



Two new species of *Enarmoniini* (Lepidoptera: Tortricidae) from eastern Thailand

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Abstract

Two new species of the tribe *Enarmoniini* (Tortricidae) are described from the Chanthaburi and Trat provinces of eastern Thailand: *Helictophanes flava* Muadsub and Pinkaew, **n. sp.**, and *Cyphophanes khitchakutensis* Muadsub and Pinkaew, **n. sp.** Illustrations of adults and genitalia are provided.

Key words: *Cyphophanes*, *Helictophanes*, *Enarmoniini*, Khao Khitchakut National Park, Olethreutinae, Trat Agroforestry Research and Training Station

Introduction

Although the tortricid fauna of Thailand remains poorly known, considerable progress has been made over the last decade (Pinkaew 2007, 2008, 2011, Pinkaew *et al.* 2005, Pinkaew & Zhang 2012, Jaikla *et al.* 2013). The two new species reported in this paper are the result of surveys of olethreutine moths in eastern Thailand during 2011–2012.

Materials and Methods

This study is based on specimens deposited in the Kasetsart Kamphaengsaen Insect Collection (KKIC). Specimens were examined and measured using an Olympus SZ40 stereomicroscope with an ocular micrometer. Forewing length was measured from the outer edge of the tegula at the wing base to the outermost edge of the fringe scales at the apex. Microtrichia, cornuti, and other characters of the genitalia were examined using a Leica DM750 compound microscope. Terminology for forewing pattern and genitalia follows Horak (1991, 2006). Methods of genitalia dissection were adapted from Common (1990). Adults were photographed with a Canon DSLR 5D mark II and 100 mm macro lens. Genitalia were photographed with a Leica DM750 compound microscope with an ICC50 HD camera module, and the photographs were refined using Helicon Focus 5.1 and Photoshop CS3. Holotypes of the two new species are deposited in the Natural History Museum, London (BMNH), and paratypes are deposited in Kasetsart Kamphaengsaen Insect Collection (KKIC) and the Thailand Natural History Museum (TNHM).

Results

Helictophanes Meyrick, 1881

Helictophanes Meyrick, 1881 was proposed with *H. uberana* Meyrick as the type species. As currently defined

(Horak 2006), the genus includes five species: *H. uberana* Meyrick from Australia, *H. prospera* (Meyrick) from India, *H. scambodes* (Meyrick) from Australia, *H. myriolychna* (Turner) from Australia, and *H. flava* Muadsub and Pinkaew, n. sp., from Thailand, described below. Reported food plants for the genus include *Alyxia ruscifolia* R. Br. (Apocynaceae) for *H. uberana*; *Hearnia sapindina* F. Muell. (Meliaceae) for *H. myriolychna*; and *Omphalea queenslandiae* F. M. Bailey (Euphorbiaceae) for *H. prospera* (Horak 2006).

Horak (2006) characterized *Helictophanes* by the triangular to subrectangular forewing with the costa angled at 3/4 before the apex to evenly curved, and modified male hindwings with a ribbon-shaped process from the base of the anal area. The venation is characterized by a weak basal part of R_4 and a strongly oblique distal margin of the discal cell. The male genitalia have a swollen cucullus and sinuate or long sclerites ventrally. In the female genitalia the signa are represented by two large, curved blades tapering to sharp points.

***Helictophanes flava* Muadsub and Pinkaew, n. sp.**

(Figs. 1A–B, 2A, 2C, 3A, 4A)

Diagnosis. This species is characterized by the following features: forewing yellow with a dark triangular dorsal mark and an irregular, curved band from the middle of the costa to the termen; hindwing veins M_3 and CuA_1 long stalked; male hindwing with a long ribbon-shaped anal lobe nearly reaching the anal angle; and short, nearly straight labial palpi with a small, very short terminal segment. The male genitalia are characterized by a narrow apex of the tegumen with dense scale sockets laterally; and by a valva with a distinct, curved neck and an elongate elliptical cucullus with a very short apical spine. The female genitalia are characterized by a ring-shaped sterigma, incomplete posteriorly; a very short ductus bursae; and a corpus bursae with two large triangular, bladelike signa with elongate hollow bases and a sclerotized plate posteriorly. *H. flava*, n.sp. differs from previously described species of *Helictophanes* by the presence of a sclerite on the posterior area of corpus bursae.

