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A revision of the genus *Tineovertex* Moriuti (Insecta: Lepidoptera: Tineidae), with descriptions of five new species

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Abstract

The genus *Tineovertex* Moriuti, 1982 is revised. Eleven species are recognized, including five new ones: *T. hamoides*, **sp. nov.**, from Malaysia; *T. expansa*, **sp. nov.**, from Malaysia and Brunei; *T. fibriformis*, **sp. nov.**, from Malaysia; *T. thailandia*, **sp. nov.**, from Thailand; and *T. elongata*, **sp. nov.**, from China and Thailand. Adults and genitalia of all species are illustrated, and a key to the species is provided. Types of the new species are deposited in Hunan Agricultural University, Changsha, Hunan, China; Osaka Prefecture University, Sakai, Osaka, Japan; and The Natural History Museum, London, UK.

Key words: Lepidoptera, new species, taxonomy, Tineidae, *Tineovertex*

Introduction

Tineovertex was proposed by Moriuti (1982), with *Tinea melanochrysa* Meyrick, 1911 as type species, based primarily on morphological characters of the male and female genitalia, which later were described in detail by Huang *et al.* (2007). Six species have been assigned to the genus from the Oriental and Palaearctic Regions, but the genitalia of four of them have not been undescribed (Meyrick 1911, 1931; Moriuti 1982; Davis 1992; Robinson *et al.* 1994; Robinson *et al.* 1995; Robinson & Tuck 1996; Wang *et al.* 2000; Huang *et al.* 2007; Robinson 2008). In this paper we revise *Tineovertex*, present the descriptions of five new species, provide descriptions of the genitalia of all known species, and include am identification key to the species.

Material and methods

Specimens examined in the present study are deposited in the BMNH (The Natural History Museum, London, UK), OPU (Osaka Prefecture University, Sakai, Osaka, Japan), HUNAU (Hunan Agricultural University, Changsha, Hunan, China), NSMT (National Science Museum, Tokyo, Japan), and SCAU (South China Agricultural University, Guangzhou, Guangdong, China). Genitalia were examined after maceration in 10% KOH. The terminology used in descriptions of morphology follows Robinson and Nielsen (1993). Measurements in millimeters were made using a binocular microscope. Photographs of the adults were taken with a Nikon Coolpix 4500 digital camera. Type specimens of the new species are deposited in HUNAU, OPU and BMNH.

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Taxonomy

Tineovertex Moriuti, 1982

Type species: *Tinea melanochrysa* Meyrick, 1911, by original designation.

Description. *Head:* Vertex roughly clothed with dense, erect, black or white scales. Antenna filiform, brown or gray, usually slightly longer than forewing, scape smooth-scaled. Compound eyes large, frons covered with dense scales; maxillary palpus moderately developed, dark fuscous or brown; labial palpus brown with strong lateral and apical bristles on the second segment. *Thorax:* Dorsum and tegula smooth, covered with black or white scales. Legs extensively covered with scales, hind tibia bearing sparse long hairs dorsally and ventrally. Wings moderately elongate with similar pattern; apices moderately rounded; forewing ground color creamy white with all veins free; hindwing ground color brownish gray with pointed apex, nearly semihyaline, with long pale brown fringe except on basal 1/2 of costa; all veins free and separate basally. *Abdomen:* Dorsum covered with darker scales, venter with grayish white scales. Abdominal segment VIII with dense slender scales covering genitalia. Male genitalia with a pair of separated uncal lobes, gnathos absent, juxta indistinct, subscaphium membranous, saccus elongate rod-shaped; valva simple, elongate-spatulate, inner surface weakly sclerotized with dense setae; phallus cylindrical and nearly straight, vesica usually with cornuti. Female genitalia without corethrogyne scaling, eighth abdominal tergum with a median keel; apophyses anteriores and posteriores long and stout, posteriorly narrowed and rounded with many short spines; eighth abdominal sternum semicircular in ventral aspect with two triangular projections; ostium with short bristles, ovipositor well sclerotized; papilla analis strongly sclerotized and pointed to form piercing apex with minute serrations laterally; corpus bursae with a pair of symmetric signa either present or absent (see Huang *et al.* 2007).

