Original article KOREAN JOURNAL OF APPLIED ENTOMOLOGY

한국응용곤충학회지
Korean J. Appl. Entomol. 64(3): 173-179 (2025)
DOI: https://doi.org/10.5656/KSAE.2025.06.0.024

pISSN 1225-0171, eISSN 2287-545X

Two Newly Recorded Species of the Genus *Stathmopoda* Herrich-Schäffer, 1853(Lepidoptera: Stathmopodidae) from the Korean Peninsula

In-Won Jeong[1,2], Jinsung Park[1,2] and Sora Kim[1,2]*

[1]Lab. of Insect Phylogenetics and Evolution, Department of Plant Protection & Quarantine, Jeonbuk National University, Jeonju 54896, Korea
[2]Department of Agricultural Convergence Technology, Jeonbuk National University, Jeonju 54896, Korea

Stathmopoda 속(나비목: 감꼭지나방과) 미기록 2종 한반도 첫 보고

정인원[1,2] · 박진성[1,2] · 김소라[1,2]*

[1]전북대학교 식물방역학과 곤충계통진화연구실, [2]전북대학교 농축산식품융합학과

ABSTRACT: Stathmopodidae is characterized by long setae clusters on the hind tibia and comprises over 408 species in 44 genera worldwide. Among these, the genus *Stathmopoda* Herrich-Schäffer, 1853 is the most diverse, with more than 240 species whose larvae feed on various substrates. However, taxonomic studies have been limited due to the small size and morphological similarity among species. In this study, we report two species, *Stathmopoda atridorsalis* Terada and *S. dorsioculella* Terada, that are first recorded in the Korean Peninsula. For each species, we provide diagnostic characteristics, detailed descriptions, and photographs of the adults and their genitalia. Additionally, we provide a key to the Korean species of the genus *Stathmopoda* based on the forewing, including the newly reported species in this study.

Key words: Stathmopodidae, *Stathmopoda*, New record, Korean Peninsula

초 록: 감꼭지나방과는 뒷종아리마디에 위치한 긴 강모 다발을 특징으로 하며, 전 세계적으로 44속 408종 이상이 보고되었다. 이 중 가장 다양한 종수를 포함하는 속은 *Stathmopoda* Herrich-Schäffer, 1853로, 유충 시기에 다양한 먹이원을 가진 240종 이상의 종들로 구성되어 있다. 그러나 성충의 크기가 작고 종들끼리 형태적으로 유사하여 분류학적 연구가 제한적이었다. 본 연구에서는 미기록 2종, *Stathmopoda atridorsalis* Terada와 *S. dorsioculella* Terada를 한반도에서 최초로 보고한다. 각 종에 대한 진단, 기재, 성충과 생식기의 사진을 제공한다. 추가적으로, 이번 연구를 통해 보고되는 종들을 포함한 한반도산 *Stathmopoda* 속 종의 앞날개에 기반한 검색표를 함께 제공한다.

검색어: 감꼭지나방과, *Stathmopoda*, 미기록 종, 한반도

The family Stathmopodidae, characterized by clusters of long setae on the hind tibia, was first reported by Edward Meyrick in 1913 (Meyrick, 1913; Sinev, 2015). This family comprises more than 408 species in 44 genera worldwide, with distributions concentrated particularly in the Indo-Australian and Afrotropical regions, while very few species have been reported from South America and the temperate zones of the Holarctic region (Koster and Sinev, 2003; van Nieukerken et al., 2011).

Among these, the genus *Stathmopoda* Herrich-Schäffer, 1853 comprises the largest proportion, with more than 240 species, and exhibits high ecological diversity, with larvae feeding on a wide variety of materials such as crops, mosses, spider eggs, and fern sporese (Austin, 1985; Terada, 2016; Shen and Hsu, 2023). However, because adult individuals are extremely small and often morphologically similar to one another, species identification is challenging, which has led to limited research on this group (Kim et al., 2017).

