

Two Newly Recorded Species of the Notodontidae (Lepidoptera) from Korea

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ABSTRACT

This paper reports two newly recorded species of Notodontid moths, *Nephodonta tsushimensis* Sugi and *Hiradonta ohashii* Nakatomi in Korea. Among them, *Nephodonta tsushimensis* can be distinguished by the broad central fascia with yellowish-white ante- and postmedial lines of the forewing, grayish hindwing with a paler basal part and dark medial and termen, and the stout, bifurcated uncus, the short, thumb-shaped socii, and a long, strongly sclerotized valva, where long sclerotized costa and a round swelling medial process can be found, and an almost straight, long aedeagus with a thin coecum and dense minute spicules on the vesica. *Hiradonta ohashii* can be distinguished by the dark brownish forewing with strongly dentate costal part of the postmedial line and grayish apex, and light brown hindwing with a dark basal part and transverse medial line and dark grayish termen, as well as by the slender socii and the medial process of valva, and the long slender distal process of the aedeagus. Thus far, 108 species of Notodontidae moths are known in Korea.

Keywords: Notodontidae, Korea, Lepidoptera, new record, *Nephodonta*, *Hiradonta*

INTRODUCTION

The family Notodontidae is a cosmopolitan moths with more than 2,800 described species worldwide (Miller and Brower, 2010). In Korea, Kim et al. (2016) listed 105 species in 59 genera, and Choi et al. (2020) added one species of *Neodrymonia*, giving a total of 106 species of Notodontidae in Korea.

The genus *Nephodonta* Sugi, 1980, is an East Asian genus with three known species, which is distributed from northern Vietnam to Japan (Schintlmeister, 2008). The moths of the genus show the sexual dimorphism in the antennae, bipectinate in males and filiform in females, grayish wing color, medial lines on the forewing marked by brown spots, and a robust uncus, a pair of massive socii, and broad valva of male genitalia (Schintlmeister, 2008).

The genus *Hiradonta* Matsumura, 1924 is also an East Asian genus with five known species from China, Korea, and Japan. The moths of the genus show the sexual dimorphism in the antennae, shortly bipectinate in males and filiform in females, blackish-brown forewing with paler brown apical patches, brown dorsal areas and tooth scale at the dorsum, as well as a

robust uncus, a pair of socii, and a costal projection of the valva of the male genitalia (Schintlmeister, 2008). The aim of this paper is to report two species of Notodontidae for the first time from Korea, *Nephodonta tsushimensis* Sugi, and *Hiradonta ohashii* Nakatomi.

Material studied in this study was collected at night using a UV-light bucket trap (BioQuip, USA). For slide preparation of the male and female genitalia, each specimen was prepared by boiling the abdomen in 10% KOH for approximately 20 min. The scales and tissues were then removed. The remaining sclerotized structure was stained with Chlorazol black and mounted on slides in a Euparal solution.

The terminology of the adult characteristics, including female genitalia, follows Miller and Brower (2010). The following abbreviations are used: TL, type locality; GG, Gyeonggi-do, and JJ, Jeju-do.

SYSTEMATIC ACCOUNTS

Order Lepidoptera Linnaeus, 1758

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Fig. 1. Adults of *Nephodonta tsushimensis* (A) and *Hiradonta ohashii* (B). Scale bars: A, B = 10 mm.

Family Notodontidae Stephens, 1829
 Subfamily Notodontinae Stephens, 1829
 Genus *Nephodonta* Sugi, 1980

¹**Nephodonta tsushimensis* Sugi, 1980 (Figs. 1A, 2A–C)
Nephodonta tsushimensis Sugi, 1980: 179. TL: Japan.

Material examined. 1 male, Korea: GG: Yangpyung, Danweol-myon, Bisol Gogae (Hill), 12 Apr 2012, Na SH.