Description. Head. Ocellus large, vertex covered with golden yellow scales, upper frons golden yellow, with pale yellow, appressed scales on lower frons; labial palpus rather short (1.5X diameter of eye) (Fig. 2A), porrect, yellow, with brown to dark brown scales dorsobasally on second segment, first segment short, second segment long and nearly straight, gradually widening toward apex, terminal segment short, apex acute, pointing downward; antenna to beyond middle of forewing, golden yellow.

Thorax. Smooth, without raised scale tuft posteriorly, light brown; legs unmodified. Forewings subrectangular, length 2.9–3.0 mm in male ($n = 2$) (Fig. 1A) 3.8–3.9 mm in female ($n = 2$) (Fig. 1B); without costal fold in male, costa curved near base and before apex, apex rounded, termen oblique and nearly straight; forewing venation with all R veins separate, R_5 reaching to termen below apex, M_3 and CuA_1 parallel and very close in basal half (Fig. 2C); ground color pale yellow, with six dark brown spots along costa, three basally and the other three distally, and a long narrow dark brown band medially, curved and extending from costa to termen at M_1 , brown to dark brown; dorsum with large, triangular brown mark medially, edged with dark brown scales; underside pale brown, speckled paler reflecting wing pattern. Hindwing narrow, apex pointed, with long ribbon-shaped anal lobe in male, nearly reaching anal angle; wing venation with M_3 and CuA_1 connate to long-stalked, without trace of CuP , 3A extending along basal half of anal margin, half as long as 1A+2A (Fig. 2C); upper side translucent, brown, paler towards base; underside pale brown.

Abdomen. Male genitalia (Fig. 3A). Tegumen moderately high, weakly sclerotized, dorsolaterally with narrow lobe with dense sockets; socius elongate membranous, sparsely covered with hairs; gnathos represented by a weak sclerotized band, arising from dorsal 1/3 of tegumen; vinculum small; valva moderately sclerotized, with large basal excavation, costa curved; sacculus large, subrectangular, with moderately dense long setae apicoventrally; with deep ventral excavation; cucullus long, slender, elliptic to band-shaped, slightly widening beyond neck, rounded apically with small, single dorsoapical spine; juxta small; caulis rather long; phallus cylindrical, straight, moderately long and wide, slightly tapering to apex; with numerous lanceolate cornuti, nearly as long as phallus. Female genitalia (Fig. 4A). Papillae anales with dense setae. Tergum VIII smooth except for lateral triangular extensions with sparse scale sockets; sternum VII weakly sclerotized, moderately scaled, sterigma beyond posterior margin of sternum VII, subcircular ridge, wider laterally, with dense microtrichia around ostium; colliculum small, irregular ring, moderately sclerotized; ductus bursae short and wide, ductus seminalis arising from lobe near bursae neck with elongate and sinuate sclerite on posterior area end of corpus bursae; corpus bursae subovate with two large, unequal signa: triangular blades with long hollow bases.