***Corresponding author:** skim01@jbnu.ac.kr
Received June 5 2025; **Revised** June 13 2025
Accepted June 26 2025

Furthermore, while 14 species have been reported in the *Stathmopoda* − from the Korean Peninsula, over 24 species have been recorded in Japan (Terada, 2016; Park et al., 2018; Kim et al., 2024). Depending on the circumstances, members of this family can become serious agricultural pests or serve as a means of biological control, nevertheless, research on this genus remains particularly insufficient in the Korean Peninsula. In this study, we report *Stathmopoda atridorsalis* Terada, 2014 and *S. dorsioculella* Terada, 2014 from the Korean Peninsula for the first time, confirming their distribution.

Materials and Methods

Specimens were collected using light traps equipped with mercury vapor lamps (220 V/400 W) and black lights (12 V/20 W). Collected specimens were pinned through the thorax and wings, and then dried in an oven at 50°C for over three weeks. Dissection for identification followed the protocol described by Kim et al. (2017), using an EZ4 stereomicroscope (Leica, Germany). Specimens for which sex could not be determined due to a missing abdomen were designated as 'individual'. Adults and genitalia were photographed using a Leica S8APO stereomicroscope (Leica, Germany) equipped with a Tucsen Dhyana 400 DC digital camera (Tucsen, China) and a Leica LED 5000 HDI dome illuminator (Leica, Germany). Images taken at multiple focal points were combined using Mosaic software (Tucsen, China) and Helicon Focus software (Helicon Soft, Ukraine), with backgrounds subsequently removed using Adobe Photoshop 2024 (Adobe, USA).

Taxonomic Accounts

Family Stathmopodidae Meyrick, 1913

Stathmopodidae Meyrick, 1913: 310. Type genus. *Stathmopoda* Herrich-Schäffer

Genus *Stathmopoda* Herrich-Schäffer, 1853

Stathmopoda Herrich-Schäffer, 1853: 54. Type species. *Phalaena* (*Tinea*) *pedella* Linneaus, 1761

Boocara Butler, 1880: 562. Type species. *Boocara skelloni* Butler, 1880

Placostola Meyrick, 1887: 280. Type species. *Placostola diplaspis* Meyrick, 1887

Erineda Busck, 1909: 94. Type species. *Erineda elyella* Busck, 1909

Agrioscelis Meyrick, 1913: 96. Type species. *Agrioscelis tacita* Meyrick, 1913

Kakivoria Nagano, 1916: 138. Type species. *Kakivoria flavofasciata* Nagano, 1916

Diagnosis. *Adult*. wing expanse 10.0 − 20.0 mm. Head generally yellow to ocher. Labial palpus upcurved, sharply pointed at the apex. Thorax generally yellow to brown, caudal margin differently colored from the ground color. Abdomen with scales at each segment caudally. Forewing generally yellow to brown, either uniformly colored or mixed with multiple colors; fringes generally similar to ground color, occasionally differing at the apex. Hindwing brown to dark brown; frenulum single in male, three to four in female. *Male genitalia*. Uncus with densely setae at the lateral margin. Gnathos as long as uncus, generally tongue-shaped. Cucullus oval-shaped or triangular, densely setae internally. Sacculus with setae at the ventral margin. *Female genitalia*. Papillae anales weakly sclerotized with some short setae. Eighth abdominal segment sclerotized, setae along the caudal margin. Apophyses posteriores approximately twice the length of apophyses anteriores. Corpus bursae sac-like, one or two signa present.

***Stathmopoda atridorsalis* Terada, 2014 (신칭: 갈색가슴꼭지나방) (Fig. 1A − E)**

Stathmopoda atridorsalis Terada, 2014: 109 − 110. Type locality. Japan

Diagnosis. This species is similar to *S. pedella* (Linnaeus) and *S. stimulata* Meyrick but is easily distinguished by the marking and color of the wing. In. *S. pedella*, the forewings are ocher with the third fascia reaching the costal, the brownish black blotch near the apex, and the hindwings and fringes are brown. In *S. stimulata*, the center of the third fascia is pale white, and a well-developed black streak is present near the apex. But in this species, the wings and fringes are pale ocher, the third fascia does not reach the costal, and the pale brown streak near the apex is weakly developed. In the male genitalia, this species is close to *S. neohexatyla* (Li and Wang) but has

Fig. 1. *Stathmopoda atridorsalis* Terada, 2014. A, Adult; B, wing; C, abdomen; D, male genitalia of caudal view; E, aedeagus.

differences from cucullus and aedeagus. In *S. neohexatyla*, cucullus is narrow oval-shaped, and six spiniform cornuti are located at the aedeagus. But in this species, cucullus is subtriangular, and there are more than 10 cornuti present at the aedeagus.

