

A new Noctuid pests, *Protegitra songi* Chen & Zhang (Lepidoptera, Noctuidae, Hadeninae) Attacking to *Eucommia ulmoides* Oliv. in Korea

Bong-Kyu Byun*, Huilin Han¹, Jun Hyoung Jeon, Young-Jae Kim², Sung-Jong Cho³, Sang-Hyun Koh⁴ and Jae-Ho Park²

Department of Biological Sciences and Biotechnology, Hannam University, 461-6, Yuseong-gu, Daejeon 305-811, Korea

¹School of Forestry, Northeast Forestry University, Hexing Road 26, Harbin, Heilongjiang, 150040, P.R. China

²Chungcheongnam-do Institute of Forest Environment Research, Sejong 339-803, Korea

³Jeonbuk Forest Environment Research Institute, Deolyeon-ro, Jinan-gun 45-54, Korea

⁴Division of Forest Insect Pests and Disease, Korea Forest Research Institute, Seoul 130-712, Korea

두충을 가해하는 밤나방류 (나비목, 밤나방과, 줄무늬밤나방아과)의 신해충 1종 보고

변봉규* · Huilin Han¹ · 전준형 · 김영재² · 조성종³ · 고상현⁴ · 박재호²

한남대학교 생명시스템과학과, ¹중국동북임업대학교, ²충남산림환경연구소, ³전북산림환경연구소, ⁴국립산림과학원

ABSTRACT: As a result of investigation on the larvae attacking leaves of *Eucommia ulmoides* Oliv. and causing serious damage on the plant in Seoul, Chungnam and Jeonbuk Province in Korea during summer in 2013, *Protegitra songi* Chen & Zhang of the family Noctuidae was identified. In this study, we report the host plants of it for the first time from Korea, with larval damage and taxonomic information by illustrating the characteristics of male and female genitalia.

Key words: *Protegitra songi*, Hadeninae, Noctuidae, Lepidoptera, New pest, Korea

초 록: 2013년 하계기간 중 우리나라의 서울, 충남, 전북 지역 등지에서 유충이 두충(*Eucommia ulmoides* Oliv.)의 잎을 가해하며 심각한 피해를 발생시키는 새로운 해충을 채집하여 사육한 후 우화한 성충을 분류동정 한 결과 두충밤나방(신칭) (*Protegitra songi* Chen & Zhang)으로 확인되어 보고한다. 또한 본 연구를 통해 상기종의 기주식물이 우리나라에서는 처음으로 확인된다. 아울러 본 종에 대한 발생 및 피해상황과 분류학적 특징을 기재함과 동시에 암수생식기의 특징을 도해하여 제시하였다.

검색어: 두충밤나방, 줄무늬밤나방아과, 밤나방과, 나비목, 신해충, 한국

A perennial woody species, *Eucommia ulmoides* Oliv., is the monotypic species of the monotypic genus belonging to Eucommiaceae. The origin of *E. ulmoides* is China, where this plant is a rare plant and naturally growing at an altitude 300–2,500 m in the downstream region of the Yangtze River. In 1930, it has been introduced firstly from Japan to Korea and was propagated by planting in a Forestry Experiment Station. During 40-50 years

since its introduction, this plant had not been widely cultivated in Korea, because of non-breeding technology and ignorance of medicinal value. But the medicinal value was reported around 1980, thereafter the cultivation area has been rapidly increasing (Rural Development Administration, 2013).

If cutting the fruit, the gummy viscous thread comes out, which is called the *Eucommia ulmoides* Oliv. or Chinese *E. ulmoides* Oliv. in the Chinese medicine, and the bark of tree has been used as the tonic, but in recent years, the leaves and seeds are also used together (Cho, 2011; Lee, 2003; Lee, 2006).

*Corresponding author: bkybyun@hnu.ac.kr

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The *Protegira songi* was described under the genus *Orthosia* by Chen & Zhang (1995) from China and reported as a major pest which feeds the leaves of *E. ulmoides*. The outbreak of this moth causing a severe damage on *E. ulmoides* was reported in Henan, Shandong, Beijing and Hebei etc. (Du et al., 2000). Later, the genus of this species was transferred to *Protegira* (Ronkay et al., 2010). In Korea, *E. ulmoides* was recently reported from Prov. Gyeongnam by An et al. (2013) with no record of host plants.

In Seoul, Prov. Chungnam and Prov. Jeonbuk areas during Summer in 2013, this harmful insect larvae attacking seriously and leaving only the vein of *E. ulmoides* was occurred. These larvae was identified as *P. songi*, which is newly reported pest on *E. ulmoides* In Korea.

Therefore, this study was aimed to report the present status of the occurrence of *P. songi* from Korea and provide the basic data for monitoring and local state of this pest with illustrating the external morphological characteristics.