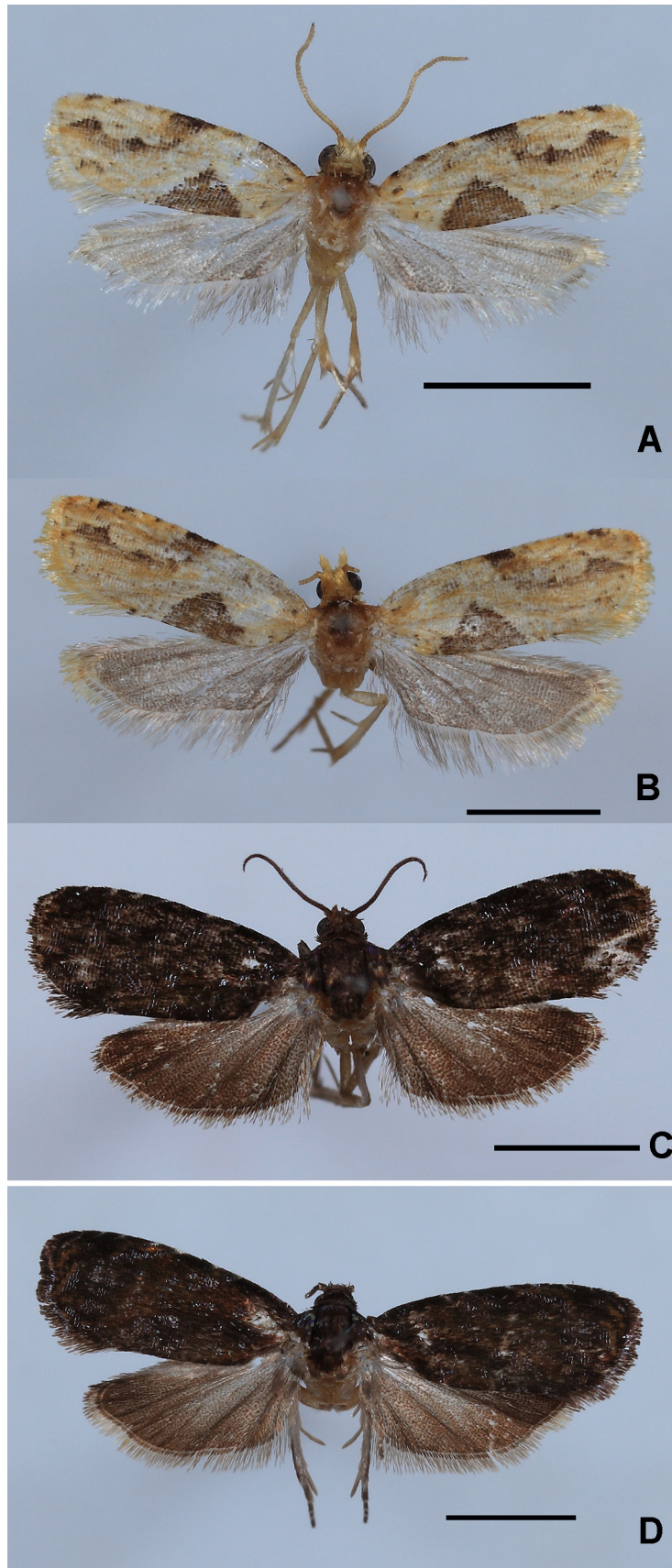


FIGURE 1. Adults of *Helictophanes* and *Cyphophanes*. A. *Helictophanes flava*, **n. sp.** (holotype male). B. *H. flava*, **n. sp.** (paratype female). C. *Cyphophanes khitchakutensis*, **n. sp.** (holotype male). D. *C. khitchakutensis*, **n. sp.** (paratype female) (scale bar=2 mm).

