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NOTE

Two newly recorded species of Geometridae (Lepidoptera) from Korea

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The Lepidopteran family Geometridae is one of the most diverse and widely studied taxa in Korea, encompassing over 726 species. In this study, we report two species for the first time in Korea: *Problepsis albidior* Warren, 1899, belonging to the subfamily Sterrhinae, shows a whitish wing with a large medial eye spot encircled by ochreous and blackish scales. From its close relative, the male genitalia can be distinguished by the relatively rounded ceras on the eighth sternite, the strongly dentate inner margin of the tegumen, and two minute cornuti on the vesica. *Proomphe lobata* Warren, 1896, from the subfamily Larentiinae, features a light brown forewing with dark ochreous costal area, a pointed apex, a toothed distal margin, and a yellowish hindwing. The male genitalia are characterized by a strongly tapering uncus, a well-developed transtilla and anellus lobe, and a slender valva with a long, club-shaped harpe. A simple antrum, a long ductus bursae, and an ovate corpus bursae without a signum identify the female genitalia. Diagnoses, redescription, along with photographs of adults and their genitalia, are provided.

Keywords: biodiversity, Korea, moth fauna, *Problepsis*, *Proomphe*

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INTRODUCTION

The genus *Problepsis* Lederer (1853) was established with *Caloptera ocellata* Frivaldszky, 1845 as its type species and comprises over 51 species worldwide with high diversity in the Old World and Australia (Hausmann, 2004; Xue *et al*., 2018). Members of this genus are easily diagnosed by the presence of eye spots encircled by silvery scales on whitish or grayish white wings, and by the fused socii in the male genitalia (Hausmann, 2004; Xue *et al*., 2018). In Korea, five species of *Problepsis* have been recorded (NIBR, 2024).

The genus *Proomphe* established by Warren (1896) with *Proomphe lobata* Warren as the type species, includes only a single species occurring in the northern India, southwestern China, and Russian Far East. This monotypic genus exhibits remarkable wing shape that resembles *Dysathia* Warren (a synonym of *Heterophleps* Herrich-Schäffer, 1854) (Warren, 1896). The purpose of the present paper is to report two geometrid moths, *Problepsis albidior* Warren (1899) and *Proomphe lobata* Warren, 1896 for the first time in Korea.

MATERIALS AND METHODS

The examined materials in this study were collected using a 22-watt UV-light bucket trap with a 12 V battery (BioQuip, USA) and are deposited in the Department of Environmental Education, Mokpo National University and National Institute of Biological Resources, Incheon.

Species identification was based on the external mor-

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phology of adults including the genitalia. For genitalia slide preparation, the specimen was prepared by boiling the abdomen in 10% potassium hydroxide (KOH) for approximately 15−20 min. The scales and tissues were removed using a stereomicroscope (Leica S9i), stained with Chlorazol black, and mounted on slides in Euparal mounting medium. Photographs of the adults were taken using a Nikon D300 DSLR camera equipped with an AF-S Micro-Nikkor 105 mm f/2.8G IF-ED objective, and genitalia were photographed with built-in digital camera of a Leica S9i stereomicroscope.

Terminology refers to Hausmann (2001; 2004). Abbreviations used in this study are as follows: TS - type species; TL - type locality; GW - Gangwon-do; GB - Gyungsangbuk-do; JB - Jeollabuk-do; JN - Jeollanam-do.

Taxonomic Accounts

Order Lepidoptera Linnaeus, 1758
Family Geometridae Leach, 1815
Subfamily Sterrhinae Meyrick, 1892

***Problepsis* Lederer, 1853**

Problepsis Lederer, 1853: 74. TS: *Caloptera ocellata* Frivaldszky, 1845. TL: [Greece] Crete, [Turkey] Smyrna (= Izmir).
= *Argyris* Guenée, 1858.
= *Problepsiodes* Warren, 1899.
= *Caloptera* Frivaldsky, 1845 (preocc. Gistl, 1834).

