

## Two Species of Thyatirinae (Lepidoptera, Drepanidae), New to Korea

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### ABSTRACT

Two species of the Drepanidae are newly recorded from Korea. *Habrosyne indica formosana* Werny, 1966 and *Neodaruma tamanukii* Matsumura, 1933. *Habrosyne indica formosana* can be distinguished by the blackish forewing with a large inverse triangular medial band and the whitish pink subtermen running from the apex to tornus, and the blackish hindwing. *Neodaruma tamanukii* can be distinguished by the dark grayish forewing with a pair of parallel undulating, blackish antemedial and postmedial lines and a large, renal-shaped discal dot, and a pale grayish undulating subterminal line of the forewing, and the whitish hindwing with a darkly colored postmedial line and subtermen. We provide the diagnosis and figures of adult and genitalia.

**Keywords:** Drepanidae, Thyatirinae, *Habrosyne*, *Neodaruma*, new record, Korea

### INTRODUCTION

The subfamily Thyatirinae is medium-sized noctuid-like, drepanid moths and comprises about 300 species worldwide (Minet and Scoble, 1999; László et al., 2007). Adults of Thyatirinae show the lamellate antennae in both sexes, the narrow forewing with complex wing pattern elements, the unicolorous hindwing, being paler than the forewing without a remarkable pattern, a slender abdomen, and the tympanal organs on A1 where three interconnected chambers associated with spiracular air sac and the tergo-sternal sclerite running from dorsum A1 to sternum A2 (László et al., 2007). The genitalia of the subfamily are characterized by the well-developed uncus-socii complex, the lacking gnathos, the simple valva of the male genitalia, and the very short ductus bursae with the ductus seminalis arising near the ostium bursae of the female genitalia (László et al., 2007). The larvae are characterized by their fully developed crochet-bearing anal prolegs (Minet and Scoble, 1999; László et al., 2007). The monophyly of the subfamily is defined, but the tribal relationship is largely unresolved (Minet and Scoble, 1999).

In Korea, about 30 species in 17 genera of the Thyatirinae are recorded, up to now (Kim et al., 2006; Choi, 2007). The purpose of the present study is to report two species of Thy-

atirinae collected from the southern part of South Korea for the first time in Korea.

### MATERIALS AND METHODS

Adult moths were collected at night using a 22-watt circline UV-light bucket trap (BioQuip, USA). All collected adults were mounted for examination and were identified based on the external morphology including the genitalia. The terminology of the adult characteristics, including the male and female genitalia, refers to László et al. (2007). All materials have been deposited in the Insect Collection, Department of Environmental Education, Mokpo National University, South Korea, and at the National Institute of Biological Research, Incheon, South Korea. Abbreviations are as follows: TL, type locality; TS, type species; GW, Gangwon-do; JJ, Jeju-do and JN, Jeollanam-do.

### SYSTEMATIC ACCOUNTS

Order Lepidoptera Linnaeus, 1758

Family Drepanidae Meyrick, 1895

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**Fig. 1.** Adult of *Habrosyne indica formosana* (A) and *Neodaruma tamanukii* (B) in Korea. Scale bars: A, B=20 mm.

Subfamily Thyatirinae Werny, 1966

Genus *Habrosyne* Hübner, 1816

Type species: *Phalaena (Noctua) derasa* Linnaeus, 1767

= *Gonophora* Bruand, 1845 (TS: *Phalaena (Noctua) derasa* Linnaeus, 1767)

= *Cymatochrocis* Houlbert, 1921 (TS: *Gonophora dieckmanni* Graeser, 1888)

= *Hannya* Matsumura, 1927 (TS: *Thyatira violacea* Fixsen, 1887)

= *Miothyatira* Matsumura, 1933 (TS: *Gonophora aurorina* Butler, 1881)

= *Habrosynula* Bryk, 1943 (TS: *Habrosyne argenteipuncta* Hampson, [1893])

<sup>1</sup>\**Habrosyne indica formosana* Werny, 1966

(Figs. 1A, 2A–C)

*Gonophora indica* Moore, 1867: 44. TL: India, Bengal.

*Habrosyne indica formosana* Werny, 1966: 281. TL: Taiwan, Rantaizan.

**Material examined.** 1 male, Korea: JJ: Jeju-si, Haeandong, Mt. Hallasan, 33°23'31.6"N, 126°29'13"E, 954 m, 4 Sep 2020, Choi SW; 1 male, JN: Wango-gun, Wando-eup, Jeongdo-ri, 34°17'52", 126°42'47"E, 26 m, 12 May 2021.

