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Three newly recorded species of Lepidoptera (Argyresthiidae, Gracillariidae, Tortricidae) from Korea

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Three species of microlepidoptera belonging to the families Argyresthiidae, Gracillariidae, and Tortricidae are newly recorded from Korea: *Argyresthia rara* Moriuti, 1969, *Caloptilia querci* (Kumata, 1982), and *Pammene gallicana* (Guenée, 1845). Specimens were collected using light traps and examined in detail based on external morphology and genitalia structures. Diagnostic characters of adults and genitalia are described and illustrated comprehensively, and brief notes on their distribution and host plants are provided. The discovery of these species expands the known range of each taxon within East Asia and contributes to a better understanding of the diversity and biogeographical composition of the Korean microlepidopteran fauna.

Keywords: Argyresthiidae, Gracillariidae, Korea, Lepidoptera, new records, Tortricidae

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Introduction

The Microlepidoptera comprise an artificial assemblage of small-sized moths representing diverse and relatively primitive lineages within Lepidoptera (Pogue, 2009). Despite their remarkable diversity and ecological importance, the fauna of microlepidopteran species in Korea remains insufficiently studied compared with that of larger moths. The first comprehensive checklist of Korean microlepidoptera was published by Park (1983) and later revised by Byun *et al.* (2009), enumerating approximately 1,200 species across several families. However, continued field surveys have revealed additional unrecorded taxa, suggesting that the Korean microlepidopteran fauna is still far from being completely known.

Among the microlepidopteran groups, the families Argyresthiidae, Gracillariidae, and Tortricidae include species of considerable economic and ecological significance. Members of Argyresthiidae are mostly host-specific shoot or fruit, Gracillariidae species are well known for their leaf-mining larvae, and Tortricidae, particularly the subfamily Olethreutinae, comprises several important agricultural pests. Although these families are well represented in the Palearctic Region, they have been poorly documented in Korea from limited localities.

During recent faunistic surveys conducted in various regions of Korea, three species belonging to these families were discovered for the first time in the country. In this paper, we report *Argyresthia rara* Moriuti, 1969, *Caloptilia querci* (Kumata, 1982), and *Pammene gallicana* (Guenée, 1845) for the first time from Korea. Diagnostic characteristics and genital structures of the species are described and illustrated, with brief notes on their distribution and host associations.

Materials and Methods

All available specimens of microlepidoptera from Korea were examined in this study. All specimens examined for

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the present study were collected at night using light traps. Images of the adult specimens were taken using a Canon EOS 550D digital camera (Canon, Japan) and images of the head and antenna of specimens were taken using a digital camera attached to the Dhyana 400DC (Tucsen Photonics, Fuzhou, China) with a microscope (LEICA M205C © Leica Microsystems, Wetzlar, Hesse, Germany). The genitalia were dissected under a stereomicroscope (Nikon SMZ445; Nikon, Tokyo, Japan), using the method described by Holloway *et al.* (1987) and were mounted on a slide glass with Canada balsam as the mounting medium. Images of genitalia were taken using a digital camera attached to a microscope (LEICA M205C © Leica Microsystems, Wetzlar, Hesse, Germany).

Abbreviations used in this study are as follows:

TL (type locality), HNUSEL (Systematic Entomology Lab., Hannam University, Daejeon, Republic of Korea), HUNHM (Hannam University Natural History Museum, Daejeon, Republic of Korea) and NIBR (National Institute of Biological Resources, Incheon, Republic of Korea), GW (Gangwon state), JN (Jeollanam-do).

Taxonomic Accounts

Superfamily Yponomeutoidea Stephens, 1829
Family Argyresthiidae Bruand, 1850
Genus *Argyresthia* Hübner, [1825]

***Argyresthia rara* Moriuti, 1969 (Figs. 1A, 2A)**
깜보라광택집나방 (신칭)

Argyresthia rara Moriuti, 1969: 22. TL: Honshu, Japan.

Adult (Fig. 1A). Wingspan 10 mm. Head covered with white scales; vertex white; face smooth and pale yellow; labial palpus creamy white; antenna filiform; scape of antenna yellowish white; flagellum white with brown scales covering the apices of each segment. Mesoscutum of thorax covered with white scales; tegula golden-brown. Legs ground color creamy white; femur creamy white; tarsus and tibia white, ringed with brown scales. Forewing ground color dark fuscous with purplish sheen; dorsal streak white, stretched from base to 1/3 of forewing. Hindwing and cilia dark gray.