***Problepsis albidior* Waren, 1899 (Figs. 1A, 2A−C)**

두눈큰애기자나방

Problepsis albidior Warren, 1899: 33. India: Kulu.

Material examined. 1 male, JN: Wando, Chungsan-myeon, Is. Chungsan-do, E126°53′06″ N34°12′23″, 97 m, 1.VI.2010, Sei-Woong Choi (NIBR RORYIN0000004888).

Diagnosis. The species is externally indistinguishable from the sister species, *Problepsis eucircota* Prout, but the species can be distinguished by the male eighth sternite and genitalia: *P. albidior* has a strongly dentate inner margin of the tegumen, while it is smooth in *P. eucircota*; *P. albidior* presents two minute cornuti on the vesica, whereas *P. eucircota* shows several large cornuti; and *P. albidior* features relatively rounded ceras, compared to the less rounded ceras in *P. eucircota*.

Redescription. Wingspan 33 mm. Antenna in male partially bipectinate with long rami, distal 1/4 filiform; labial palpi short, almost the same length as the eye diameter, barely projected beyond frons, dorsally blackish, ventrally whitish; frons blackish, lower middle yellowish white; vertex blackish. Thorax whitish, legs covered with long dark brownish hairs. Forewing ground color whitish; costa blackish; medially with a large eye spot encircled by ochreous and blackish scales and a small ochreous spot; subtermen with ochreous rounded line, followed by a series of faint, parallel dark dots; termen blackish dotted. Hindwing ground color whitish; medially with a dark grayish, flattened sphere-shaped marking and dark grayish tinges; subtermen grayish relatively thick, rounded line, followed by a parallel line with grayish dots.

Male abdomen and genitalia. 8th sternite anterior broad, medially narrowed, posteriorly three-branched form, wide ceras and relatively slim mappa in the middle. Uncus absent; socii fused in the middle; tegumen long, slender, upper inner margin strongly dentate; juxta sclerotized, tripod-shape; saccus broad. Valva sclerotized, strongly bifurcated; costa with a long, weakly hooked valvula; sacculus with a long, sclerotized and sharply pointed fibula. Aedeagus hammer-shaped with a large dilated caecum, apically deeply invaginated U-shaped with a short, sharply pointed process; cornuti two separate minute processes.

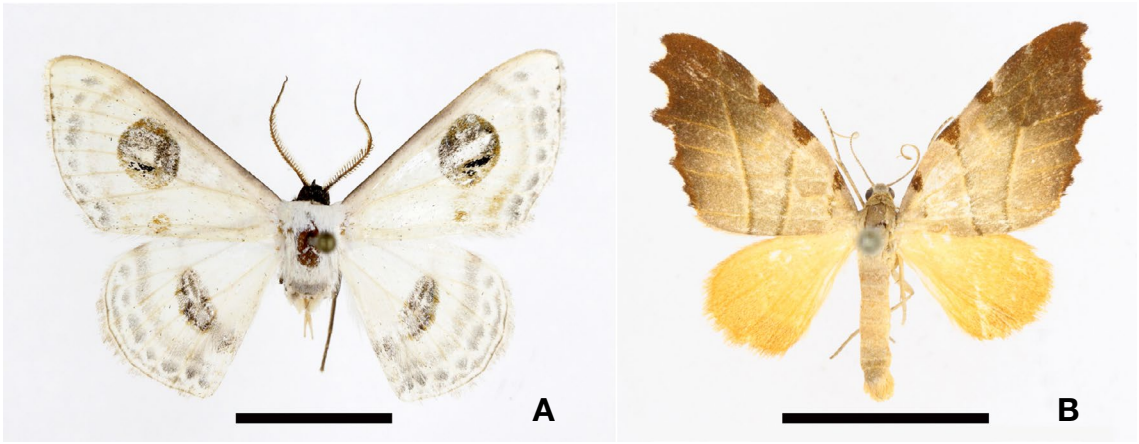

Fig. 1. Adults from Korea. Scale bar = 10 mm. A. *Problepsis albidior* Warren, B. *Proomphe lobata* Warren.