Material examined. One individual, Mt. Sobaek, Youngpung-gun, GB, Korea, 13.vii.1998, Paek.; one individual, Mt. Changbai, Changbaixian, Malugou, China, 07.viii.2002, Park.; one individual, Mt. Goheon, Ulju-gun, Ulsan-si, GB, Korea, 01. viii.2012, Bae Y.S.; one male and two individuals, Mt. Gilgok, Onmae-ro 987, Uljin-gun, GB, Korea, 08 − 09.vii.2024, Han and Ra, gen. slide. No. IPE JBNU-13287/ I.W. Jeong.

Description. Adult. wing expanse 12.1 − 15.8 mm. Head yellowish white. Antenna pale ocher. Labial palpus pale ocher. *Thorax*. Tegula grayish brown from base to middle, pale brown from middle to apex, with ocherous edges. Thorax grayish brown, pale ocherous blotch at the caudal margin, caudally darker grayish brown spot at end of caudal margin. Abdomen ocher with pale ocherous scales caudally at each segment. Forewing pale ocher; costal grayish brown; grayish brown fascia from base to 1/6; two grayish brown blotches at 1/3 and 2/3; first streak pale brown on CuP; second streak brown, originating from first blotch and gradually widening towards second blotch; third streak brown, weakly developed. Originating from the second blotch to near apex, fringes from base to 3/5 grayish brown, from 3/5 to near the apex pale ocher, black at the apex. Hindwing grayish brown; fringes grayish brown. *Male genitalia*. Uncus caudally tapering, blunt apex, numerous setae at the lateral margin. Gnathos caudally tapering, as long as uncus. Valva with round apex; costa slightly convex, with some setae; cucullus 3.5 times longer than uncus, large oval-shaped with numerous setae inwardly; sacculus sclerotized, slightly convex at median, some setae ventrally. Vinculum elongated with an acute apex; saccus 1/3 length of uncus. Anellar lobes well-developed, sclerotized, narrow oval-shaped with some setae. Aedeagus three times longer than uncus, more than 10 short spiniform cornuti arranged in a row on vesica; weakly sclerotized subrectangular plate near the base.

Host. Unknown.

Distribution. Korea (South; new record), China (new record), Japan.

***Stathmopoda dorsioculella* Terada, 2014 (신칭: 외눈무늬꼭지나방) (Fig. 2A − F)**

Stathmopoda dorsioculella Terada, 2014: 109 − 110. Type locality. Japan

Diagnosis. This species is close to *S. stimulata* but has differences in the marking of the forewing and thorax. In *S. stimulata*, there are brown blotches at 1/3 and 2/3 of the ocherous forewing, additionally, the ocherous thorax features symmetrical brown blotches at 1/2. A pale grayish-brown spot is present on the caudal margin. But in this species, there is no blotch on the ocherous forewing, also, the brown thorax has grayish brown fascia at 1/2, and there is an ocherous blotch along with a pale grayish brown spot on the caudal margin. In male genitalia, this species is similar to *S. neohexatyla*, but has differences from sacculus and aedeagus. In *S. neohexatyla*, the sacculus extends to 1/5 of the cucullus, and the aedeagus contains six or fewer cornuti. However, in this species, the sacculus extends only to the base of the cucullus, and the aedeagus contains seven or more cornuti.

Material examined. One individual, Gamsan-ri, Andeok-myeon, Seogwipo-si, JJ, Korea, 03.ix.2012; two males, Samduri 47, Guneo-myeon, Wando-gun, JN, Korea, 30.viii.2024, J. Park, gen. slide. No. IPE JBNU-13278, 13280/ I.W. Jeong.

