Tsuga*), but is believed to be endemic to Asia and western North America and to be introduced to eastern North America from Japan (Havill *et al*., 2006). In the eastern United States, it has spread rapidly and is causing serious mortality to the two native

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hemlock species (Ward *et al*., 2004). An extensive effort to obtain natural enemies for introduction in eastern United States to control the hemlock woolly adelgid has focused on Japan (Sasaji and McClure, 1997), China (Yu *et al*., 2000), and western North America (Lamb *et al*., 2005). Taiwan was the first place in Asia where *A. tsugae* was documented (Takahashi, 1937). A preliminary assessment of Taiwan as a source of natural enemies of the hemlock woolly adelgid was made in 1994 and the most abundant predator found on adelgid-infested hemlock in Taiwan is presented here as a new species.

Materials and Methods

Adult specimens were collected from foliage of *Tsuga chinensis* (Franch.) Pritzel infested with *A. tsugae* along Road 20 outside of Yu Shan National Park at an altitude of approximately 2500 meters. The adelgid was also found on hemlock in Taichung County near Tayuling, but no beetles were found. Hemlock on Mt. Lala above the Paling-Fushan Trail in Taoyuan County had neither the adelgid nor the beetle. The identity of the presumed host, *A. tsugae*, was confirmed by Gary Miller, Systematic Entomology Laboratory, Beltsville, Maryland, and a voucher specimen retained there.

Specimens mounted on cardboard points were examined with a zoom (6-60X) stereomicroscope. Critical taxonomic features were illustrated with the aid of a camera lucida and general surface morphology recorded with a digital camera through a third tube on the stereomicroscope. Genitalia were dissected and examined with a compound microscope and illustrated as above.

In preparation for the description, we examined specimens of *L. erichsonii*, *L. laticollis* Fall, *L. nigrinus*, *L. rubidus* LeConte, *L. minutus* Nikitsky in Nikitskiy and Lafer, *L. kovalevi* Nikitsky in Nikitskiy and Lafer, *L. baoxingensis* Zilahi-Balogh and Jelínek, and *L. kangdingensis* Zilahi-Balogh and Jelínek. Morphological terminology follows Lawrence and Hlavac (1979).

Specimen depositories

NMNS – National Museum of Natural Science, Taichung, Taiwan
IZCAS – Institute of Zoology, Chinese Academy of Sciences, Beijing, PRC
BMNH – The Natural History Museum, London, UK
NMNH – National Museum of Natural History, Washington, D.C., USA
YPM – Peabody Museum of Natural History, Yale University, New Haven, USA.

***Laricobius taiwanensis* Yu and Montgomery, sp. nov.** (Fig. 1, Fig. 2 A-F)

Description of adult: Body length 2.0-2.3 mm, width 1.0-1.1 mm. Head and pronotum dark reddish brown to black; antennae yellowish brown with brown scape; elytra yellowish to reddish brown, with narrow dark brown markings along suture and variable ones along lateral side to maximum 2/3 length; ventral side black; legs black or dark reddish brown but tibiae and tarsi pale. Pubescence normal in length, yellowish, semi-erect.

Head oblongly ovate; eyes large, convex, finely facetted. Clypeus short, slightly concave anteriorly. Frons with a large deep impression near each eye and near clypeus, more than 20 large punctures roughly arranged in 2 lines between discal area and each eye, discal area narrowly quadrate and finely punctured. Antennae (see Fig. 1) slender with 11 segments; segment IV shorter than III or V, VII longer than VI or VIII; club (Fig. 2C) with segment IX and X wider than long, and terminal, XI, segment distinctly longer than wide.

Pronotum (see Fig. 1) widest at midlength, about 1.35 times wider than long; sides (Fig. 2D) smooth without teeth;

anterior angles rectilinear, rounded, not narrowed behind; posterior angles distinct, small, obtuse with slight constriction before angle.

Elytra length about 1.58 times greatest combined width and 3.35 times length of pronotum, a shallow, barely distinct transverse groove about 1/4 length from elytral base. Ten rows of punctures and a scutellary striole; punctures in 3rd row from suture about 30.

