

First Report of Genus *Canephora* (Lepidoptera: Psychidae) in Korea, with a Newly Recorded Species, *C. pungelerii*

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한국미기록 작은검정주머니나방속(나비목: 주머니나방과) 작은날개검정주머니나방 보고

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ABSTRACT: The genus *Canephora* Hübner is reported for the first time from Korea with a newly recorded species, *Canephora pungelerii* (Helaerts). All available information, including the collection localities and illustration of female, are presented. DNA barcode for precise identification of the species is also provided.

Key words: *Canephora*, Psychidae, Bagworms, Lepidoptera, Korea

초록: 금번 연구를 통해 작은검정주머니나방속이 국내에서 처음 발견되어 보고한다. 작은검정주머니나방속 내 작은날개검정주머니나방에 대한 암컷 형태 특징, 채집지 정보 등을 포함한 이용가능한 모든 정보를 제공하였다. 또한 신속한 종 동정을 위한 DNA 바코드 정보를 작성하였다.

검색어: 작은검정주머니나방속, 주머니나방과, 도롱이별레, 나비목, 한국

The family Psychidae is a medium-sized family consisting of 241 named genera and 1,350 species (Sobczyk, 2011; van Niekerken et al., 2011). Most psychids make various cases or bags at different larval stages (Sugimoto, 2009a, 2009b). Also, males have wings, whereas most females cannot fly because of their wings have been reduced (Niitsu and Kobayashi, 2008; Roh et al., 2016).

In Korea, Roh et al. (2016) reviewed nine species including a new species, *Psyche yeongwolensis* Byun and Roh, 2016 and a newly recorded species, *Proutia maculatella* Saigusa and Sugimoto, 2014. Later, Roh and Byun (2016) recorded

Ceratosticha leptodeta Meyrick, 1935 new for Korea. Recently, five more species were reported: *Bacotia sakabei* Seino, 1981 (Roh and Byun, 2017a), *Bruandella niphonica* (Hori, 1926) and *Proutia nigra* Saigusa and Sugimoto, 2014 (Roh and Byun, 2017b), *Dahlica* (*Dahlica*) *somae* Roh and Byun, 2018 and *Dahlica* (*Dahlica*) *ochrostigma* Roh and Byun, 2018 (Roh et al., 2018). Consequently, 15 species in total are now known from Korea.

The genus *Canephora*, belonging to the subfamily Oiketicinae, was established by Hübner (1822) based on the type species *Phalaena* (*Bombyx*) *unicolor* Hufnagel, 1766. Heylaerts (1900) described a new species, *Chalia pungelerii* from Japan. Later, *Chalia pungelerii* changed into *Canephora pungelerii* by Inoue (1981). Poda (1761) described a new

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Received November 30 2017; Revised February 1 2018

Accepted March 10 2018

species of *Canephora*, *C. hirsuta* from Austria. Thus, a total of two species of *Canephora* have been recorded worldwide to date (Sobczyk, 2011).

In this study, we report a newly recorded species of the genus *Canephora*, *C. pungelerii* from Korea. All available information is presented, including the collection locations, and illustration of female. DNA barcode is also provided for precise identification of each species.

Materials and Methods

The material examined in this study is preserved in the Systematic Entomology Laboratory, Hannam University (SEL/HNU), Daejeon, Korea. Females were dissected and examined after mounting with euparal solution. Photographs were taken using a Pax cam digital camera (PAXcam Microscope Cameras Co., Chicago, IL, USA) attached to a Carl Zeiss Axio Imager A1 microscope (Carl Zeiss Ltd., Cambridge, MA, USA). Terminology and morphological characters of the females follows Sugimoto and Saigusa (2001).

Genomic DNA was extracted from the thorax part of an immersion specimen, preserved in 100% alcohol using a Genomic Cell/Tissue Spin Mini Kit (Mbiotech, Inc., Hanam, Korea), according to the manufacturer's protocol. A specimen was sequenced for, the 658 bp fragment of the mitochondrial cytochrome c oxidase I (COI) gene, the DNA barcode, was amplified using the primer pair Lep F1 and Lep R1 (Hebert et al., 2004). PCR conditions for amplification followed the manufacturer's protocol (Platinum Taq, Invitrogen, Carlsbad City, CA, USA). Amplicons were purified using the QIAquick® PCR purification kit (QIAGEN, Inc.) and directly sequenced at Genotech Corp. (Yuseong-gu, Daejeon, Korea). Contigs were assembled using CodonCode aligner version 2.0.6 (CodonCode Co., Centerville City, MA, USA). Successful sequences were submitted to GenBank.

Taxonomic accounts

Order Lepidoptera Linnaeus, 1758.

Family Psychidae Boisduval, 1829: 44.

Subfamily Oieketicinae Herrich-Schäffer, 1855: 48.

Genus *Caenephora* Hübner, 1822. 작은검정주머니나방속(신칭)

<Type species: *Phalaena (Bombyx) unicolor* Hufnagel, 1766>

Canephora pungelerii (Butler, 1881) 작은날개검정주머니나방(신칭)

Chalia pungelerii Heyaerts, 1900: 190. Type locality: Japan.

Eumeta pungeleri: Tutt, 1900: 434.

Eurycytarus andrewsi Wileman, 1911: 347.

Canephora pungeleri: Dierl, 1970: 170.

Canephora pungelerii: Inoue, 1981; 197-198.

