

A Webbing Clothes Moth, *Tineola bisselliella* (Lepidoptera, Tineidae) New to Korea

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Tineola bisselliella (나비목, 곡식좀나방과)의 국내 발견 보고

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ABSTRACT: The genus *Tineola* Herrich-Schäffer is reported for the first time in Korea, with a species *Tineola bisselliella* (Hummel, 1823). These moths can cause damage not only on irreplaceable materials of aesthetic, historic or scientific importance, but also on daily commodities such as clothes, furnishings, and other materials made of animal fur, wool, feathers or leathers. The morphological characters of *T. bisselliella* are described, and illustrations of examined specimens are provided.

Key words: Tineidae, Tineinae, Invasive species, Keretophagous

초록: 본 연구를 통해 국내 미기록속인 *Tineola* Herrich-Schäffer속의 *Tieola bisselliella* (Hummel, 1823)을 최초로 확인하였다. 해당 종은 모피, 양모, 깃털, 가죽 등 일상용품을 가해할 뿐만 아니라 미술, 역사, 또는 과학적으로 중요한 물품들을 가해하는 것으로 알려져 있다. 한국산 *T. bisselliella*의 성충 및 암수 생식기를 기재하고 도판을 제공하였다.

검색어: 곡식좀나방과, 옷좀나방아과, 침입종, 케라틴 섭식성

Over the past decades, as the world has been more closely connected, there has been an increase in invasive species that have become widespread in non-native regions, affecting the environment and humans (Pyšek et al, 2020).

The genus *Tineola* was established by Herrich-Schäffer (1853), based on the type species, *Tineola bisselliella* (Hummel, 1823). The webbing clothes moth *T. bisselliella* is one of the most important and widespread tineid moth pest throughout the world. These moths can cause damage not only on irreplaceable materials of aesthetic, historic or scientific importance, but also on daily commodities such as clothes, furnishings, and

other materials made of animal fur, wool, feathers or leathers (Cox and Pinniger, 2007).

The biogeographic origin of *T. bisselliella* is still undetermined, but it is assumed that this moth migrated from Africa as the world trade has grown in modern times and has been distributed globally (Krüger-Carstensen and Plarre, 2011; Plarre and Krüger-Carstensen, 2011). The webbing clothes moth *T. bisselliella*, which is considered as an invasive species in the most part of the world, has been distributed globally.

In this study, the genus *Tineola* Herrich-Schäffer, 1853 is reported for the first time in Korea, with a species *T. bisselliella* (Hummel, 1823). Photographs of adults, and the genitalia are provided.

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Materials and Methods

The materials examined of this study are kept in the Entomological Collection, Honam National Institute of Biological Resources, Mokpo, Korea. The specimens were collected from the inside of a building in Seoul.

The genitalia were dissected and examined under a Leica EZ4 stereo-microscope (Leica, Wetzlar, Germany). Images of the adults and the genitalia were photographed by using a Canon EOS 5D digital camera with a Canon EF 100 mm f/2.8L Macro IS USM lens (Canon, Inc., Tokyo, Japan), and a Leica TL5000 Ergo microscope with a Leica DMC5400 CMOS camera (Leica, Wetzlar, Germany).

Terminology and morphological characters of the adult, wing venation, and genitalia follow Robinson (1976), Common (1987), Robinson and Nielsen (1993).

Abbreviations used herein are as follows: ECHNIBR: Entomology Collection, Honam National Institute of Biological Resources; TS: Type Species; TL: Type Locality.

Taxonomic Accounts

Family Tineidae Latreille, 1810 곡식좀나방과

Subfamily Tineinae, Latreille, 1810 옷좀나방아과

Genus *Tineola* Herrich-Schäffer, 1853

Tineola Herrich-Schäffer, 1853: 7, 23. TS: *Tineola bisselliella* Hummel, 1823. TL: Europe.

