First Discovery of the Lichen-Feeding Moth

_Bacotia sakabei_ (Lepidoptera: Psychidae) from Korea

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**ABSTRACT**  
The family Psychidae is a small group consisting of 241 genera and 1,350 species in the world. The genus _Bacotia_, belonging to the family Psychidae, was established by Tutt based on the type species, _Fumea sepium_ Speyer and Speyer, 1846. In this study, we aimed to record lichen-feeding bagworms in Korea. The genus _Bacotia_ Tutt is reported for the first time from Korea with one newly recorded species, _Bacotia sakabei_ Seino, 1981. All available information, including the collecting localities, host plants, illustrations of adults and genitalia are presented. A DNA barcode for precise identification of the species is also described.

**Keywords:** _Bacotia_, Psychidae, Lepidoptera, new record, Korea
SYSTEMATIC ACCOUNTS

Order Lepidoptera Linnaeus, 1758
Family Psychidae Boisduval, 1829
Subfamily Psychinae Boisduval, 1840

Genus *Bacotia* Tutt, 1899
(type species: *Fumea sepium* Speyer and Speyer, 1846)

*Bacotia sakabei* Seino, 1981 (Figs. 1–3)
*Bacotia sakabei* Seino, 1981: 121. Type locality: Japan.

Material examined. Korea: 1♀, Daejeon: Dong­gu, Isadong, 36°17′28.30″N, 127°27′5.71″E, 288 m, 24 Sep 2015, Roh SJ; 1♂1♀, Gyeongsangbuk-do: Gimcheon-si, Bongsan-myeon, 36°11′59.39″N, 128°0′2.26″E, 474 m, 24 Oct 2014, Roh SJ, Jeon BS, Kim DS; 1♂, Jeollanam-do: Boseong-gun, Miryeok-myeon, 34°48′52.25″N, 127°7′32.13″E, 150 m, 28 Oct 2015, Roh SJ-coll. SEL/HNU.

Adult. Male (Fig. 1A, B): Wingspan 11.5–12.7 mm. Coloration and vestiture: sclerites on head and thorax reddish-brown. Head clothed with short dark brown hairs; vertex and frons covered with tufted scales. Thoracic notum dark brown. Forewings densely covered with dark brown scales; apical margin of scales usually produced into 2 to 4 weakly rounded lacinations. Hindwings covered with dark brown scales; scales slightly narrower than forewing scales, post-marginal part present with long brown hairs. Structure: head

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Korean name: 가을주머니나방(신칭)

Fig. 1. *Bacotia sakabei*. A, Male; B, Wing venation of male; C, Female; D, Ditto, head and thorax part; E, Larval case. Scale bar: E = 5 mm.

Anim. Syst. Evol. Divers. 33(1), 60-64
relatively small, compound eyes relatively large; interocular index 0.67; ocelli absent; labial palpi short and 1-segmented. Antennae as long as half of forewing, basal flagellomeres 20-segmented with pectination. Forewing relatively narrow; costa straight and slightly curved beyond 4/5; termen straightly arched to posterior margin. Wing venation: Median cell 0.66 times as long as wing, intercalary cell present; Sc terminating at 2/3 costa; R₁ originating at axillary area; R₂, R₃ stalked at 2/3 corner of anterior part of the cell; R₄ + R₅ originating at corner of anterior part of the cell and reaching to the apex; M₁, M₂ originating at intercalary cell; M₂ and M₃ parallel to termen; CuA₁ and CuA₂ closed to posterior margin. Hindwing right-angled triangular shape; costa straight, apex straightly curved; median cell 0.56 times as long as wing; Sc + R₁ straight to 4/5 costa; Rs terminating at apex; M₁ originating at corner of anterior part of the cell; M₂, M₃ arising from distal margin of median cell; CuA₁ stalked at posterior margin of median cell. Legs covered with brown scales, sclerites on femora and tibiae reddish brown but tibiae of hind legs light gray, tarsi and claws reddish brown.

Female (Fig. 1C, D): 6.4 mm in length. Coloration: Head dark brown and shiny on vertex. Meso and metanotum dark brown. Membranous areas of abdomen brown. Abdomen densely covered with yellowish brown scales; corethrogyne light yellow. Structure: head relatively small, directly ventral aspect and surface with rounded dorsal margin. Length of antennae 0.3 mm filiform. Legs well developed, relatively long, tarsi 4-segmented. Corethrogyne tufted hairs yellowish brown.

Male genitalia (Fig. 2A, B). In lateral aspect, dorsum relatively wide, uncus slightly hooked. Saccus slender 0.54 times height of ring. Ampulla club-shaped apically with several hairs, harpe short and slender. Anellus gently curved. In ventral aspect, uncus concave; gnathos absent; apex of tegumen gentle; valva narrow, apical part of valva branched with harpe. Juxta absent; saccus elongated, narrow basally; aedeagus short and thick, 0.4 times the height of the genitalia.

Female genitalia (Fig. 2C). Papillae analis slightly narrow. Apophysis anterioris relatively short. Apophysis posterioris very long and slender, 6.5 times longer than apophysis anterioris.

Larval case (Fig. 1E). 8 mm in length. Attached larvae feed on a few large particles of lichen and bark material (Seino, 1981).