Diagnosis. Wingspan 42 mm. Antennae bipectinate with long pectinations; frons with dense long blackish hairs; labial palpi moderate in length, approximately the length of the eye diameter, porrect, projected beyond the frons, 3rd segment short. Body covered with long brown long hairs. Legs dark brown with yellowish-white dots on the tibia. Forewing dark brownish in ground color; basally mixed with dark brown and ochreous scales; central fascia broad, pale brownish; antemedial and postmedial lines yellowish-white, undulating; subtermen dark brown band narrowed from the costa toward the dorsum; termen light ochreous. Hindwing grayish; basally paler, medial and termen darker. Male genitalia (Fig. 2). Uncus stout, bifurcated; socius short, thumb-shaped; tegumen large, broad, triangular; saccus short, broad. Valva long, strongly sclerotized; costa strongly sclerotized, medially curved with the round swelling process, distally pointed with an oblique end; sacculus sclerotized, medially convex and thick; harpe membranous. Aedeagus almost straight, long; coecum thin, slightly longer than 1/2 length of aedeagus, one large speculate process in the proximal part; vesica densely covered with minute spicules; cornutus absent.

Distribution. Korea (new record), Japan.

Remarks. The newly recorded species, *Nephodonta tsushimensis* in Korea was first found in an intermediate location

between Tsushima island, Japan and Shaanxi, China (Schintlmeister, 2008). The male genitalia are indistinguishable from those from Japan. On the other hand, the moth fly on April in Korea, which is one month later than in Japan. This newly recorded species can be distinguished by the broad central fascia with yellowish-white ante- and postmedial lines of the forewing and the stout, bifurcated uncus, the short, thumb-shaped socii and long, strongly sclerotized valva where long sclerotized costa and round swelling medial process, and an almost straight, long aedeagus with thin coecum and dense minute spicules on vesica. The genus *Nephodonta* is first known in Korea.

Subfamily Ptilodoninae Packard, 1864
 Genus *Hiradonta* Matsumura, 1934

²**Hiradonta ohashii* Nakatomi, 2000 (Figs. 1B, 2D, E)
Hiradonta ohashii Nakatomi, 2000: 2. TL: [Japan] Okinawa.

Material examined. Korea: JJ: 3 males, Seogwipo, Namwon-eup, Wyimi, 18 Jun 2017, Jeon JA; 1 male, Jeju, Hanyang-myeon, Jeoji-ri, 12 Oct 2018, Kim SS.

Diagnosis. Wingspan 38–40 mm. Male antennae bipectinate with long pectinations; frons broad, brownish; labial palpi short, approximately eye diameter, barely projected beyond the frons. Body covered with brownish hairs. Forewing dark brownish in ground color; basally dark brown; antemedial line strongly dentate, medially inwardly strongly bent and blackish; postmedial line strongly dentate, medially projected; discal dot dark brown, short, line-shaped. Hindwing light brown; basally darker; medial line transverse, dark brown; termen dark grayish. Abdomen dark brown. Eighth abdominal tergite posteriorly U-shaped sclerotized projection. Male geni-

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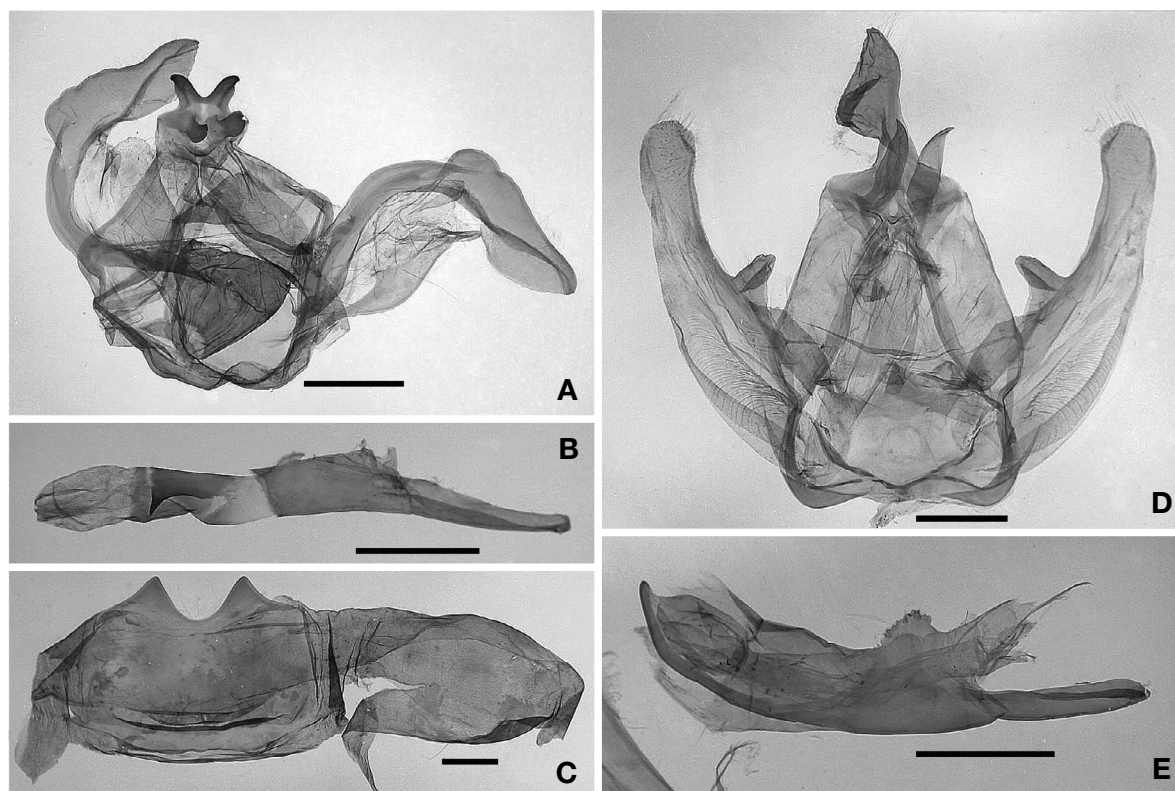