Remark. The genus *Tineola* is reported for the first time in Korea. Two species of genus *Tineola* (*T. bisselliella* (Hummel, 1823), and *T. anaphecola* Gozmány, 1967) are recognized globally. *T. bisselliella* is widely distributed worldwide, and *T. anaphecola* is confined to the tropical areas in West Africa, but species separation is suspected (Robinson and Nielsen 1993; Plarre and Krüger-Carstensen, 2011).

Tineola bisselliella (Hummel, 1823) 작은옷좀나방(신칭)

Tineola bisselliella Hummel, 1823: 6. TL: Europe.

Tineola flavifrontella Thunberg, 1794: 87. TL: Europe, nec Denis and Schiffermüller, 1775.

Tineola destructor Stephens, 1825: 453. TL: Britain.

Tineola crinella Sodoffsky, 1830: 70. TL: Europe.

Tineola lanariella Clemens, 1859: 257. TL: USA.

Tineola furciferella Zagulyaev, 1954: 156. TL: USSR.

Adult. (Fig. 1, 2) Wingspan 9-15 mm. Head with yellowish-brown, hair-like scales on vertex and frons. Antenna filiform; scape grayish-brown; each segment grayish-brown. Mouth part reduced or absent; galeae vestigial; maxillary palpi very short; labial palpus upward, covered with yellowish-brown scales. Thorax yellowish-brown. Forewing with all veins present and free; R and M stem present in cell; ground color yellowish-brown, without any pattern; approximately 3.1-3.2 times as long as width including fringe (about 3.4-3.6 times as long as width excluding fringe). Hindwing with all veins present and free; Rs slightly curved near cell; M stem branched in cell; ground color grayish-brown, without any pattern; approximately 2.1-2.2 times as long as width including fringe (about 3.5-3.6 times as long as width excluding fringe).



Fig. 1. An adult of *Tineola bisselliella* (Hummel), male.

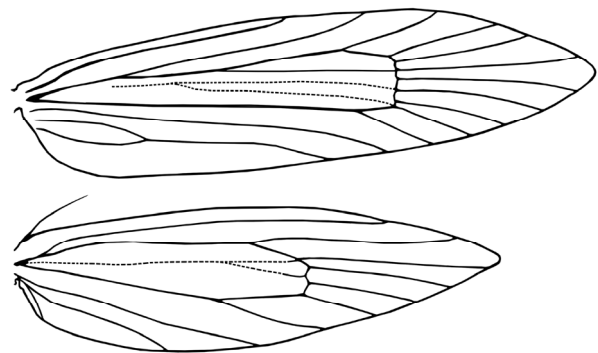


Fig. 2. Wing venation of *Tineola bisselliella* (Hummel), male.

Male genitalia. (Fig. 3) Uncus tapered on apically, sharply pointed at tip. A pair of gnathos arms strongly curved, L-shaped. Tegumen rounded and slightly sclerotized on margin. Vinculum rectangular, with slightly sclerotized on ventral to posterior margin; clearly demarcated from tegumen. Saccus rod-shaped, elongated, strongly sclerotized. Juxta simple, U-shaped, articulated with vinculum and saccus. Valva mitten-shaped, with elongated apodeme narrower to basally; costal margin nearly straight; ventral margins at 4/5 narrower to rounded apex; close to ventral margin, with strongly sclerotized patch on inside; basally with slightly sclerotized large protruded process; Aedeagus cylindrical, elongated, approximately 1.6 times as long as saccus; vesical with a large, spine-like cornutus.

Female genitalia. (Fig. 4) Ovipositor broad and short, approximately 0.8-1.1 times as long as width of abdomen. Apophyses posteriores approximately 1.5 times as long as apophyses anteriores. 8th segment slightly sclerotized, with strongly sclerotized ostium lip. Antrum broader to ductus bursae; thick-walled, with transverse wrinkles. Ductus bursae broad and long, approximately 1.3-1.6 times as long as length of apophyses anteriores. Corpus bursae sac-shaped, membranous, without signum.

Material examined. 1♂, 5♀, Apgujeong-dong, Seoul, 4. VIII. 2022 (H. C. Park), voucher no. HNIBRIN8748-8753 genitalia slide no. ECHNIBR-0002, 0003.