Male genitalia (Fig. 2A). Tuba analis as long as valva width. Socius with 20 sclerotized special scales. Valva short linguiform, hairs along the costal, ventral, and apical margin; costal hairs rather slender. Aedeagus long, about 3 times longer than valva width; Cornuti with one long thick spine, surrounded by numerous minute spinules. 8th sternite V-shaped.

Female genitalia. Unknown in Korea (see Moriuti, 1969).

Material examined. [Korea] 1♂, Baekjeon-ri, Hwaam-myeon, Jeongseon-gun, GW, 24 viii 2024 (leg. BK Byun), gen. slide No. HNUSEL-1874-coll. NIBR (RORYIN0000 004459).

Distribution. Korea (new record), Japan (Moriuti, 1969).

Host plants. Unknown.

Superfamily Gracillarioidea Stainton, 1854
Family Gracillariidae Stainton, 1854
Subfamily Gracillariinae Stainton, 1854

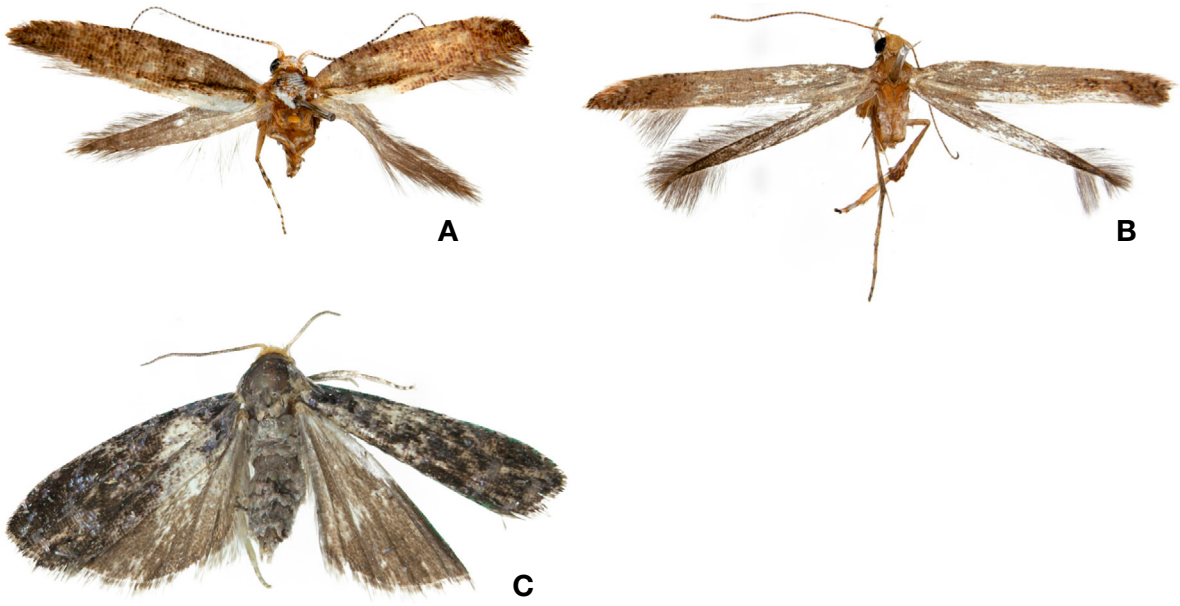


Fig. 1. Adult habitus. A, *Argyresthia rara* Moriuti, 1969; B, *Caloptilia querci* (Kumata, 1982); C, *Pammene gallicana* (Guenée, 1845).