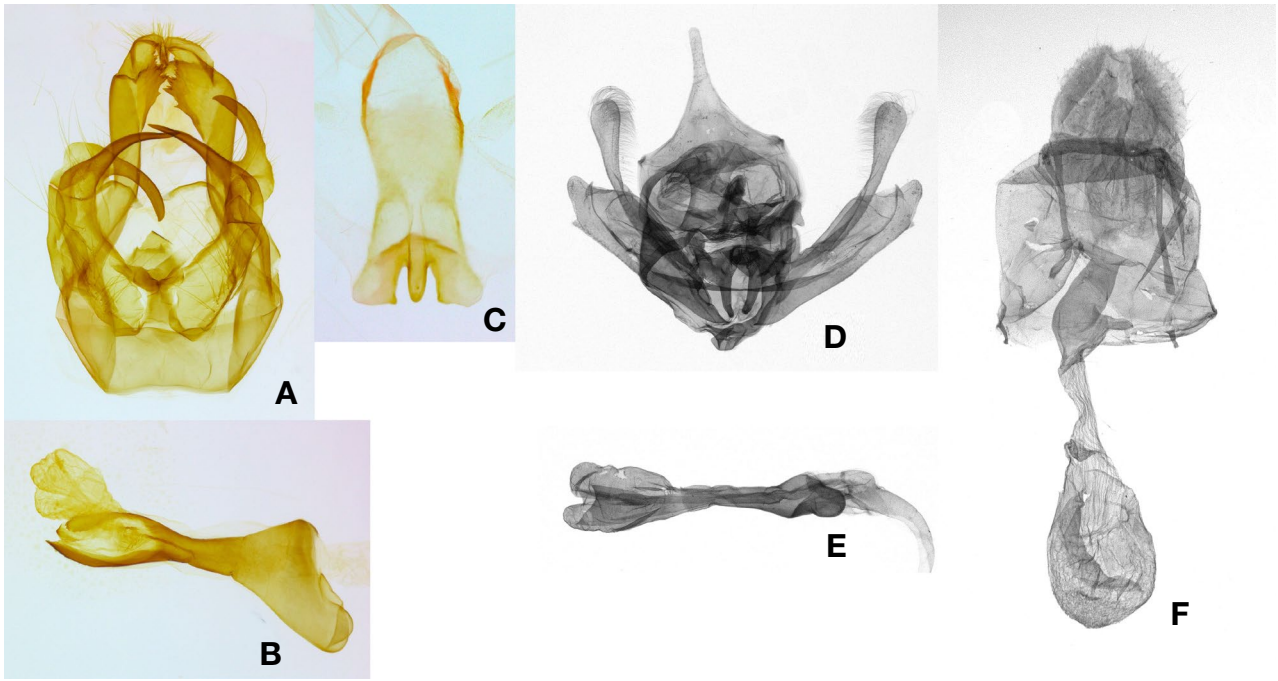

Fig. 2. Genitalia of two species of Geometridae from Korea. A, D. Male genital capsule, B, E. Aedeagus, C. 8th Sternite, F. Female genitalia. A–C. *Problepsis albidior* Warren, D–F. *Proomphe lobata* Warren.

Distribution. Korea, Japan, China (Gansu, Anhui, Zhejiang, Hubei, Hunan, Fujian, Guangdong, Hainan, Guangxi, Sichuan, Yunnan, Tibet), Taiwan, Indonesia, India.

Remarks. Including *Problepsis albidior*, a total of six species of the genus have now been recorded in Korea (NIBR, 2024). While the host plants of *Problepsis albidior* remain unidentified, many species within this genus are known to feed on plants from the Oleaceae (Singh, 1957; Holloway, 1997; Xue *et al*., 2018).