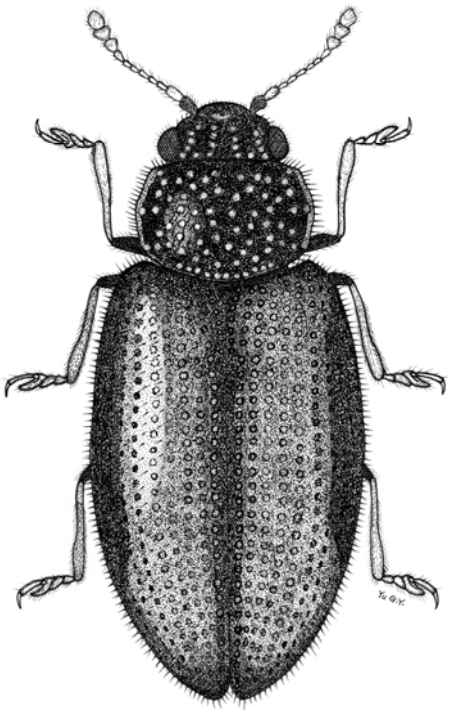

Fig. 1. *Laricobius taiwanensis* Yu and Montgomery, sp. n. -- habitus.

Aedeagus (Fig. 2A) with parameres stout at basal 1/4, then distinctly narrowed; apical 1/2 of parameres slender, about 1/3 width of median lobe in ventral view; median lobe is parallel-sided, tapering at apex, longer than parameres, 2.1-2.3 times longer than basal piece. Ninth sternite (Fig. 2B) spoon-shaped, longer than aedeagus, with short setae at the apical margin.

Female is externally indistinguishable from the male. Female genitalia are shown (Fig. 2E, 2F), but have no known characters to determine species.

Type material: Holotype ♂. Labels: 1) TAIWAN: Kao Hsiung Co., / Road 20, / 2 Km west of Ya Kou Hotel / 26 May 1994, S.T. Murphy 2) HOLOTYPE / *Laricobius taiwanensis* / Yu and Montgomery (NMNS). Paratypes, 29 specimens, sex unknown except as noted, same labels as holotype; placed in NMNS (3, one is female), NMNH (4, one is female), IZCAS (2), BMNH (15), and YPM (3), and two retained by authors.

Diagnosis: Four of the five described species from Nepal and China -- *L. mirabilis* Háva and Jelínek, 1999, *L. schawalleri* Háva and Jelínek, 2000, *L. loebli* Jelínek and Háva, 2001 and *L. baoxingensis* Zilahi-Balogh and Jelínek, 2007 -- have the pronotum with pointed anterior angles and distinct convergent sides near the anterior margin whereas the outline of the lateral edge of the pronutum is nearly rectilinear in the new species. Another species from China, *L. kandingensis* Zilahi-Balogh and Jelínek, 2007, has pronotal angles and sides similar to this new species, but it is not bicolored and its frons has only a few scattered deep punctures and the discal area is transverse. A species from the Russian Far East, *L. minutus* has a narrower pronotum (1.23X wider than long) with darker color on elytra confined to a narrow stripe along the seam of the elytra (Nikitsky and Lafer, 1992). Species with bicolor, reddish brown elytra similar to the new species are the European *L. erichsonii,* the North American *L. rubidus.* The new species is easily distinguished from them by the punctation on the head (Fig. 1), especially the central, discal area of the frons being narrowly quadrate rather than transverse.