**Diagnosis.** Wingspan 38 (male)–46 (female) mm. *Habrosyne indica formosana* can be distinguished by the filiform antennae, the long, well-projected labial palpi beyond the frons, the densely covered, long grayish hairs on the body, the light grayish legs with grayish hairs on the femur, the blackish forewing with a large inverse triangular medial band that is bordered with a whitish, strongly slanted antemedial line and the medially strongly undulating dark brownish postmedial line and the whitish pink subtermen running from the apex to tornus, and the blackish hindwing. *Habrosyne indica formo-*

*sana* is externally very similar to *H. pyritoides* Hufnagel but can be distinguished by the slender, strongly slanted whitish antemedial line of the forewing. The male genitalia are characterized by the long basally tapering uncus, a pair of thin socii, 1/5 shorter than the length of the uncus, the broad, trapezoidal fultura inferior (= juxta) with pointed vertex at both upper ends, the broad, distally broader valva with several horizontal plicate walls, and the rod-shaped aedeagus with a pair of long band-shaped sclerotized plates and a patch of short spicules on the vesica. The male genitalia of *Habrosyne indica formosana* are similar to those of *H. pyritoides* but can be distinguished by the shape of fultura inferior. The female genitalia are characterized by the long, strongly sclerotized ostial complex (the ostium bursae and the dilated posterior part of the tubular section of ductus bursae), and the large ovate corpus bursae with a long, slender pouch-shaped signum with minute spicules. The female genitalia of *Habrosyne indica formosana* are similar to those of *H. pyritoides* but can be distinguished by the long, strongly sclerotized ostial complex.

**Distribution.** Korea, Japan, and Taiwan.

**Remarks.** The genus *Habrosyne* comprises 16 species, widely distributed in the Holarctic and Oriental regions, and is characterized by the common sclerotized and trapezoidal plate on the top of the tegumen where the slender, long, stick-like uncus and a pair of finer, thinner, shorter socii are present, and the slightly curved ventral hook on the carina of the aedeagus with a large dense cornuti field consisting of pin-like spinules (László et al., 2007). In Korea, six species of *Habrosyne* are recorded, including *H. indica formosana*.

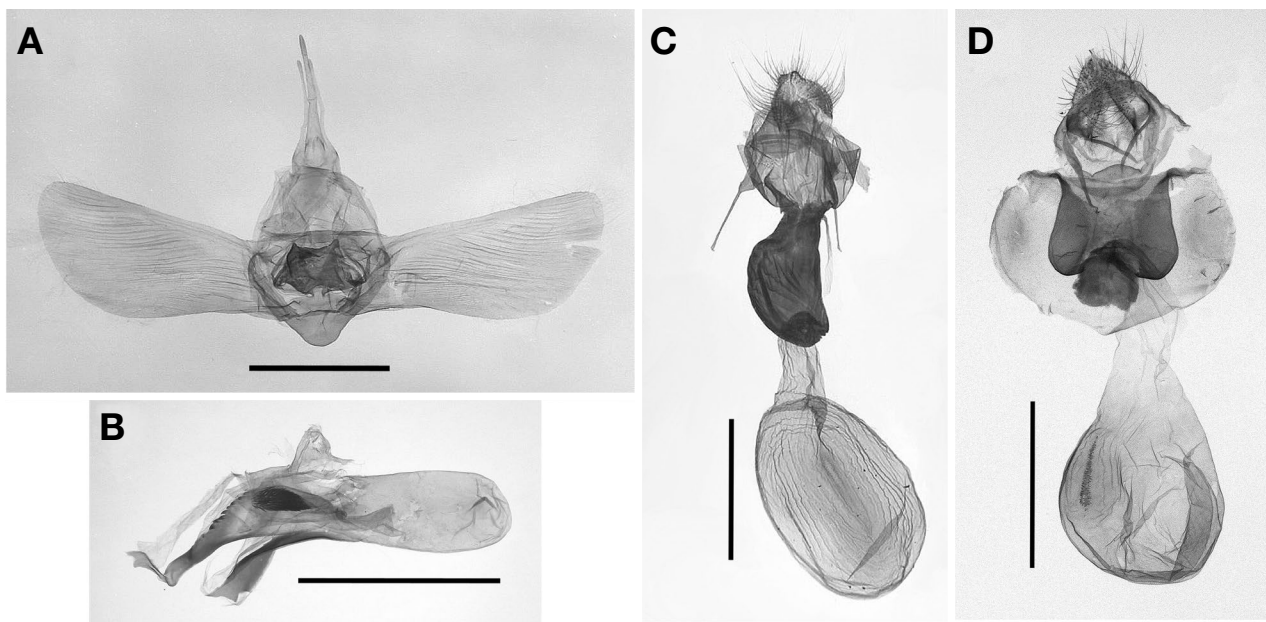
Subfamily Polyplocinae Werny, 1966

Tribe Polyplocini Werny, 1966

Genus *Neodaruma* Matsumura, 1933

Type species: *Neodaruma tamanukii* Matsumura, 1933

Korean name: <sup>1</sup>\*긴흰줄뿔족날개나방 (신칭)



**Fig. 2.** Male and female genitalia of two species of the Thyatirinae in Korea. A–C, *Habrosyne indica formosana*; D, *Neodaruma tamanukii*. Scale bars: A–D=2 mm.