Adult. Female (Fig. 1). Length 8.4-9.1 mm, vermiform, cylindrical, nearly same thickness from the metathorax to the 7th abdominal segment, 9 + 10th abdominal segments with short papillae anales. Coloration: Head with reddish brown and shiny vertex. Meso and metanotum red-brown. Membranous areas of abdomen yellowish brown. 7th abdominal segment pale yellow. Structure: Head (Fig. 1B) reduced in size, about 0.07 times as long as body length; apical part of vortex with few short hairs, mouth part slightly degenerated, antennae very short; well-developed with 2 segments, eye-spots blackish. Thorax (Fig. 1C and D) small, 0.16 times as long as body length, dorsal margin weakly curved, prothorax narrower than meso and metathorax, lateral part of metathorax with degenerated wings and few small setae, forewing narrow than hindwing. Legs almost degenerated with very short, present 2 segments (consist of 2 short segments, basal part with one femur and apical part with one tibia (Sugimoto and Saigusa, 2001)). Abdomen well developed, cylindrical and 5.14 times as long as body length, first abdominal segment well sclerotized, second to 6th abdominal segments almost membranous and second segment shorter than 3 to 6th segments, seventh abdominal segment nearly 1.4 times as long as the 6th segment and wide, dorsal part of 7th segment (corethrogyn or anal hair tuft) densely covered reddish brown hairs (but macerated condition), eighth abdominal segment very short, apophysis anterior parts invaginated from anterior margin of sclerite and very short, ostium bursa slightly thickness, 9th and 10th abdominal segments present papillae anales (ovipositor), papillae anales sclerotized and slightly short.

Male. Unknown.

Larval case (Fig. 2). It makes a relatively wide cylindrical case, which is slightly tapered to the lower part and covered

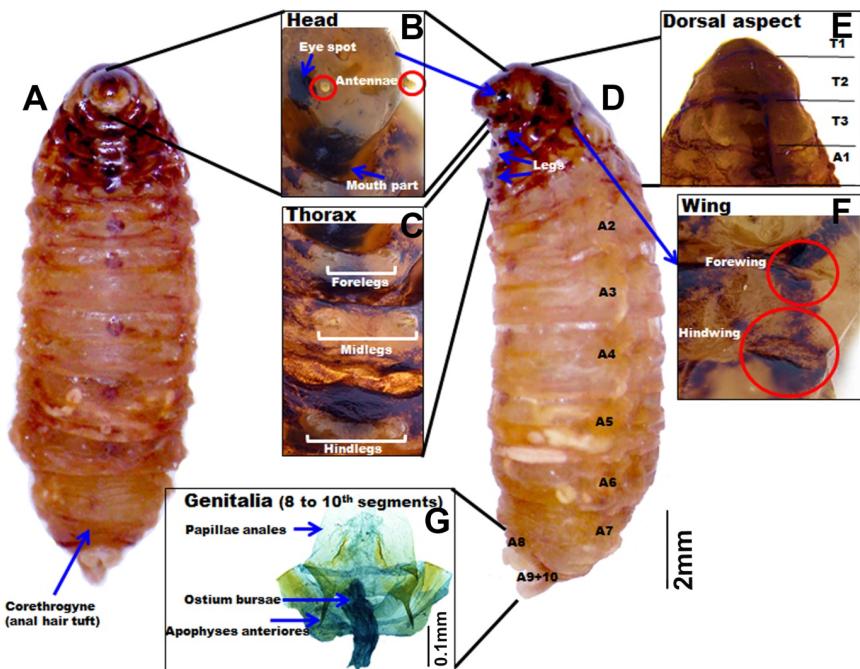


Fig. 1. Female of *Canephora pungelerii*: A, Ventral aspect; B, Head; C, Thorax; D, Lateral aspect; E, Thorax, dorsal aspect; F, Wing; G, Genitalia (abbreviation, A (abdomen); T1 (prothorax); T2 (mesothorax); T3 (metathorax)).



Fig. 2. Larval case of *Canephora pungelerii*. A, Feeding on *Rhododendron indicum* (L.); B, Pupation (fixed the larval case on the fence).

with pieces of leafs arranged longitudinally.

Host plants (Fig. 2). It mainly feeds on Gramineae (Seino, 1975). In this study, *Rhododendron indicum* (L.) Sweet (Ericaceae) is reported for the first time from Korea as a host plant of *C. pungelerii*.

Material examined. 2 ♀, Jangneung, Yeongwol-gun, GW, 20. vi. 2014 (B.K. Byun and S.J. Roh), slide no. KNAEFSJ01; 2 ♀, Jeonmin-dong, Yuseong-gu, Daejeon, 20. v. 2015 (S.J. Roh), slide no. KNAEFSJ02; 1 ♀, Jeonmin-dong, Yuseong-gu,

Daejeon, 1. vi. 2015 (S.J. Roh); 1 ♀, Jeonmin-dong, Yuseong-gu, Daejeon, 2. vi. 2015 (S.J. Roh), slide no. KNAEFSJ03-coll. SEL/HNU.

Distribution. Korea (new record), Japan.

DNA barcode. DNA barcode sequence was generated (accession no. MG563819). Multiple alignments using the BLAST tool in the NCBI database showed the following species as nearest neighbor: *Canephora pugelerii* (locality of reference data from Japan) 98%.

Acknowledgements

We thank to Ms. Kim DS, Choi HR, and Mr. Kim SY, Systematic Entomology Lab., Hannam University, for help in larval rearing. This study was carried out with the support of the 'R&D Program for Forest Science Technology (Project No. 2017042A00-1823-CA01)' provided by Korea Forest Service (Korea Forestry Promotion Institute) and Korea National Arboretum (Project No. KNA1-1-20, 16-1).

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