Distribution. Oriental and Palaearctic Regions.

Remarks. Huang *et al.* (2007) separated the genus into two species groups: the *T. melanochrysa* species group with the head and thorax bearing blackish scales, and the *T. canicoma* species group with the head and thorax bearing whitish or ochreous yellowish scales. Subsequently, Huang *et al.* (2008) reported on the oviposition behavior and feeding habits of the early stages of *T. melanochrysa* from Japan, which is the first information on the biology of *Tineovertex*. Huang *et al.* (2009) suggested that *Tineovertex* is related to *Coryptilum* Zeller, 1839 based on the morphology of the male and female genitalia. Robinson (2009) considered that the piercing ovipositor of *Tineovertex*, which is shared with *Ischnuridia* Sauber, 1902, *Dinochora* Meyrick, 1924, *Ectropoceros* Diakonoff, 1955, and *Psychoides* Bruand, 1853 has evolved independently several times in Tineidae. According to a phylogenetic analysis based on mitochondrial and nuclear DNA sequences (*COI + 18S*), the genus *Tineovertex* is closely related to *Coryptilum*, with a bootstrap value of 91% (Huang 2008).

The previously proposed species grouping based on external coloration do not appear to be monophyletic; hence, we tentatively arrange the species on the basis of similarities in the male genitalia, such as the shapes of the uncus and valva.

Key to the species of the genus *Tineovertex* Moriuti

1	Vertex and pronotum covered with black scales	2
-	Vertex and pronotum covered with white or ochreous-yellow scales	5
2	Mesonotum and tegula entirely black	*T. gladiata*
-	Mesonotum and tegula black except posterior portions yellowish white	3
3	Uncus bilobed, narrowly separated basally	*T. sartoria*
-	Uncus bilobed, widely separated basally	4
4	Uncus slender, long; saccus shaped like an elongate triangle, nearly 0.8 × length of valva	*T. melanochrysa*
-	Uncus wide, short digitate; saccus slender, long, rod-shaped, about 1.8 × length of valva	*T. hamoides*, **sp. nov.**
5	Forewing with a black streak from dorsum beyond middle to tornus	6
-	Forewing with a black streak from dorsum near base to tornus	7
6	Costa with a streak dilated in middle reaching nearly 1/3 across forewing	*T. elongata*, **sp. nov.**
-	Costa with a streak dilated in middle reaching nearly 1/6 across forewing	*T. thailandia*, **sp. nov.**
7	Saccus shaped like an elongate triangle	8
-	Saccus entirely rod-shaped	9
8	Valva with basal half broad, uncus very slender	*T. canicoma*

-	Valva elongate-spatulate, uncus wedge-shaped	*T. melliflua*
9	Valva with apical 2/3 gradually broader, uncus short and hooked	*T. fibriformis*, **sp. nov.**
-	Valva elongate-spatulate, uncus broad	10
10	Termen gold-yellow irrorated with dense black scales	*T. antidroma*
-	Termen creamy-white not irrorated with black scales.	*T. expansa*, **sp. nov.**

Tineovertex melanochrysa (Meyrick, 1911)

(Figs. 1A–C, 3A)

Tinea melanochrysa Meyrick 1911: 120 (type locality: Khasi Hills, NE India).
Tineovertex melanochryseus: Moriuti 1982: 167; Davis 1992: 63.
Tineovertex melanochrysa: Robinson & Tuck 1996: 10; Wang *et al.* 2000: 34; Huang *et al.* 2007: 39; Huang *et al.* 2008: 261.

Diagnosis. This species can be distinguished from other *Tineovertex* by the following characters: uncus slender, long; saccus elongate-triangular; and valva elongate-spatulate, slightly curved dorsally.

Description. Forewing length 5.5–6.0 mm in male, 6.0–6.5 mm in female; antenna length 6.0–6.5 mm in male, 6.5–7.0 mm in female (Figs. 1A–C).