**<sup>1</sup>\**Neodaruma tamanukii* Matsumura, 1933**

(Figs. 1B, 2D)

*Neodaruma tamanukii* Matsumura, 1933: 194, Pl. 4: 1, 23.  
TL: Russia, Sakhalin, Konuma.

**Material examined.** Korea: 1 female, GW: Inje-gun, Girin-myon, Bangdong-ri, 17 Apr 2012, Kim SS.

**Diagnosis.** Wingspan 41 mm. *Neodaruma tamanukii* can be distinguished by the silvery white long hairs on the head and body, the dark grayish forewing with broad central fascia that show a pair of parallel undulating, blackish antemedial and postmedial lines, and a large, renal-shaped discal dot, and a pale grayish undulating subterminal line, and the whitish hindwing with a darkly colored postmedial line and subtermen. *Neodaruma tamanukii* is externally similar to *Shinploca shini* but can be distinguished by the parallel and transverse blackish postmedial line and the renal discal dot that is close to the postmedial line of the forewing and the light blackish postmedial line of the hindwing. The female genitalia can be distinguished by the pair of large, pouch-shaped sclerotized lateral processes and one large rounded process of the ostium, and the large ovate corpus bursae with a long slender signa patch with minute spicules. The female genitalia of *N. tamanukii* are similar to those of *S. shini* but can be distinguished by the large sclerotized lateral processes of the ostium, and the relatively broad ductus bur-

sae.

**Distribution.** Korea, Japan, and Russia (Sakhalin, Primor-ye, Transbaikalia).

**Remarks.** The genus *Neodaruma* is monotypic, distributed in East Asia, and is similar to its sister genera such as *Achlya* Billberg (1820) and *Shinploca* Kim (1995) in external morphology and genitalia (László et al., 2007). The monophyly and sister relationship among the *Acyla* generic complex are needed. *Neodaruma tamanukii* is univoltine, flying in early Spring from the end of April to the end of May (László et al., 2007).

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**CONFLICT OF INTEREST**

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

Korean name: <sup>1</sup>\*새이른뿔뿔족날개나방 (신칭)

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## REFERENCES

- Billberg GJ, 1820. Eumerattio insectorum in Museon. Typis Gadelianis, Stockhom, p. 87.
- Choi SW, 2007. First record of a thyatirine species, *Achlya kuramana* (Matsumura) (Lepidoptera: Drepanidae; Thyatirinae), from Korea. *Entomological Research*, 37:111-113. <https://doi.org/10.1111/j.1748-5967.2007.00065.x>
- Kim MY, Lee HK, Ronkay L, Park KT, 2006. A review of the Korean Thyatiridae (Lepidoptera), including the Mt. Changbai-shan. *Journal of Asia-Pacific Entomology*, 9:203-221. [https://doi.org/10.1016/S1226-8615\(08\)60293-9](https://doi.org/10.1016/S1226-8615(08)60293-9)
- Kim SS, 1995. Description of a new genus and a new species of Thyatiridae (Lepidoptera) from Korea. *Transactions of the Lepidopterological Society of Japan*, 46:23-25. [https://doi.org/10.18984/lepid.46.1\\_23](https://doi.org/10.18984/lepid.46.1_23)
- László GM, Ronkay G, Ronkay L, Witt T, 2007. The Thyatiridae of Eurasia, including the Sundaland and New Guinea (Lepidoptera). *Esperiana*, 13:122-137.
- Matsumura S, 1933. New species of Cymatophoridae of Japan and Formosa. *Insecta Matsumurana*, 7:190-201.
- Minet J, Scoble MJ, 1999. The drepanoid/geometroid assemblage. In: *Lepidoptera, moths and butterflies*. Vol. 1. Evolution, systematics, and biogeography (Ed., Kristensen NP). de Gruyter, Berlin, pp. 301-320.
- Moore F, 1867. On the Lepidopterous insects of Bengal. *Proceedings of the Zoological Society of London*, 33:755-823. <https://doi.org/10.1111/j.1469-7998.1865.tb02432.x>
- Werny KJ, 1966. Untersuchungen über die Systematik der Tribus Thyatirini, Macrothyatirini, Habrosynini und Tetheini (Lepidoptera: Thyatiridae). Inaugural-Dissertation zur Erlangung des akademischen Grades eines Doktors der Naturwissenschaften der Mathematisch-Naturwissenschaftlichen Fakultät der Universität des Saarlandes. PhD dissertation, Universität des Saarlandes, Saarbrücken, Germany, pp. 1-463.

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