Materials and Methods

In order to survey noctuid pests on *E. ulmoides* in 2013, the authors investigated occurring localities and appearing seasons on national scale in Korea. In addition, totally 30 larvae from *E. ulmoides* were collected to rear and identify the species from Chungnam Forest Environment Research Institute on Sep. 7, 2013. The larvae collected were reared in a breeding container in the laboratory. In order to rear the larvae, fresh *E. ulmoides* leaves were supplied, and the petioles were wrapped with cotton soaked in water to maintain the vigor. The larvae were checked every day. Finally, 15 adults were successfully emerged from the reared individuals and examined for species identification.

Obtaining the adults, the external characteristics and structure of the male and female genitalia were examined by a microscope. The material examined in this study are now preserved in Systematic Entomology Laboratory, Hannam University, Daejeon, Korea (SELHNU).

Taxonomic accounts

Order Lepidoptera Linnaeus, 1758.

Family Noctuidae, Latreille, 1809.

Subfamily Hadeninae Guenée 1837.

Genus *Protegira* Ochsenheimer, 1816: 79.

<Type species: *Noctua instabilis* [Denis & Schiffermüller], 1775>

***Protegira songi* Chen & Zhang, 1995** 두충밤나방(신칭)
(Figs. 1-3)

Orthosia songi Chen & Zhang, 1995: 242-243, pl. 1: 1. Type locality: Hunan (China).

Protegira songi, Ronkay et al., 2010: 153.

Adult (Fig. 1). Wingspan 25~30 mm. Head: brownish; vertex mixed brownish and black scales; antennae brown; labial palpus short; proboscis without scales. Thorax: brownish; tegula dense dark brown scales, Legs black and brown striped pattern. Forewing ground color dark brownish; costal margin straight towards apex, outer margin curved; basal dash short, tornal dash broad in width; orbicular spot blurry, reniform spot large, pale brown; antemedial line absent, postmedial line a string of arched, subterminal line fuscous brown. Hindwing dark brownish, mixed with light brown scales along termen; apex somewhat rounded; fringe brownish.

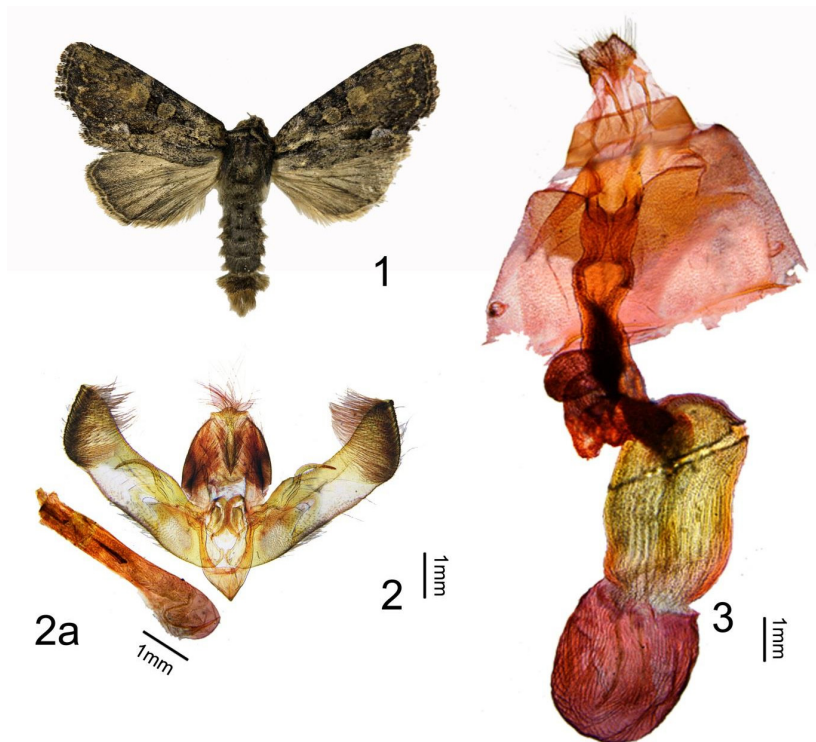
Larva. Body length 27~35 mm. Head capsule blackish. Thoracic legs incarnadine. Body dark brown with a white line on pleurum surface of thorax.

Pupa. Length 13~15 mm. oval shaped dark brown. compound eye black.