Male. *Head.* Vertex and frons black. *Thorax.* Dorsum and tegula black with posterior portions yellowish white. Forewing with apex and termen black, about 2.5–2.9 × as long as wide including fringe (about 3.3–3.4 × as long as wide excluding fringe); costa with a broad irregular black streak from base to near apex, dilated in middle reaching about 3/7 across wing; apex with one distinct yellowish white costal strigula. Hindwing pale brown, 1.9–2.0 × as long as wide including fringe (3.4–3.7 × as long as wide excluding fringe). *Abdomen.* Male genitalia (Fig. 3A) with uncus lobes widely separated, slender, about 0.5 × length of valva, with apex narrow and pointed, gradually curved ventrally. Saccus elongate triangular, about 0.8 × length of valva. Valva elongate-spatulate, narrow throughout, with apex rounded, slightly curved dorsally. Phallus basally stout with digitate apex, slightly curved ventrally, about 1.1 × length of valva; vesica with cornuti consisting of a mass of minute spines.

Female. Very similar to male. Female genitalia (see Moriuti, 1982: plate 248-6) with corpus bursae bearing a pair of thorn-shaped signa.

Type material. Lectotype (in BMNH), male. ASSAM: Khasi Hills., VI.1906, leg. E. Meyrick, BM. 1938-290; Paralectotypes (in BMNH), 7 males, same data to lectotype, with genitalia slide no. 32130 in BMNH.

Other material examined (in OPU and NSMT)**.** [JAPAN] Honshu. Osaka Pref.: Minoo: 1 female, 1.VII.1971, leg. T. Saito; 5 males, 2 females, 2–10.VII.1979, leg. T. Saito; 2 males, 2 females, 10.VII.1979, leg. K. Yasuda; 2 males, 3 females, 3.VII.1980, leg. T. Saito; 1 female, 5.VII.1982, leg. T. Saito. 1 female, Aokaiyama, Toyono-cho, 25.VI.1998, leg. T. Saito; Mt Mikusayama: 10 males, 6 females, 15.VII.1993, leg. T. Hirowatari; 8 males, 6 females, 5.VII.2007, leg. T. Hirowatari, S. Kobayashi & A. Nobuoka; 20 males, 16 females, 18.VII.2007, leg. G. H. Huang, T. Hirowatari, S. Kobayashi & A. Nobuoka. Shikoku. Kochi Pref.: 4 males, 3 females, Ashizurimisaki, 14.VI.1964, leg. S. Moriuti. Ehime Pref.: 1 female, Sugitate, 27.VI.1956, leg. M. Okada. Kyushu. Fukuoka Pref.: 1 male, Mt Sarakura, Yahata, 19.VII.1961, leg. T. Kawamura; Mt Hiko-san: 1 male, 23.VII.1956, leg. H. Kuroko; 1 female, 27.VII.1954, leg. H. Kuroko. Kagoshima Pref.: 1 female, Ôyamada, Kajiki-cho, 26.VI.1984, leg. T. Nakahara. Ryukyu. Ishigakijima Is.: Omotodake: 3 males, 2.V.1978, leg. S. Moriuti; 2 males, 2 females, 2.V.1978, leg. Y. Arita, NSMT; 1 female, 4.V.1978, leg. Y. Arita, NSMT; 1 male, 4.V.1978, leg. S. Moriuti; 1 male, 5.V.1978, leg. S. Moriuti; 1 female, 2.IV.1980, leg. K. Yasuda; 2 males, 6.IV.2001, leg. B.W. Lee. 1 female, Banna, 3.V.1978, leg. S. Moriuti; 1 male, Nagura, 3.V.1978, leg. S. Moriuti; 1 male, Bannakoen, 7.IV.2001, light trap, leg. T. Ueda, N. H. Ahn, B. W. Lee, Y. Miyamoto & K. Yamada. Iriomote Is.: 1 male, Nakamagawa, 11.X.1992, leg. T. Ueda; 1 male, Uehara, Taketomi-cho, larva in portable case collected 4.X.2001, emerged 9.I.2002 with dead leaf as host, leg. T. Saito; 2 females, Shirahama, 29.XI.1996, leg. T. Ueda. Yonakuni Is.: 3 males, 1 female, Mt Urabe-dake, 13.V.1963, leg. Y. Arita, NSMT.