Fig. 2. Male abdomen and genitalia. A–C, *Nephodonta tsushimensis*; D, E, *Hiradonta ohashii*; A, D, Genital capsule; B, E, Aedeagus; C, Male abdomen. Scale bars: A–E = 5 mm.

talía (Fig. 2). Uncus large, spatulate; socius long, plate-shaped with a sharply pointed apex; tegumen large, broad, triangular; saccus short, broad. Valva long, strongly sclerotized; costa strongly sclerotized, medially with a large triangular process, distally rounded end; sacculus ventrally long, slender, sclerotized, centrally swollen with rounded line-shaped parallel lines; harpe membranous. Aedeagus long; coecum thin, slightly longer than the 1/2 length of the aedeagus, one long curved process in the proximal part; cornutus absent.

Distribution. Korea (new record), Japan.

Remarks. This a newly recorded species, *Hiradonta ohashii* is externally similar to *H. takaonis* Matsumura, but can be distinguished by the strongly dentate costal part of the postmedial line and grayish apex of the forewing. The male genitalia of *H. ohashii* can be distinguished from those of *H. takaonis* by the slender socii and the medial process of the valva, and the long slender distal process of the aedeagus. Unlike the southern population in Japan, the Korean population has two generations in June and October. The larvae feed on *Celtis* (Ulmaceae) in Japan (Nakatomi, 2000). There are two species of *Hiradonta* in Korea: *H. takaonis* Matsumura (1924) and *H. ohashii* Nakatomi (2000).

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CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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REFERENCES

- Choi SW, Kim SS, Jeon JA, 2020. A new record of Notodontidae moth, *Neodrymonia marginalis* in Korea. *Animal Systematics, Evolution and Diversity*, 36:164-166. <https://doi.org/10.5635/ASED.2020.36.2.012>
- Kim SS, Choi SW, Kononenko V, Schintlmeister A, Sohn JC, 2016. Revised list of the Korean Noctuoidea based on latest classification. *Entomological Research Bulletin*, 32:138-160.
- Miller JS, Brower AVZ, 2010. Notodontidae Stephens 1829. Version 21 June 2010 [Internet]. Tree of Life Web Project, Accessed 11 Feb 2020, <<http://tolweb.org/Notodontidae/12163/2010.06.21>>.
- Nakatomi M, 2000. A new species of *Hiradonta* (Notodontidae) from southeast islands of Japan with notes on immature stage of two *Hiradonta* species. *Gekkan-Mushi*, 349:2-9.
- Schintlmeister A, 2008. Palearctic Macrolepidoptera. Vol. 1. Notodontidae. Apollo Books, Stenstrup, pp. 1-482.
- Sugi S, 1980. New genera and new species of Notodontidae, with synonymic notes: Lepidoptera. *Tyo to Ga*, 30:179-187. https://doi.org/10.18984/lepid.30.3-4_179

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