Description. *Adult*. wing expanse 13.0-15.8 mm. Head grayish ocher. Antenna yellowish white; scape pale ocher dorsally. Labial palpus yellowish white. *Thorax*. Tegula brown with grayish brown blotch on the inner side of the middle, ocher at the apex. Thorax brown; prothorax dark ocher, grayish brown caudally; grayish brown blotch symmetrically on the cephalic margin; pale grayish brown triangular blotch at cephalic 1/4; arched grayish brown fascia darker caudally at the middle; ocherous blotch at the caudal margin; pale grayish ocherous spot darker caudally at the end of caudal margin. Abdomen ocher, with pale ocherous scales at each segment caudally. Forewing mostly grayish ocher, narrower and paler toward the apex; five streaks running; first streak dark grayish ocher, broad, from the base to the anal angle along posterior, not reaching posterior; second streak broad grayish brown, from base to 2/7 along costal; third streak broad grayish brown, from anal angle to median of CuP; fourth streak brown, along CuP; fifth streak originating from 2/3 extending near apex,

dark pale brown towards the apex; fringes grayish ocher, pale gray at the apex. Hindwing grayish ocher darker towards the apex; fringes grayish ocher. *Male genitalia*. Uncus tapering caudally with a blunt apex, numerous setae at the lateral margin. Gnathos slightly shorter than uncus, narrow, round at the apex. Valva round at apex; costa slightly angled dorsally with some setae; cucullus longer than three times the length of the uncus, large oval-shaped with slightly angled at base 1/3, numerous setae inwardly; sacculus sclerotized, round at apex, with some setae ventrally. Vinculum elongated; saccus slightly longer