Bionomics. Seasonal occurrence: May to December. The female inserts eggs into the living tissue of the fern *Blechnum nipponicum* (Kunze) Makino (Blechnaceae), and the larvae feed on dead plant material on the ground after making a portable case (Huang *et al.* 2008).

Distribution. Japan, China (Taiwan), India.

Remarks. Huang *et al.* (2008) described the biology, including oviposition behavior and feeding habits of the early stages based on material from Japan.

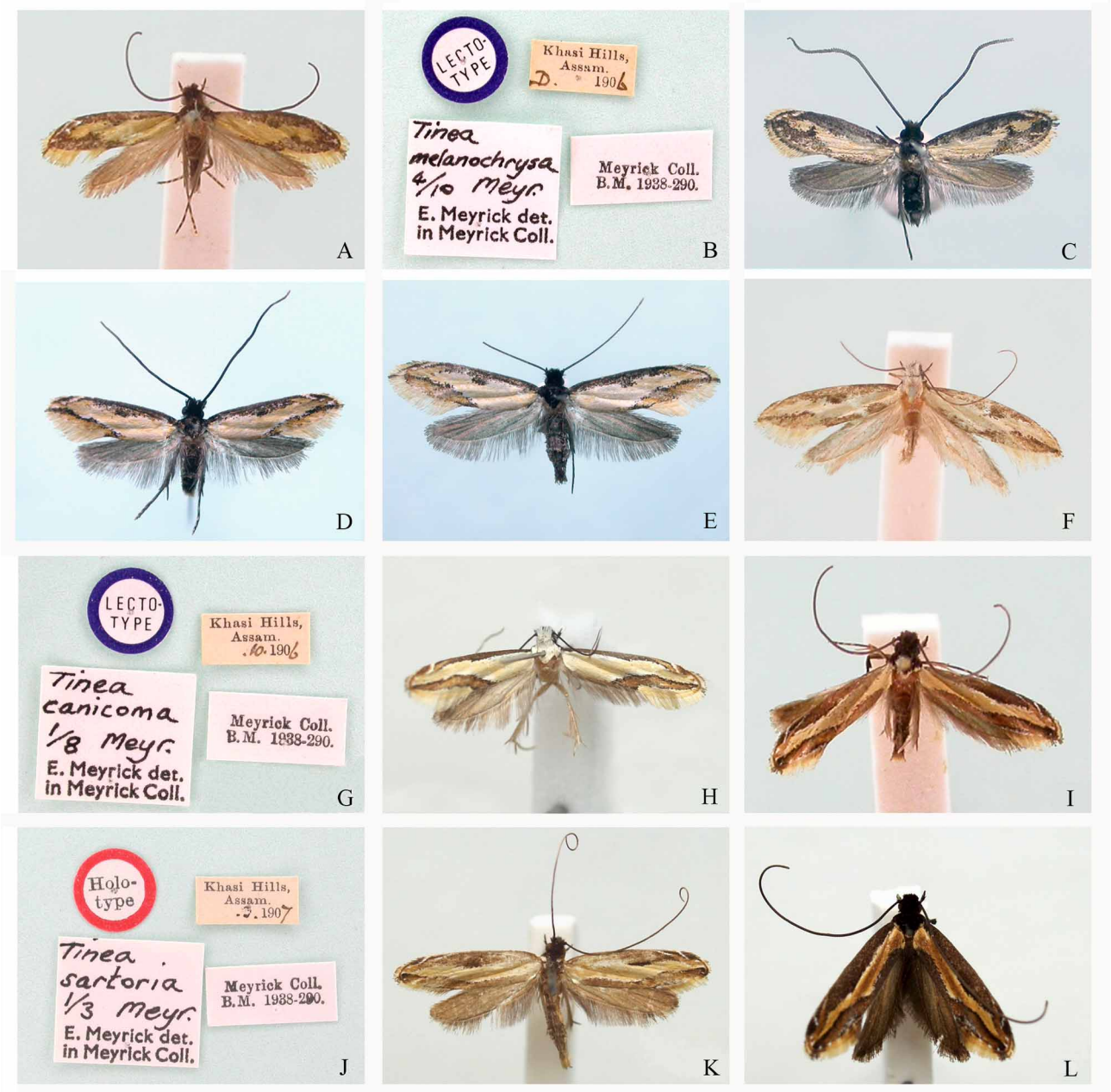

FIGURE 1. Adults and labels of *Tineovertex* spp. A–B. "*Tinea melanochrysa* Meyrick, 1911", Male, Lectotype; C. *Tineovertex melanochrysa* (Meyrick, 1911), Female; D. *Tineovertex gladiata* Huang, Hirowatari & Wang, 2007, Male, Holotype (also see Huang *et al*., 2007: Fig. 2A); E. *Tineovertex gladiata* Huang, Hirowatari & Wang, 2007, Female, Paratype (also see Huang *et al*., 2007: Fig. 2A); F–G. "*Tinea canicoma* Meyrick, 1911", Male, Lectotype;. H. *Tineovertex thailandia* **sp. nov.**, Female, Holotype; I–J. "*Tinea sartoria* Meyrick, 1911", Male, Holotype; K. *Tineovertex sartoria* (Meyrick, 1911), Female; L. *Tineovertex hamoides*, **sp. nov.**, Male, Holotype.

Tineovertex gladiata Huang, Hirowatari & Wang, 2007

(Figs. 1D–E, 3B)

Tineovertex gladiata Huang, Hirowatari & Wang 2007: 40 (type locality: China (Guangdong)).

Diagnosis. This species is similar to *T. melanochrysa*, but it can be distinguished by the following characters: in *T. gladiata* the mesonotum and tegula are entirely black; the phallus is cylindrical and stout; and the corpus bursae has a pair of large sword-shaped signa. In *T. melanochrysa* the posterior region of the mesonotum and the tegula are

pale yellow; the phallus is stout basally and tapered apically; and there are two thorn-shaped signa the corpus bursae.

Description. Forewing length 5.5–6.0 mm in male, 6.5–7.0 mm in female; antenna length about 6.0 mm in male, about 7.0 mm in female (Figs. 1D–E; also see Huang *et al.*, 2007: fig. 1A–B).