Subfamily Larentiinae Duponchel, 1845

***Proomphe* Warren, 1896**

Proomphe Warren, 1896: 316. TS: *Proomphe lobata* Warren, 1896. TL: [India, Meghalaja] Sikkim.

***Proomphe lobata* Warren, 1896 (Figs. 1B, 2D–F)**

고구려물결자나방 (신칭)

Proomphe lobata Warren, 1896: 316. TL: [India, Meghalaja] Sikkim.

Material examined. 2 males 1 female, GW: Samchuk, Nogok-ri, 24.VI.2023; 1 male, GW: Chuncheon, 15.VI. 1992; 1 male, GW: Taeback, Tong-ri, 8.VII.2008; 1 male 1 female, GW: Pyungchang-gun, Mt. Nambyungsan, 9.VI. 2016; 1 male, GW: Pyungchang, Mt. Jungangsan, 1.VII. 2011; 1 male, GW: Pyungchang, Mt. Jungangsan, 22.VI. 2017; 1 male, GB: Bongwha, Seungbu-ri, 11.VI.2023; 1 male, JB: Namwon, Banseon, E127°34′57.9″ N35°22′ 33.1″, 4.VI.2022. Sei-Woong Choi (NIBR PCQAIN0000 010654).

Diagnosis. *Proomphe lobata* is distinguishable by its forewings, which show a light brown ground color and dark ochreous costal area, a pointed apex, a toothed distal margin, three transverse medial lines, and yellowish hindwings without a medial line. This species exhibits a resemblance to *Heterophleps fusca* (Butler, 1878) by the presence of two dark-colored costal markings on the forewings. However, it can be readily distinguished by the toothed distal margin of the forewing and the yellowish hue of the hindwing. The male genitalia are characterized by a strongly tapering uncus, a well-developed transtilla and anellus lobe, and a slender valva with a long, club-shaped harpe. In females, the genitalia are identified by a simple antrum, a long ductus bursae that shows striated anteriorly and simple, sclerotized posteriorly, and an ovate corpus bursae lacking a signum.

Redescription. Wingspan 21 mm. Male antennae filiform; labial palpi short, almost not extending beyond the frons; frons square in shape, almost flat; vertex light grayish. Forewing ground color light brown with dark brown or dark ochreous, apex pointed, termen with toothed distal margin, the largest teeth on veins M_1 and M_3; costal margin with three triangular dark brown spots in the basal and medial areas, one light-brown fleck subapically, which is placed almost equidistantly to each other; three brownish

transverse lines from base to postmedian, underlined by yellow on one side; central fascia costally broad, tapered to dorsum. Hindwing ground color yellow, tinted with light brown suffusion along the outer margin.

Male genitalia. Uncus long, strongly tapering, almost triangular; tegumen broad, upper edge sclerotized with minute projected; transtilla with a pair of long apically projected processes; anellus lobe long, digitate; saccus weakly projected. Valva slender; costa membranous, medially expanded; harpe a long rod-shaped process with distally hairy and dilated, strongly projected beyond valva; sacculus long, slender with a short distal sharply pointed process. Aedeagus rod-shaped; cornutus absent.

Female genitalia. Papillae anales large, rounded; anterior apophyses very short, about 1/6 of posterior apophyses. Antrum simple, flat; ductus bursae long, anterior half with dense stripes, posterior half simple, sclerotized, weakly dilated; corpus bursae ovate, without a signum.

Distribution. Korea, China (Southwest), Russian Far East, India.

Remarks. Dr. Jaan Viidalepp (Tartu, Estonia), and Dr. Evgeny Beljaev (Vladivostok, Russia) prepared a description of a potential new taxon of *Proomphe* based on material from the Russian Far East. In addition, a specimen from southwestern China in Zoologische Staatssammlung München exhibited morphological differences compared to the type specimen in the British Museum, indicating the possibility of more than one species of *Proomphe* in the World.

Conflicts of Interest

The authors of this paper have no affiliation with any interests and are solely responsible for the paper.

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