Fig. 3. Male genitalia of *Tineola bisselliella* (Hummel), genitalia slide no. ECHNIBR-0002.

Distribution. Korea (Seoul), Cosmopolitan.

Remarks. This species is recorded for the first time in Korea. We found the specimens on an imported bed made of camel hair. The larva of *T. bisselliella* built tightly woven silk tubes (Fig. 5) with the substrate and lived inside it. The tubes are closely attached to the substrate and are better able to prevent water loss than the portable tube of other tineid moths (Plarre and Krüger-Carstensen, 2011).

Although the type locality of *T. bisselliella* is Europe, it is not thought to be native to Europe because it was not found in Europe before the 19th century (Plarre and Krüger-Carstensen, 2011). In the 18th century, *T. bisselliella* was not described in the systematic work of Linnaeus and Frabricius, nor was it mentioned in Réaumur's report on controlling moths in textiles (Weidner, 1970).

According to the study on the effects of temperature on *T. bisselliella*, the eggs survived for 2 days at -15°C, 3 days at -10°C, 7 days at -5°C, and 21 days at 0°C (Brokerhof et al., 1992). Given that, *T. bisselliella* would be difficult to survive in the wild habitats during winter in the temperate regions. In the winterless regions, keratin-rich food sources, such as bee



Fig. 4. Female genitalia of *Tineola bisselliella* (Hummel), genitalia slide no. ECHNIBR-0003.

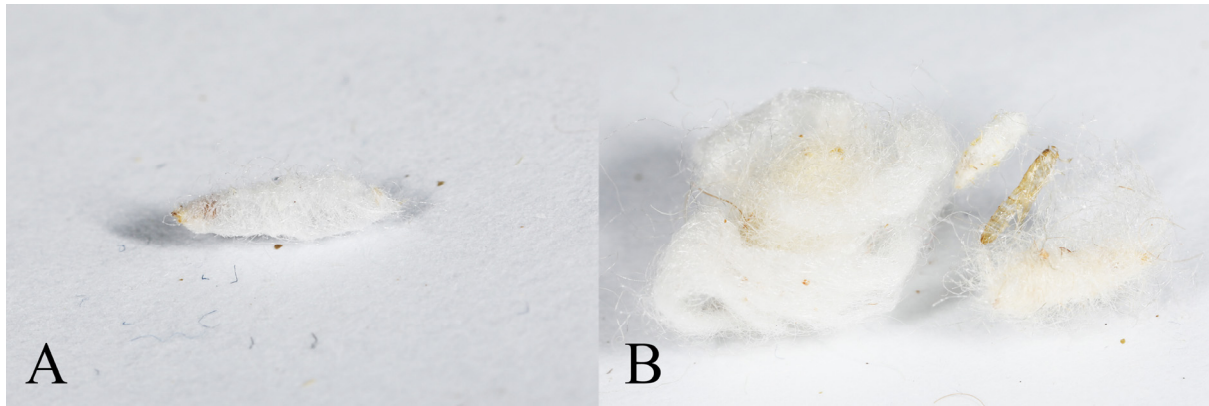


Fig. 5. Silk tube and pupal case of *Tineola bisselliella* (Hummel). A: Silk tube; B: Pupal case.

and bird nests and arthropods remains, are the wild habitats in which *Tineola* spp. lived before entering man-made environments (Meyrick, 1927). It can therefore be assumed that *T. bisselliella* arrived in Europe relatively late and was probably accidentally introduced with the natural produce trade in Africa and later spread throughout the world (Krüger-Carstensen and Plarre, 2011).

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Statements for Authorship Position & Contribution

Lee, D.-J.: Honam National Institute of Biological Resources, Associate Researcher; Examined specimens, prepared figures and wrote the manuscript.

Park, H. C.: Cultural Entomology Institute, Chief; Collected specimens, prepared figures.

Roh, S. J.: Honam National Institute of Biological Resources, Senior Researcher; Examined specimens, wrote the manuscript.

All authors read and approve the manuscript.

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