Male. *Head*. Vertex and frons black. *Thorax*. Dorsum and tegula entirely blackish. Forewing with apex and termen gold-yellow, about 3.6–4.0 × as long as wide including fringe (about 3.4–3.8 × as long as wide excluding fringe); costa with a broad irregular black streak from base to basal 4/5, dilated in middle reaching almost 1/2 across wing; subapical with a distinct gold-yellowish strigula; a narrow and nearly straight black streak from dorsum beyond middle to apex, separating creamy-white and gold-yellow areas. Hindwing brownish gray, 1.8–2.0 × as long as wide including fringe (3.1–3.3 × as long as wide excluding fringe). *Abdomen*. Male genitalia (Fig. 3B: left; also see Huang *et al*. 2007: fig. 4) with uncus lobes widely separated, elongate triangular, about 0.8 × length of valva, apex narrow and pointed, gradually curved ventrally. Saccus elongate, slightly longer than length of valva, widened and flattened posteriorly. Valva simple, elongate-spatulate, narrow throughout, with apex rounded. Phallus nearly straight, cylindrical, stout, about 1.2 × length of valva; apex slightly curved ventrally; vesica with cornuti consisting of a mass of minute spines.

Female. Very similar to male. Female genitalia (Fig. 3B: right; also see Huang *et al*. 2007: fig. 5) with corpus bursae large, bearing a pair of large sword-shaped signa. The entire corpus bursae almost equal in length to apophysis anterioris.

Type material. Holotype (in SCAU), male, CHINA: Guangdong, Shaoguan, Nanling National Nature Reserve, Xiaohuangshan, 1300 m altitude, 11.VI.2005, light trapping, leg. G.H. Huang, L.S. Chen and M. Wang. Paratypes (in OPU and BMNH), 2 males, same data as holotype; 1 male, 2 females, Xiangsikeng, 1360 m altitude, 12.VI.2005, other data same as holotype; 2 males, Nanling National Nature Reserve, 31.V.–6.VI.2006, light trapping, leg. L.S. Chen.