Distribution. Korea (new record), Japan.

Host plant (Fig. 3). Lichen on bark and walls (Seino, 1981; Saigusa and Sugimoto, 2013).

DNA barcode. A COI gene (cytochrome c oxidase subunit I) sequence was extracted and sequenced (Genbank accession No. KY247098).

Remarks. This species reported to be emerged from late October to early December, unlike other species in the genus (Seino, 1981). It is same to the Japanese species such as the time of appearance, biological characteristics and genitalic structure for this species (Seino, 1981).
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REFERENCES

Boisduval JBAD, 1840 (1829). Genera et Index methodicus Europaeorum Lepidopterorum. Roret, Paris, pp. 1-238.

Byun BK, Park KT, Bae YS, Lee BW, 2009. A checklist of the microlepidoptera in Korea (Lepidoptera). Korea National Arboretum, Pocheon, pp. 113-114.

Byun BK, Weon GJ, Lee SG, Lee BY, 1996. A Psychid species, Acanthopsyche nigraplagia Wileman (Lepidoptera, Psychidae) new to Korea. Korean Journal of Applied Entomology, 35:15-17.

Dierl W. 1964. Cytologie, Morphologie und Anatomie der Sackspinner Fumea casta (Pallas) und erassionella (Bruand) sowie Bruandia comitella (Bruand) (Lepidoptera, Psychidae) mit Kreuzungsversuchen zur Klärung der Artspezifitäten. Zoologische Jahrbucher Systematik, 91:201-270.

Hebert PDN, Penton EH, Burns JM, Janzen DH, Hallwachs W, 2004. Ten species in one: DNA barcoding reveals cryptic species in the neotropical skipper butterfly Astraptes fulgerator. Proceedings of the National Academy of Sciences of the United States of America, 101:14812-14817. https://doi.org/10.1073/pnas.0406166101

Katoh K, Toh H, 2008. Recent developments in the MAFFT multiple sequence alignment program. Briefings in Bioinformatics, 9:286-298. https://doi.org/10.1093/bib/bbn013

Linnaeus C. 1758. Systema Naturae. 10th ed. Laurentius Salvius, Stockholm.

Leraut P, 1984. Mise à jour la liste des Psychides de la faune de France (Lep., Psychidae). Entomologica Gallica, 1:65-77.

Meyrick E, 1935. Exotic Microlepidoptera, Vol. 4. E. W. Classey Limited, Middlesex, pp. 577-608.

Park KT, 1983. Psychidae. In: Illustrated flora and fauna of Korea, Insecta IX, Vol. 27 (Eds., Shin YH, Park KT, Nam SH). Ministry of Education, Seoul, pp. 546-549.

Roh SJ, Banasiak G, Byun BK, 2016. A new and an unrecorded species of the family Psychidae (Lepidoptera) from Korea, with an annotated catalogue. Journal of Natural History, 50:669-680. https://doi.org/10.1080/00222933.2015.1082654

Roh SJ, Byun BK, 2016. Discovery of Ceratosticha leptodeta Meyrick (Lepidoptera: Psychidae) from Korea. Journal of...
Asia-Pacific Biodiversity, 9:91-93. https://doi.org/10.1016/j.japb.2015.12.009
Saigusa T, Sugimoto M, 2013. Psychidae. In: The standard of moths in Japan III (Eds., Hirowatari T, Nasu Y, Sakmaki Y, Kishida Y). Gakken Education Publishing, Tokyo, pp. 136-159.
Seino A, 1981. A new psychid species of Bacotia from Japan (Lepidoptera). Tyô to Ga, 31:121-125.
Sobczyk T, 2011. World catalogue of insects. Vol. 10, Psychidae (Lepidoptera). Apollo Books, Stenstrup, pp. 1-467.
Speyer AD, Speyer AU, 1846. Lepidopterologische Beiträge IV [recte V], 2. Zur Naturgeschichte einzelner Arten. Isis [von Oken], 39:19-48.
Tutt JW, 1899. Critical note on the synonymy of Fumea sepium. Entomologist’s Record and Journal of Variation, 11:178-179.
Van Nieukerken EJ, Kaila L, Kitching IJ, Kristensen NP, Lees DC, Minet J, Mitter C, Mutanen M, Regier JC, Simonsen TJ, Wahlberg N, Yen SH, Zahiri R, Adamski D, Baixeras J, Bartsch D, Bengtsson BA, Brown JW, Bucheli SR, Davis DR, De Prins J, De Prins W, Epstein ME, Gentili-Poole P, Gielis C, Hattenschwiler P, Haussmann A, Holloway JD, Kallies A, Karscholt O, Kawahara AY, Koster SJC, Kozlov MV, Lafontaine JD, Lamas G, Landry JF, Lee S, Nuss M, Park KT, Penz C, Rota J, Schitlmeister A, Schmidt BC, Sohn JC, Solis MA, Tarmann GM, Warren AD, Weller S, Yakovlev RV, Zolotuhin VV, Zwick A, 2011. Order Lepidoptera Linnaeus, 1758. In: Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness (Ed., Zhang ZQ). Zootaxa, 3148:212-221.

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