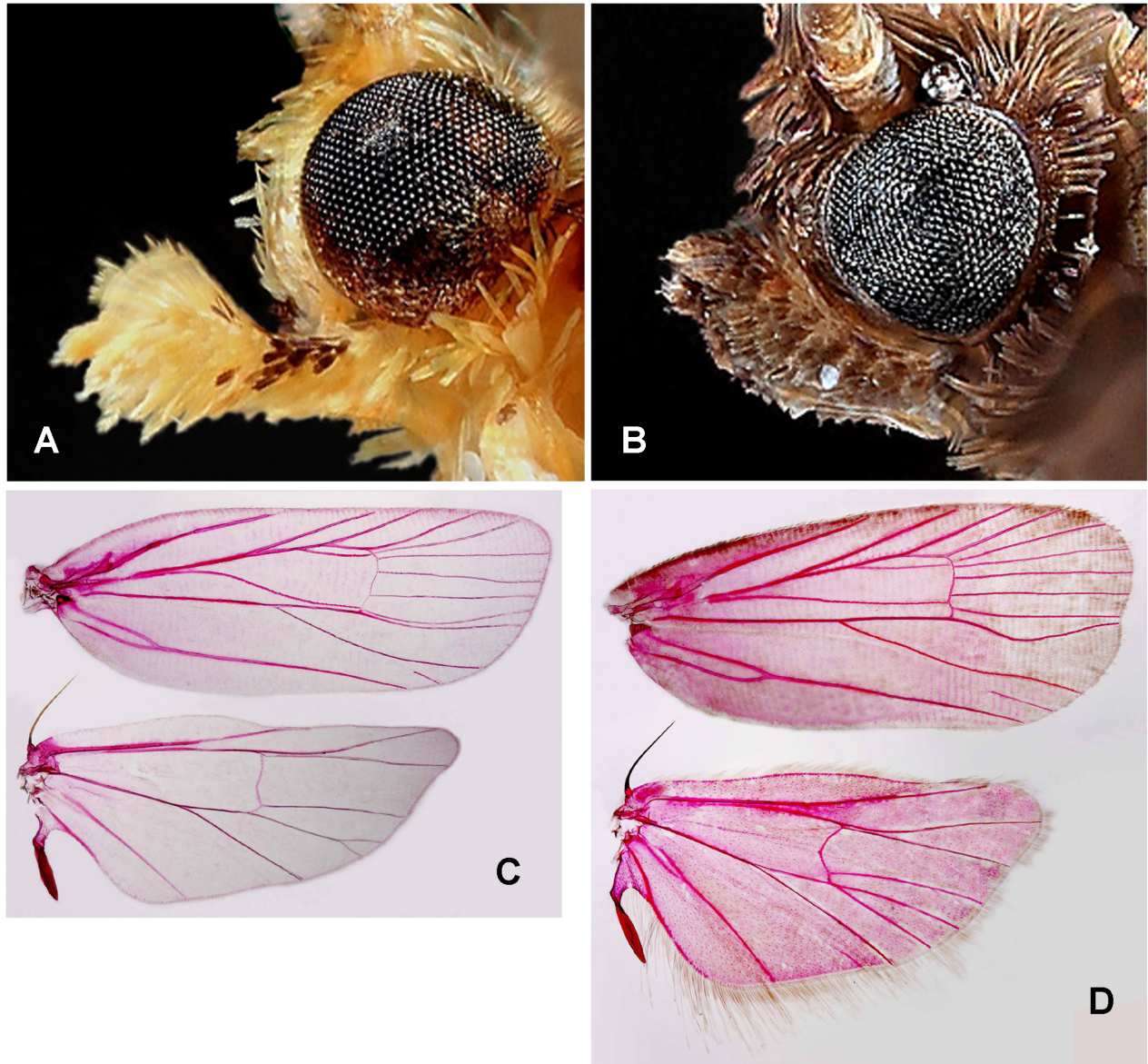


FIGURE 2. Labial palpi and wing venation. A-B. Labial palpi; A. *Helictophanes flava*, n. sp. B. *Cyphophanes khitchakutensis*, n. sp. C-D. Wing venation; C. *H. flava*, n. sp. D. *C. khitchakutensis*, n. sp.

Holotype ♂. Thailand: Trat Prov.: Trat Agroforestry R.St., 12°23'43"N 102°40'32"E, ca. 30 m, 12 Oct 2012, N. Pinkaew, np5396 (genitalia slide NP2016). Deposited in BMNH.

Paratypes. Thailand: Trat Prov.: Trat Agroforestry R.St., 12°23'43"N 102°40'32"E, ca. 30 m, 12 Oct 2012, N. Pinkaew (1♂, genitalia slide NP2014, 2♀, genitalia slide NP2012, NP2017). Deposited in KKIC and THNM.

Etymology. The specific epithet *flava* (latin = yellow) refers to the ground color of forewing.

Distribution. Thailand (Trat).

Cyphophanes Meyrick, 1937

Cyphophanes Meyrick, 1937 was proposed with *C. dyscheranta* Meyrick, 1937 as its type species. Four species are known: *C. dyscheranta* Meyrick from Indonesia, *C. dryocoma* (Meyrick) from India, *C. gracilivalva* (Horak) from Australia, and *khitchakutensis* Muadsub and Pinkaew, n. sp., from Thailand, described below. The only reported food plant for the genus is *Murraya* sp. (Rutaceae) for *C. dyscheranta* (Meyrick 1937).