Other material examined (in HUNAU). 4 males, CHINA: Guangdong, Shaoguan, Nanling National Nature Reserve, Xiaohuangshan, 1300 m altitude, 22.VI.2008, light trapping, leg. G.H. Huang.

Bionomics. Seasonal occurrence: May to June, with host unknown.

Distribution. China. Known only from the type locality in southern China.

Remarks. Most *Tineovertex* species are day-fliers, but we obtained this species only by light trapping. More surveys are necessary to understand the behavioral ecology of this species.

Tineovertex canicoma (Meyrick, 1911)

(Figs. 1F–G, 3C)

Tinea canicoma Meyrick 1911: 120 (type locality: Khasi Hills, NE India).
Tineovertex canicoma: Robinson *et al.* 1995: 175; Robinson & Tuck 1996: 10; Huang *et al.* 2007: 40.

Diagnosis. This species is similar to *T. melliflua*, but it can be distinguished by the following characters: in *T. canicoma* the phallus is stout, the uncus is very slender and ventrally curved, and the valva is narrow throughout and spatulate. In *T. melliflua* the phallus is tapered distally with a hook-shaped apex, the uncus is wedge-shaped, and the valva is broadened in the basal half.

Description. Forewing length 6.5–7.0 mm, antenna length 7.0–7.5 mm in male (Figs. 1F–G).

Male. *Head*. Vertex and frons white. *Thorax*. Dorsum and tegula white with anterior portions black. Forewing with termen gold-yellow, about 3.8–4.0 × as long as wide including fringe (about 3.7–3.8 × as long as wide excluding fringe); costa with a broad irregular black streak from base to basal 5/6, dilated in middle reaching 2/5 across wing; a narrow and nearly straight black streak from basal 1/5 of dorsum to apex, separating creamy-white and gold-yellow areas. Hindwing brownish pale, 1.9–2.1 × as long as wide including fringe (3.6–3.7 × as long as wide excluding fringe). *Abdomen*. Male genitalia (Fig. 3C) with uncus lobes widely separated, very slender, about 0.8 × length of valva, apical half curved ventrally. Tegumen very narrow. Saccus elongate, triangular, about 1.3 × length of valva. Valva basal half broad, apical half curved dorsally. Phallus stout, about 1.5 × length of valva; apex slightly curved ventrally; vesica with cornuti consisting of short masses of minute spines.

Female. Unknown.

Material examined. Lectotype (in BMNH), male, ASSAM: Khasi Hills., VI.1906, leg. E. Meyrick, BM.

1938-290. Paralectotypes (in BMNH), 5 males, same data as lectotype, with Genitalia slide No. 32129 in BMNH.

Bionomics. Seasonal occurrence: June, with host unknown.

Distribution. India, Nepal.

Remarks. This species can be distinguished from other members of *Tineovertex* by the white vertex and pronotum and by the valva broadened over the basal half.

Tineovertex thailandia, sp. nov.

(Figs. 1H, 3D)

Diagnosis. This new species can be distinguished from other members of *Tineovertex* by the following characters: costa with a streak dilated in middle reaching nearly 1/6 across forewing, termen creamy white and apex gold yellow.

Description. Forewing length 6.0–6.5 mm, antenna length 6.5–7.0 mm in female (Fig. 1H).

Male. Unknown.

Female. *Head*. Vertex and frons white. *Thorax*. Dorsum and tegula entirely white. Forewing creamy-white with apex gold-yellow around perimeter, about 4.2–4.4 × as long as wide including fringe (about 4.0–4.2 × as long as wide excluding fringe); costa with a broad irregular black streak from base to basal 2/3, dilated at middle and reaching 1/6 across wing; a distinct large gold-yellow digitiform stripe with black thin streak around from dorsum basal 3/8 to apex. Hindwing brownish gray, 2.3–2.5 × as long as wide including fringe (4.4–4.6 × as long as wide excluding fringe). *Abdomen*. Female genitalia (Fig. 3D). with eighth abdominal tergum flattened anteriorly with a distinct median keel, narrowed and rounded posteriorly with mass of long spines; eighth abdominal sternum semicircular in ventral view, ostium with two triangular projections and short bristles around. Ovipositor well sclerotized, corethrogyne scaling absent. Apophysis posterioris long and thick, about 1.5 × length of apophysis anterioris. Papilla analis strongly sclerotized, pointed, forming piercing apex with minute serration laterally. Corpus bursae large with a pair of long sword-shaped signa. Entire corpus bursae nearly equal in length to apophysis anterioris.