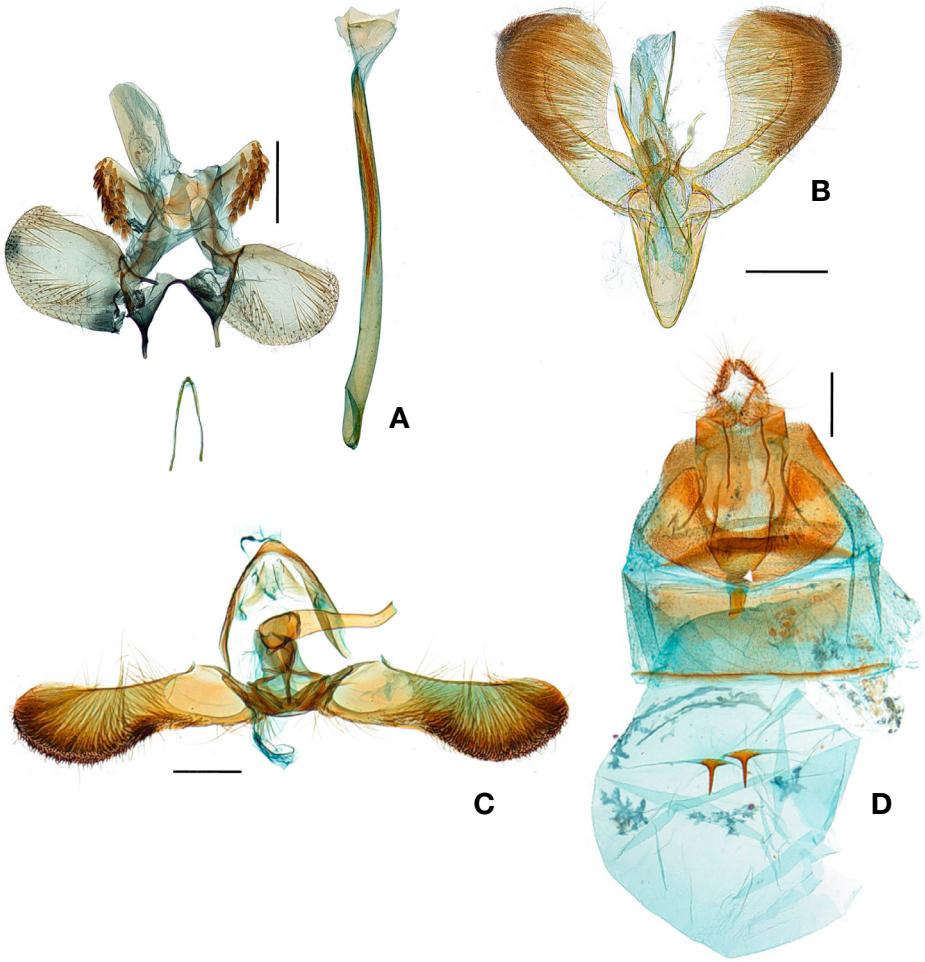


Fig. 2. Genitalia structures. A, *Argyresthia rara* Moriuti, 1969, male; B, *Caloptilia querci* (Kumata, 1982), male; C, *Pammene gallicana* (Guenée, 1845), male; D, *Ditto*, female. Scale bars = 0.2 mm.

Genus *Caloptilia* Hübner, 1816

***Caloptilia querci* (Kumata, 1982) (Figs. 1B, 2B)**
참나무가는나방 (신칭)
Caloptilia querci Kumata, 1982: 103. TL: Hokkaidō, Japan.

Adult (Fig. 1B). Wingspan 12 mm. Face and Head ocherous-yellow to yellowish-gray, sparsely irrorated with dark scales. Labial palpus whitish above, ochreous-yellow to reddish-brown below; second segment bearing a brownish elongate-triangular tuft slightly longer than the smooth apical segment, the latter with two faint oblique brown streaks ventrally. Antennae light ochre-yellow, annulated with dark brown; scape reddish-brown, paler above, without pecten. Thorax ochre-yellow to ochre-brown dorsally, sometimes slightly darkened anteriorly on tegulae; pleural surface reddish-brown with faint ochre-whitish streaks. Fore and mid legs dark reddish-brown; fore coxa with two ochre-whitish bands at base and middle.

Forewing ground color ocherous-brownish, irrorated with ocherous-yellowish or whitish scales; dark brown spots situated near apex. Two narrow dark brown to blackish fasciae near apex, oblique outwardly, often edged with fine whitish iridescent scales outwardly. Hindwing ground color dark brown; cilia reddish-brown around apex with a pale vertical subapical line.