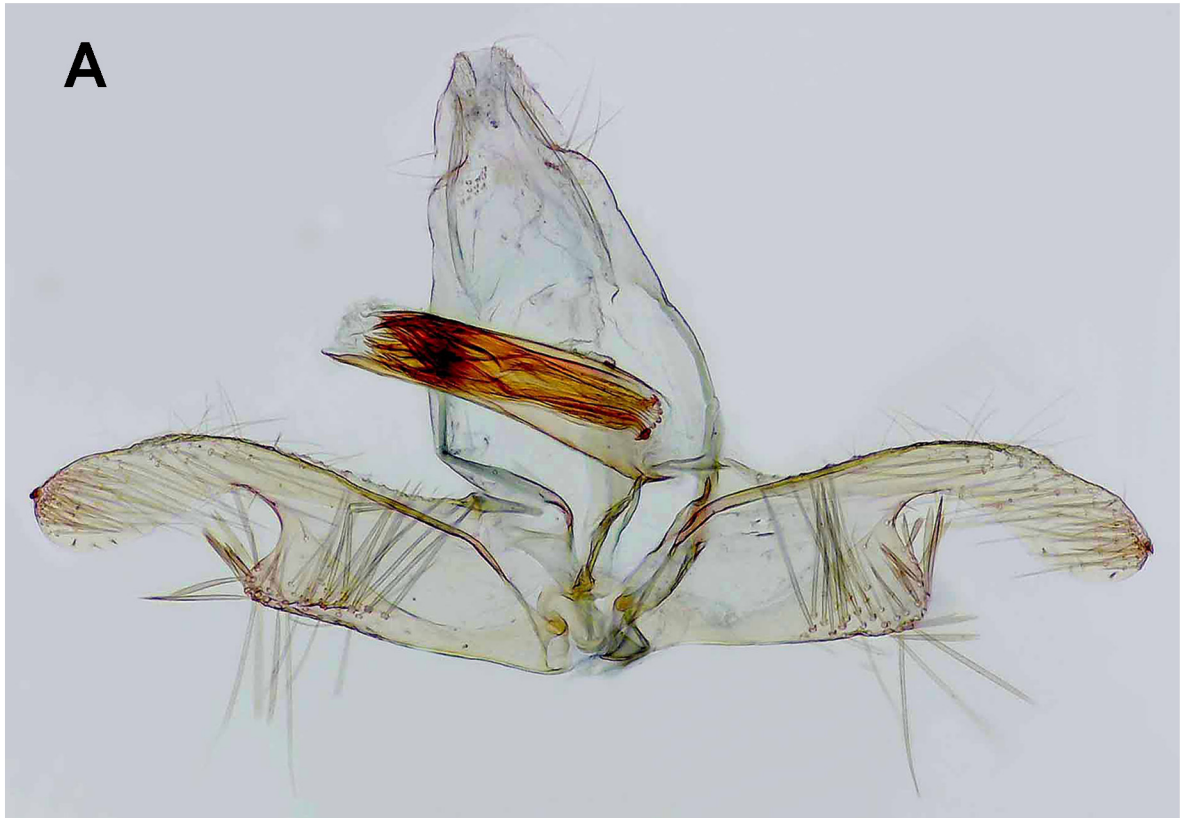


FIGURE 3. Male genitalia. A. *Helictophanes flava*, **n. sp.** (holotype male). B. *Cyphophanes khitchakutensis*, **n. sp.** (holotype male).