Material examined. Holotype, female, THAILAND: Chiang Mai, 7.V.1994, leg. I.J. Kitching *et al.*, BM. 1994-97, with the genitalia slide No. 32139 in BMNH, deposited in BMNH. Paratypes, 2 females, THAILAND: Chiang Mai, Doi Pui, 1300 m altitude, 26–27.X.1985, leg. S. Moriuti, T. Saito & Y. Arita. Paratypes deposited in OPU.

Bionomics. Seasonal occurrence: May to October; the host is unknown.

Distribution. Thailand.

Etymology of specific epithet. From the type locality of Chiang Mai, Thailand.

Remarks. The new species is described from three female specimens. Although the females of five named *Tineovertex* species are still unknown, this species is distinct based on the diagnostic characters of the adults provided above.

Tineovertex sartoria (Meyrick, 1911)

(Figs. 1I–K, 3E)

Tinea sartoria Meyrick 1911: 120 (type locality: Khasi Hills, NE India).
Tineovertex sartoria: Robinson & Tuck 1996: 10; Huang *et al.* 2007: 40.

Diagnosis. This species can be distinguished easily from the closely related species *T. melanochrysa* by the following characters: uncus thumb-shaped, lobes narrowly separated basally, valva curved dorsally nearly vertical at basal 2/3; phallus with apex pointed.

Description. Forewing length 5.5–6.0 mm in male, 6.5–7.0 mm in female; antenna length about 6.5 mm in male, about 7.5 mm in female (Figs. 1I–J).

Male. *Head*. Vertex and frons black. *Thorax*. Dorsum and tegula black with posterior portions yellowish white. Forewing with apex gold-yellow, about 3.5–3.8 × as long as wide including fringe (about 3.3–3.6 × as long as wide excluding fringe); costa with a broad irregular black streak from base to near apex, dilated in middle reaching about 2/5 across wing; two distict yellowish white costal strigulae present near apex; a narrow and nearly straight black

streak from dorsum basal 1/4 to apex, long creamy-white at termen. Hindwing brownish gray, 2.0–2.2 × as long as wide including fringe (3.8–4.0 × as long as wide excluding fringe). *Abdomen.* Male genitalia (Fig. 3E: left) with uncus lobes thumb-shaped with rounded apex, nearly 0.5 × length of valva, narrowly separated basally. Saccus slender throughout, about 1.8 × length of valva. Valva broad with rounded apex, L-shaped, curved dorsally nearly vertical at basal 2/3. Phallus stout with pointed apex, about 2.0 × length of valva, vesica with cornuti consisting of large masses of minute spines.

Female. Very similar to male. Female genitalia (Fig. 3E: right) with corpus bursae broad, bearing a pair of lanceolate signa. Entire corpus bursae nearly equal in length to apophysis anterioris.

Type material. Lectotype (in BMNH), male, ASSAM: Khasi Hills, 1907, leg. E. Meyrick, BM. 1938-290, with genitalia slide no. 32132 in BMNH.

Other material examined (in BMNH)**.** 1 female, ASSAM: Khasi Hills., 1907, leg. L. Walsingham, BM. 1910-427 (det. G. Robinson, 2007), with genitalia slide no. 32133 in BMNH.

Bionomics. Seasonal occurrence: March, based on the original description.

Distribution. This species is known only from the type locality in northern India.

Remarks. The female is reported for the first time in this study.

Tineovertex hamoides, sp. nov.