Male genitalia (Fig. 2B). Subscaphium moderately sclerotized, slightly widened apically; tegumen simple, weakly arched dorsally; peniculi approximately one-third as long as valva, distinctly twisted and hook-shaped apically. Valva long and strongly upturned from the basal third, gradually widened toward apex; apical margin evenly rounded; long and slender setae densely arranged along the apical margin and extending posteriorly to about two-thirds of the ventral margin. Vinculum narrowly rounded apically, about half the length of valva. Aedeagus straight, slender, distinctly shorter than valva, needle-shaped, slightly narrowed api-

cally; cornuti not observed.
Female genitalia. Unknown in Korea (see Kumata, 1982).
Material examined. [Korea] 1♂, Wando-eup, Wando-gun, JN, 15 vii 2019 (leg. BK Byun), gen. slide no. HNUSEL-6022-coll. HUNHM.
Distribution. Korea (new record), Japan (Kumata, 1982).
Host plants. *Castanea crenata* Siebold & Zucc., *Castanopsis cuspidata* (Thunb.) Schottky, *Quercus acutissima* Carruth., *Q. glauca* Thumb., and *Q. mongolica* var. *crispula* (Blume) H. Ohashi. [Fagaceae] (Kumata, 1982).

Superfamily Tortricoidea Latreille, 1803
Family Tortricidae Latreille, 1803
Subfamily Olethreutinae Walsingham, 1895
Genus *Pammene* Hübner, [1825]

***Pammene gallicana* (Guenée, 1845) (Figs. 1C, 2C, 2D)**
참나무혹애기잎말이나방 (신칭)
Orchemia gallicana Guenée, 1845: 192. TL: France.
Grapholitha pudicana Herrich-Schäffer, 1851: 263.
Grapholitha implicatana Christoph, 1881: 417.

Adult (Fig. 1C). Wingspan 10–11 mm. Head ochreous; antenna yellowish brown; labial palpus grayish brown. Thorax and abdomen dark brown; legs yellowish brown. Forewing costa gently arched; termen without notch below apex; ground color grayish brown, median fascia violet-gray; costal strigulae ill-defined; dorsal blotch absent. Hindwing ground color grayish brown; cilia grayish white.
Male genitalia (Fig. 2C). Tegumen slightly protuberant at the top. Valva long, broad with rounded angle. basal cavity ovate; cucullus clavate, densely with setae at lower margin; sacculus well sclerotized. Aedeagus moderate in size, narrowed apically, cornuti absent.
Female genitalia (Fig. 2D). Papillae anales small and narrow, densely covered with setae. Apophyses anteriores slightly longer than apophyses posteriores. Sterigma subquadrate, well sclerotized, with 2 protrusions laterally. Ostium bursae cup-shaped, long and broad. Ductus bursae short and narrow, well sclerotized. Corpus bursae large and ovate, with two horn-shaped signum.
Material examined. [Korea] 1♀, Gurae-ri, Sangdong-eup, Yeongwol-gun, GW, 24 viii 2019 (leg. BK Byun), gen. slide no. HNUSEL-1023-coll. NIBR (RORYIN000000 4471); 1♂1♀, Gunae-ri, Sangdong-eup, Yeongwol-gun, GW, 24 viii 2019 (leg. BK Byun), gen. slide no. HNUSEL-1022, 1024-coll. HNUSEL.
Distribution. Korea (new record), Japan, Russia, Europe (Komai, 1999).
Host plants. Galls of *Quercus robur* L. [Fagaceae] (Disque, 1908), *Angelica sylvestris* L., *Daucus carota* L., *Heracleum sphondylium* L., *Pastinaca sativa* L., *Thysselinum palustre* (L.) Hoffm., *Silaum silaus* (L.) Schinz & Thell. [Apiaceae] (Bradley *et al*., 1979).

Discussion

The three species newly recorded in this study represent valuable additions to the Korean microlepidopteran fauna, particularly within the families Argyresthiidae, Gracillariidae, and Tortricidae, which have received comparatively less attention in faunistic surveys. Their detection further supports the view that the diversity of small moths in Korea remains insufficiently documented.

Argyresthia rara was previously known only from Japan and can be identified by its distinctive forewing pattern with a white dorsal streak and purple sheen. *Caloptilia querci* is distributed in Japan and associated with several *Quercus* and *Castanea* species (Kumata, 1982). *Pammene gallicana* is known across the Palearctic Region and is associated with Apiaceae plants.

Additional sampling across different regions will be required to determine whether these occurrences indicate established populations, rare immigrant records, or undersampled taxa. The present findings suggest the possibility that the Korean Peninsula may function as a transitional zone for Palearctic microlepidopteran diversity, but further evidence is needed to test this hypothesis. Future studies incorporating more specimens, larval host associations, and detailed life histories will be essential for evaluating the ecological significance and potential economic impact of these species in Korea.

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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