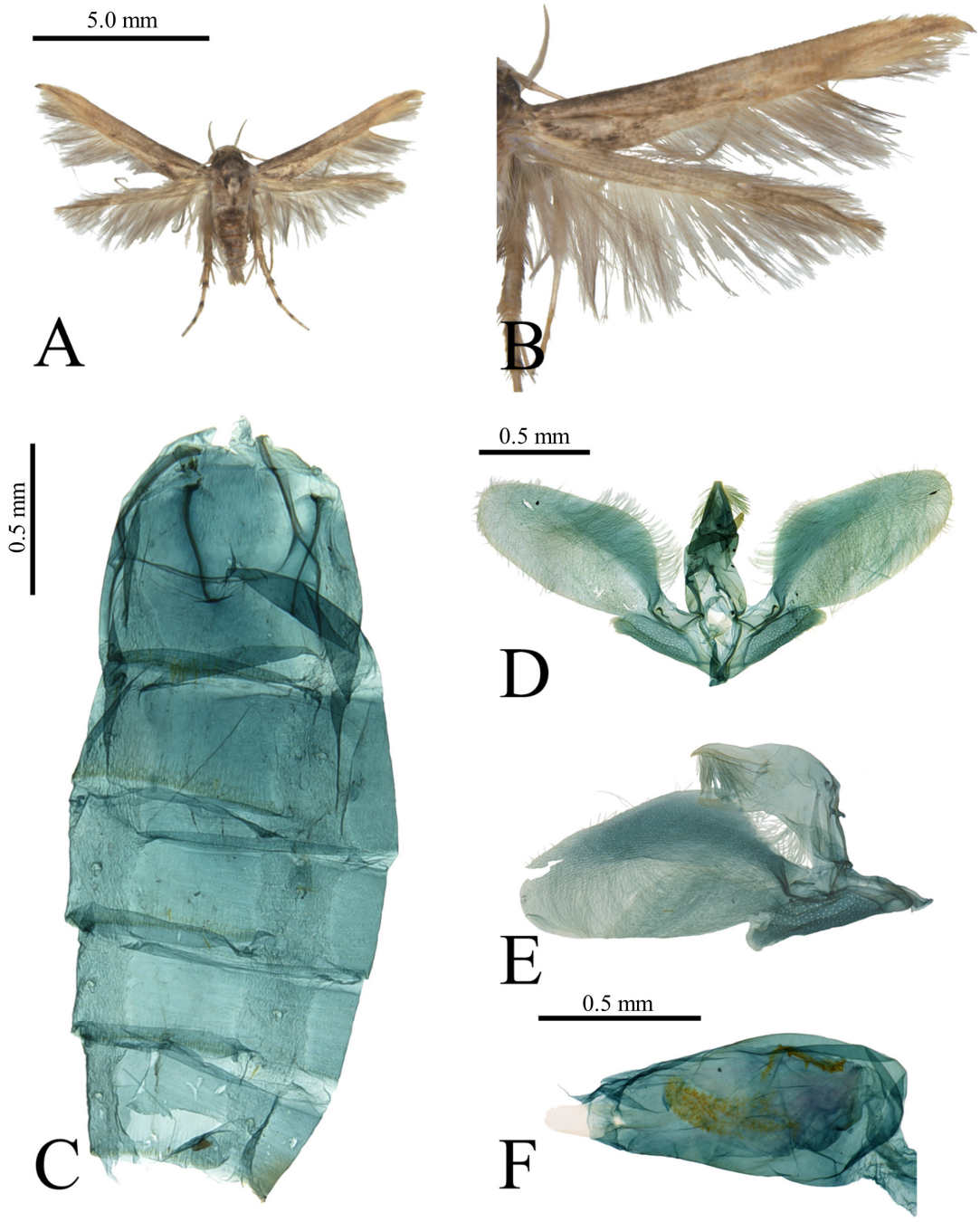

Fig. 2. *Stathmopoda dorsioculella* Terada, 2014: A, Adult; B, wing; C, abdomen; D, male genitalia of caudal view; E, male genitalia of lateral view; F, aedeagus.

than 1/3 length of uncus. Anellar lobes well-developed, weakly sclerotized, narrow oval-shaped. Aedeagus four times longer than uncus; structure composed of numerous triangular micro-spines, 1/3 length of aedeagus, on vesica; more than seven tooth-shaped cornuti connected at each end, forming a straight line; weakly sclerotized plate on vesica near the base.

Host. Unknown.

Distribution. Korea (South; new record), Japan.

Key to Species of the Genus *Stathmopoda* (based on forewing)

1. Forewing generally yellow to ocher ····· 2
- Forewing generally gray to brown ····· 11
2. Forewing without fascia or blotch ····· *S. dorsioculella*
- Forewing with fascia or blotch ····· 3
3. Second and third fasciae connected with streak near costal margin ····· 4
- Second and third fasciae connected with streak along posterior margin ····· 8
4. No streak originating from the third fascia and extending near the apex ····· *S. pedella*
- A streak originating from the third fascia and extending near the apex existent ····· 5
5. Fringes uniform color overall ····· *S. neohexatyla*
- Fringes brownish black at the apex ····· 6
6. Forewing generally straight ····· *S. atridorsalis*
- Forewing curved at the apex ····· 7
7. Forewing with a blotch on the 2/3 containing a white spot at the center ····· *S. baegunica*
- Forewing with a blotch on 2/3 without a spot *S. stimulata*
8. Third fascia without connecting to the costal ····· 9
- Third fascia connecting with the costal ····· 10
9. A streak originating from the third fascia and extending near the apex exists ····· *S. gemmiconsuta*
- No streak originating from the third fascia and extending near the apex ····· *S. flavescens*
10. A streak originating from the third fascia and extending to the apex existing ····· *S. euryzoster*
- No streak originating from the third fascia and extending to the apex ····· *S. commoda*
11. Ground color of forewing almost gray ····· 12
- Ground color of forewing almost brown ····· 13
12. Gray margin from 1/3 to apex ····· *S. haematosema*
- Gray margin from 1/5 to apex ····· *S. moriutiella*
13. Ground color of forewing brown ····· *S. masinissa*
- Ground color of forewing brown from about 1/3 to the apex ····· 14
14. Forewing yellow from base to 1/3 ····· *S. auriferella*
- Forewing multicolored from base to 1/3 ····· 15
15. Second fascia with flat base ····· *S. opticaspis*
- Second fascia with convex base ····· *S. persona*

Acknowledgments

This work was supported by a grant from the National Institute of Biological Resources (NIBR), funded by the Ministry of Environment (MOE) of the Republic of Korea (NIBR 202402202). Additionally, this work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korean government (MSIT) (No. RS-2024-00345586).

Statements for Authorship Positions & Contribution

Jeong, I.-W.: Jeonbuk National University, Student in MS; Conceptualization, Data Curation, Writing-Original Draft, Visualization

Park, J.: Jeonbuk National University, Student in Ph.D; Investigation, Resources

Kim, S.: Jeonbuk National University, Professor; Writing-Review & Editing, Supervision, Funding acquisition

All authors read and approved the manuscript.

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