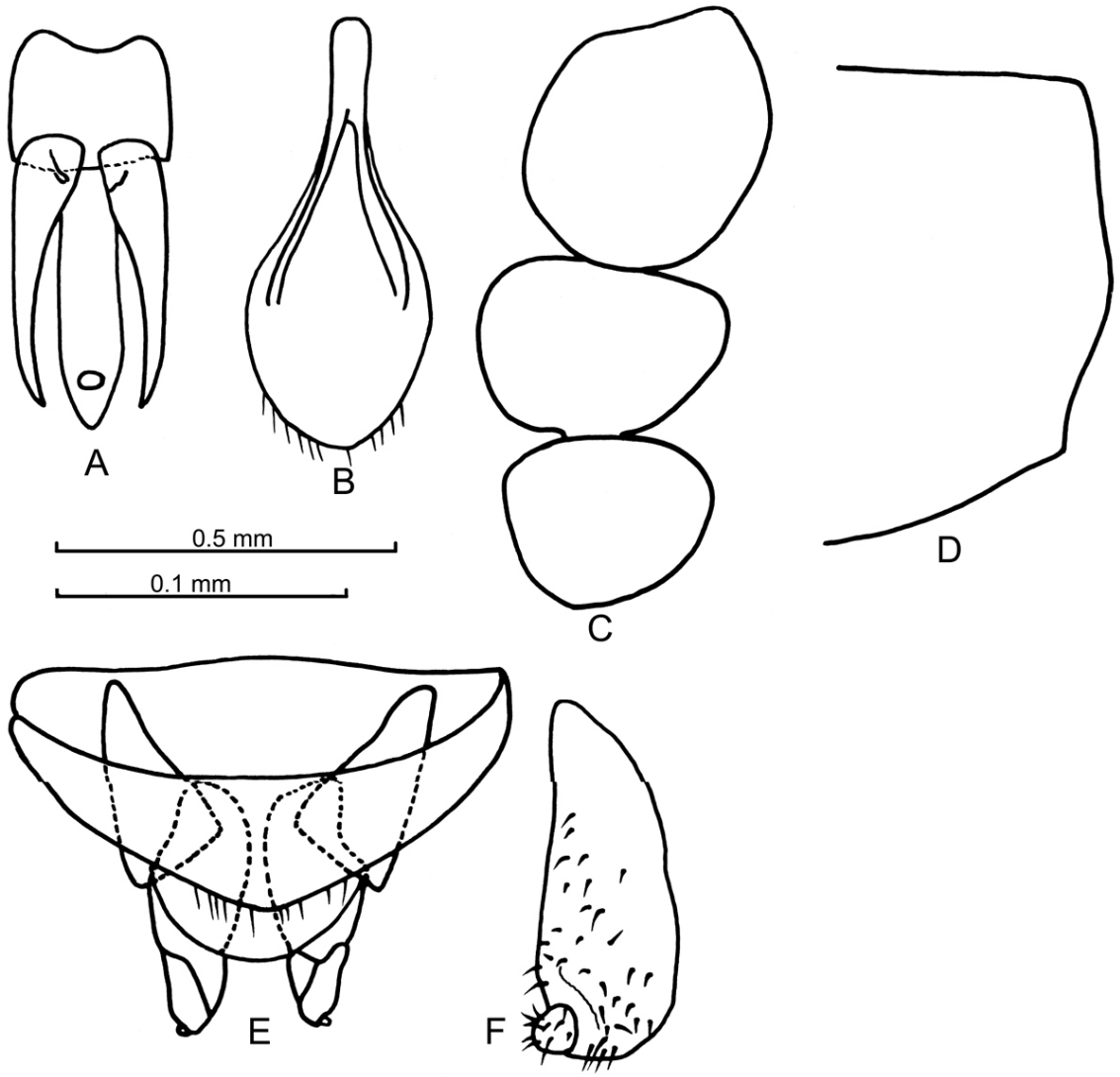

Fig. 2. *Laricobius taiwanensis* Yu and Montgomery, sp. n. -- parts: (A) aedeagus; (B) 9th abdominal segment; (C) club of antenna; (D) outline of right edge of pronotum; (E) end of female abdomen, ventral view; (F) detail left coxite and stylus; scale 0.5 mm for A, B, D, E; scale 0.1 mm for C, F.

Discussion

This new species, *L. taiwanensis,* was observed to feed on *Adelges tsugae* and was by far the most abundant predator associated with it in Taiwan. Its abundance and specificity make it a good candidate to introduce for biological control of *A. tsugae* in the eastern United States. There may be a problem however, with climate matching, because the latitude of the collection (23.2° N) is more southern that the distribution of adelgid in the eastern United States (34° to 43° N). Other *Laricobius* species feed and reproduce during the winter months with larva

completing development in late spring and entering the soil to pupate, where the adults diapause until the onset of cool weather in the fall. Additional work is needed to reveal the biology, distribution, and feeding habits of *L. taiwanensis*.

Acknowledgments

We are grateful to Sean T. Murphy (CAB International) for the collection of 62 beetles and Roger Booth (BMNH) for comparison to *L. sahlbergi* Reitter and pointing out that the punctation on the head is a good character to distinguish this new species from other species in the genus.

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Received: Septem 29, 2007
Accepted: January 4, 2008

台灣產僞郭公蟲科 (Coleoptera: Derodontidae) 一新種

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摘　要

本文描述台灣產僞郭公蟲科 (Coleoptera: Derodontidae) 一新種：*Laricobius taiwanensis* Yu and Montgomery sp. nov.。此新種捕食以台灣鐵杉 (*Tsuga chinensis*) 爲寄主植物之鐵杉球蚜 (*Adelges tsugae*)。本屬 (*Laricobius*) 爲球蚜科 (Adelgidae) 之捕食性天敵，在台灣地區爲首度紀錄。

關鍵詞：僞郭公蟲科、*Laricobius*、新種、分類。

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