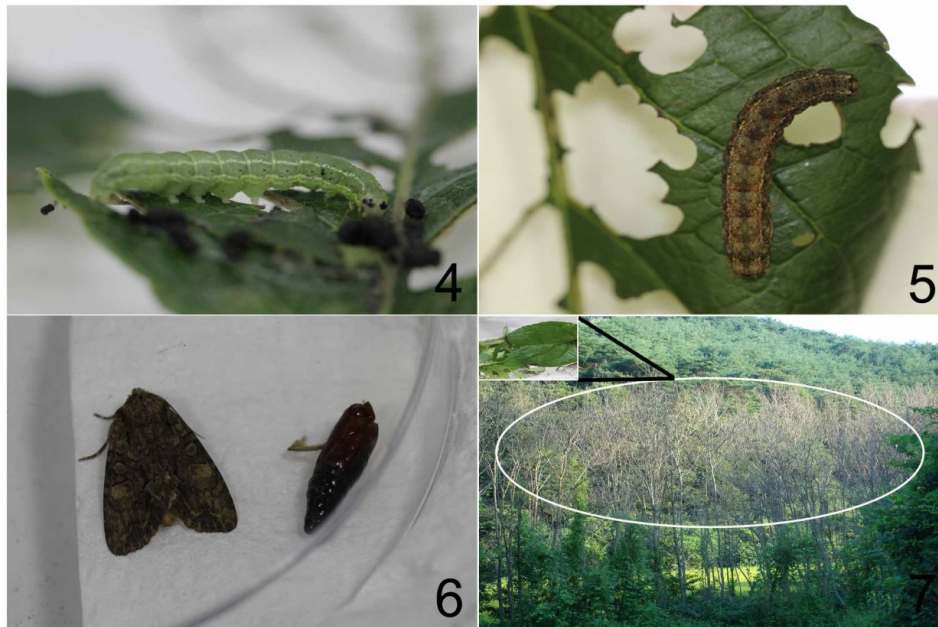
Male genitalia (Figs 2-2a). Uncus wide and long hairs. Teguman broad triangular shape, sclerotized. Saccus strongly sclerotized, sharp, innumerable hairs. Valva symmetrical, wide, round with numerous short hairs on the terminal area also with a numerous long hairs on the dorsal margin, clasper long uncinat, apex angular. Aedeagus as long as valva, broad, round apex.

Female genitalia (Fig. 3). Ovipositor narrow and Y-shaped, apophyses posteriores thin straight line, ostium bursae slightly round, apophyses anteriores short, ductus bursae same length as corpus bursa, ductus bursae with pocket-like part terminally, corpus bursae oval with two differently sized signa.

Material examined. 9♂ 6♀ Keumkang Recreational Forest, Geumnam-myeon, Sejong Special Self-Governing City, 7. IX.2013 (Y. J. Kim.), genitalia slide no. HNU 5072, HNU 5074, HNU 5081-coll. EHNU.



Figs. 1-3. *Protegira songi* Chen : 1, adult; 2, Male genitalia; 2a, Aedeagus; 3, Female genitalia.



Figs. 4-7. 4, Young larva; 5, Mature larva; 6, Adult emerged from pupa; 7, Damaged area (Imsil Jeonbuk).

Distribution. Korea, China

Host plant. *Eucommia ulmoides* Oliv. (Eucommiaceae) is reported for the first time from Korea in this study.

Occurrence and damage (Figs. 4-7)

P. songi was found throughout Prov. Chungnam, including whole area of Geumgang Arboretum, Geumnam-myeon, Sejong Metropolitan Autonomous City; Seonhak-ri, Sinpung-myeon,

Gonju City; Gapsa, surroundings Gyeryong Mountain, Gongju City; Gayasan Provincial park, Deoksan-myeon, Yesan County in early September 2013. The feeding damage of *E. ulmoides* (about 660 m²) was also found in Jangam-ri, Deokchi-myeon, Imsil County; Daea Arboretum, Jeonju City; Experiment Forest of Jeonbuk University, Buan City m Prov. Jeonbuk on September 4, 2013. It occurs also in May and September 2013 at *E. ulmoides* plantation of Hongneung Arboretum, Korea Forest Research Institute, Seoul.

The larvae showed a feeding habit that they gnawed all leaves of *E. ulmoides* and left only leaf veins. It was observed that their body color was changed to green in young larval stage and to dark brown in old larval stage. The larval period of *P. songi* was an average 12 days ranging from 10 to 14 days in room temperature. The pupal period was an average 28 days ranging from 22 to 55 days. Ronkay et al. (2010) noted that this is the first known Orthosiini species producing two generations per year.

Discussion

E. ulmoides shows various medicinal effects, and it is one of the most popular tree species in Korea, because it has many useful ingredients. Insect pests that attack *E. ulmoides* has not been known until now in Korea. But this study reports firstly the harm damage of this insect pest in this country. Especially, it is concerned that the damage of *E. ulmoides* may be seriously increased in the future, because the larvae have defoliating feeding habit on *E. ulmoides* when massively occurred. Therefore, it is considered that a forest pest monitoring for this pest thoroughly carried out in the damaged areas in 2013 and nearby areas. At present, it is difficult to determine whether this species is invasive or not due to poor information for this species. Thus, it is considered that more epidemiological investigation should be conducted in the future.

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