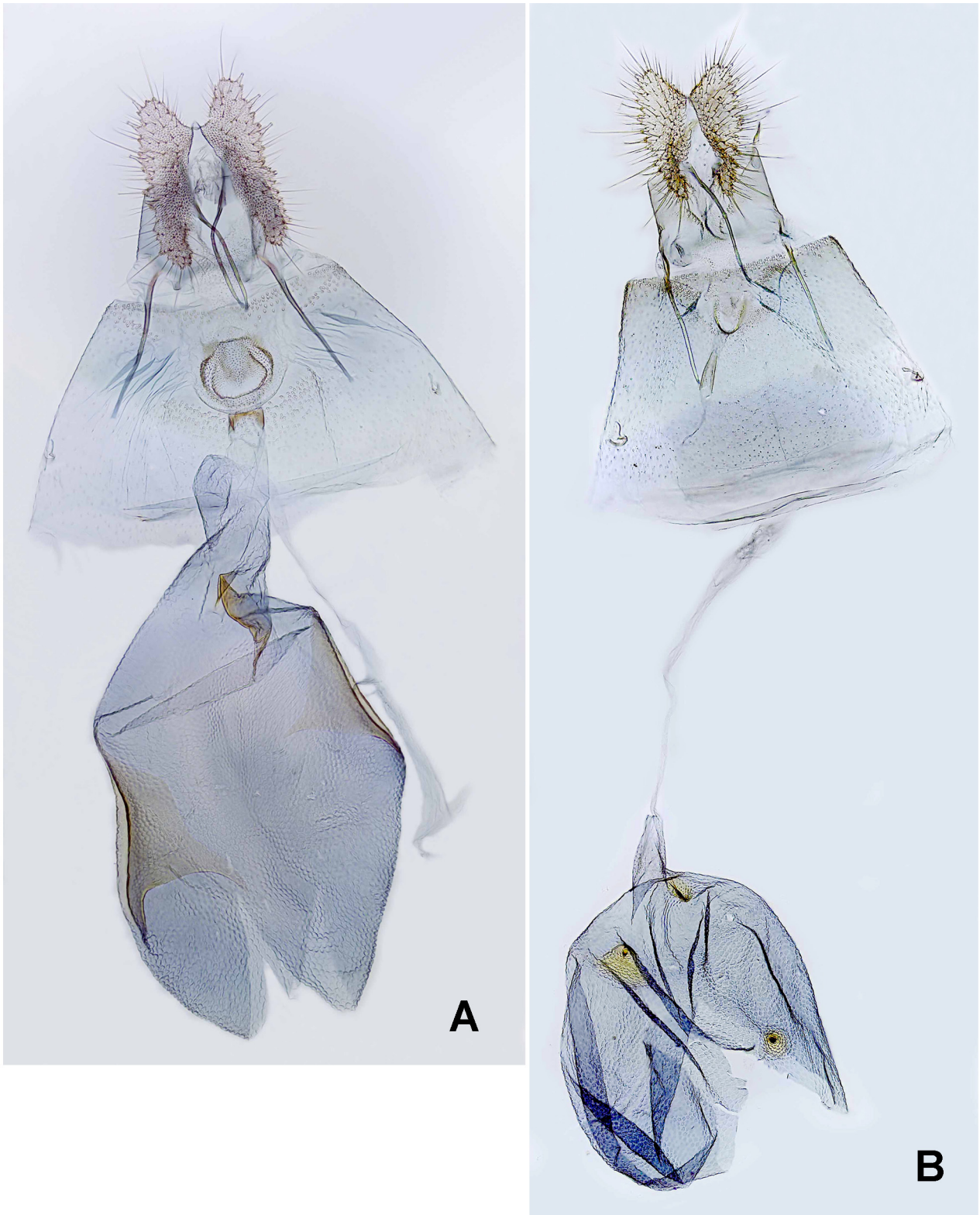


FIGURE 4. Female genitalia. A. *Helictophanes flava*, n. sp. (paratype female). B. *Cyphophanes khitchakutensis*, n. sp. (paratype female).

Horak (2006) characterized *Cyphophanes* by the subrectangular forewing with a rounded apex, and metallic blue scales with little pattern on a blackish brown ground color. Males of most species have a long, ribbon-shaped process from the base of the anal area of hindwing as in *Helictophanes*. The forewing venation has R_3 reaching the costa and a strongly oblique cross vein closing the discal cell, and in the hindwing the base of M_2 is distant from

that of M_3 . The male genitalia are characterized by a narrow and high tegumen and a narrow and slender valva with an apical thorn. The female genitalia are characterized by extended lateral-posterior corners of T7, a simple U- to ring-shaped sterigma, two signa, and an additional sclerite at the entrance to the corpus bursae.

***Cyphophanes khitchakutensis* Muadsub and Pinkaew, n. sp.**

(Figs. 1C–D, 2B, 2D, 3B, 4B)

Diagnosis. This species is characterized by a blackish brown forewing with diffuse metallic blue scales and greyish white costal strigulae, by forewing R_5 reaching the apex, by a long ribbon-shaped anal lobe nearly reaching the anal angle in the male hindwing, and by slender, rather short, slightly upcurved labial palpi with a short terminal segment. The male genitalia are characterized by a wide tegumen apex with two lateral lobes with dense scale sockets and by a very slender valva gradually tapering to an apical spine. In the female genitalia the sterigma is small and U-shaped sterigma and is thickening anterior to the ostium, the ductus bursae is long and narrow, and the corpus bursae has two very small, thorn-like signa and a small sclerotized plate in the posterior area. The characters of R_5 reaching the apex in the forewing and the very small signa in the female genitalia distinguish this species from all other known *Cyphophanes*.

Description: Head. Ocellus large, vertex, frons, labial palpus and antenna blackish brown; labial palpus rather short (1.5X diameter of eye) (Fig. 2B), porrect to upcurved, second segment upcurved, slender, only slightly widened distally, terminal segment short.

Thorax. Smooth, with raised scale tuft posteriorly, blackish brown, legs unmodified. Forewing length 3.4–3.5 mm in male ($n = 2$) (Fig. 1C) 4.06 mm in female ($n = 1$) (Fig. 1D); subrectangular with apex broadly rounded, costa evenly curved, apex broadly rounded, termen sinuate, slightly concave from M_2 to beyond CuA_1 ; forewing venation with all R veins separate, R_5 reaching to apex, M_3 and CuA_1 diverging from base, then converging at margin (Fig. 2D); ground color blackish brown, with little obvious pattern of blackish patches, with conspicuous spots of bluish metallic scales scattered across wing, with small, white strigulae along costa; underside pale brown with greyish white strigulae on costa. Hindwing with long, ribbon-shaped anal lobe in male, nearly reaching anal angle; venation with M_2 separate from very short-stalked M_3 and CuA_1 , 3A reaching to anal margin 1/3 length of $1A+2A$ (Fig. 2D); brown to dark brown, slightly paler towards base; underside light brown.

Abdomen. Male genitalia (Fig. 3B). Tegumen high, nearly equally wide throughout length, moderately sclerotized, with two laterodistal round lobes with dense, long, hair-like bristles separated by small asetose medial apex; socius membranous, covered with moderately dense scale sockets; gnathos represented by a weak sclerotized band, arising from half length of tegumen; vinculum small; valva simple, slender, sinuate, moderately sclerotized, gradually tapering to downcurved apex with single short spine; juxta small; caulis rather long; phallus moderately long, weakly curved medially, gradually tapering from wide base to pointed apex, without cornuti. Female genitalia (Fig. 4B). Papillae anales with dense setae. Tergum VIII asetose, lateral triangular extensions with a small patch of scale sockets; Tergum VII extending ventrolaterally to behind weakly sclerotized sternum VII, the latter moderately scaled, more densely on posterior margin; sterigma beyond posterior margin of sternum VII, U-shaped, sclerotized ventrally, laterally with small, narrow patch of microtrichia; colliculum slender, long, moderately sclerotized; ductus bursae long, membranous; ductus seminalis arising from anterior end of ductus bursae; corpus bursae subovate, posterior end with small, signum-like sclerites, with two very small, unequal sized, thorn-shaped signa.

Holotype ♂. Thailand: Chanthaburi Prov.: Khao Khitchakut N.P., 12°51'04"N 102°12'10"E, ca. 98 m, 14–15 Dec 2012, N. Pinkaew, np5560 (genitalia slide NP1849). Deposited in BMNH.

Paratypes. Thailand: Trat Prov.: Trat Agroforestry R.St., 12°23'43"N 102°40'32"E, ca. 30 m, 24–25 Dec 2011, N. Pinkaew (1♂, genitalia slide NP1558), 21–23 Apr 2012 (1♀, genitalia slide NP1650). Deposited in KKIC.

Etymology. The specific epithet *khitchakutensis* refers to the name of the type locality Khao Khitchakut National Park.

Distribution. Thailand (Chanthaburi and Trat).

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