(Figs. 1L, 3F)

Diagnosis. This species can be distinguished from its congeners by the following characters: uncus digitate; saccus slender, about 1.8 × length of valva; and phallus curved dorsally with uncinate apex.

Description. Forewing length 6.5–7.5 mm, antenna length 7.0–8.0 mm in male (Fig. 1L).

Male. *Head.* Vertex and frons dark black. *Thorax.* Dorsum and tegula black with posterior portions yellowish white. Forewing gold creamy white, about 3.1–3.2 × as long as wide including fringe (about 3.4–3.5 × as long as wide excluding fringe); apex and termen brownish gold with seven distinct white spots; costa with a broad irregular black streak from base to basal 7/10, dilated in middle reaching almost halfway across wing; subapex with a distict white costal strigulae; a narrow and nearly straight black streak from dorsum basal 3/20 to apex, separated creamy-white and gold-yellow areas. Hindwing brownish gray, 1.9–2.0 × as long as wide including fringe (3.2–3.3 × as long as wide excluding fringe). *Abdomen.* Male genitalia (Fig. 3F) with uncus digitate, about 0.4 × length of valva. Saccus slender throughout, about 1.8 × length of valva. Valva relatively narrow, somewhat C-shaped, gradually curved dorsally. Phallus curved dorsally at middle with uncinate apex, about 2.1 × length of valva, vesica with cornuti consisting of a small mass of minute spines.

Female. Unknown.

Type material. Holotype, male, MALAYSIA: Cameron Highlands, 19.VIII.1986, leg. G.S. Robinson, BM. 1986-299, with the genitalia slide no. 32138 in BMNH. Paratype, 1 male, MALAYSIA: Pahang, 11–29.XI.1981, leg. K.R. Tuck, BM. 1981-549, with genitalia slide no. 32140 in BMNH. All types deposited in BMNH.

Bionomics. Seasonal occurrence: August to November, with host unknown.

Distribution. Malaysia.

Etymology of specific epithet. From the Latin *hamoides* (=like a hook), referring to the uncinate tube at the apex of the phallus.

Remarks. The new species is known to occur only in Malaysia.

Tineovertex melliflua (Meyrick, 1911)

(Figs. 2A–B, 3G)

Tinea melliflua Meyrick 1911: 121 (type locality: Maskeliya, Ceylon (Pole) (Sri Lanka)).
Tineovertex melliflua: Robinson & Tuck 1996: 10; Huang *et al.* 2007: 40.

Diagnosis. This species is similar to *T. canicoma*, but it can be distinguished from that species by the characters described in the diagnosis of *T. canicoma*.

Description. Forewing length 6.5–7.0 mm, antenna length about 7.0 mm in male (Figs. 2A–B).

Male. *Head*. Vertex and frons white. *Thorax*. Dorsum and tegula white with anterior portions of tegula black. Forewing, about 3.6–3.7 × as long as wide including fringe (about 3.4–3.5 × as long as wide excluding fringe); termen yellowish white, costa with a broad irregular black streak from base to near apex, dilated medially and reaching 1/3 across wing; a narrow and nearly straight black streak from dorsum base to apex, separating creamy-white and yellowish white areas. Hindwing yellowish brown, 2.0–2.2 × as long as wide including fringe (3.7–3.8 × as long as wide excluding fringe). *Abdomen*. Male genitalia (Fig. 3G) with uncus lobes widely separated, wedge-shaped, about 0.5 × length of valva; apex narrow and pointed. Saccus elongate, basally acute and triangular, nearly equal to valva in length. Valva elongate-spatulate, entirely narrow with apex rounded, slightly curved dorsally. Phallus tapered with apex uncinate, about 1.3 × length of valva; vesica with cornuti consisting of several narrow masses of minute spines.

Female. Unknown.

Type material. Lectotype (in BMNH), male, SRI LANKA: Maskeliya, IX.1905, leg. E. Meyrick, BM. 1938-290. Paralectotypes (in BMNH), 2 males, same data as lectotype, with genitalia slide no. 32131 in BMNH.

Bionomics. Seasonal occurrence: September; the host is unknown.

Distribution. Sri Lanka.

Remarks. This species is known only from the type locality.

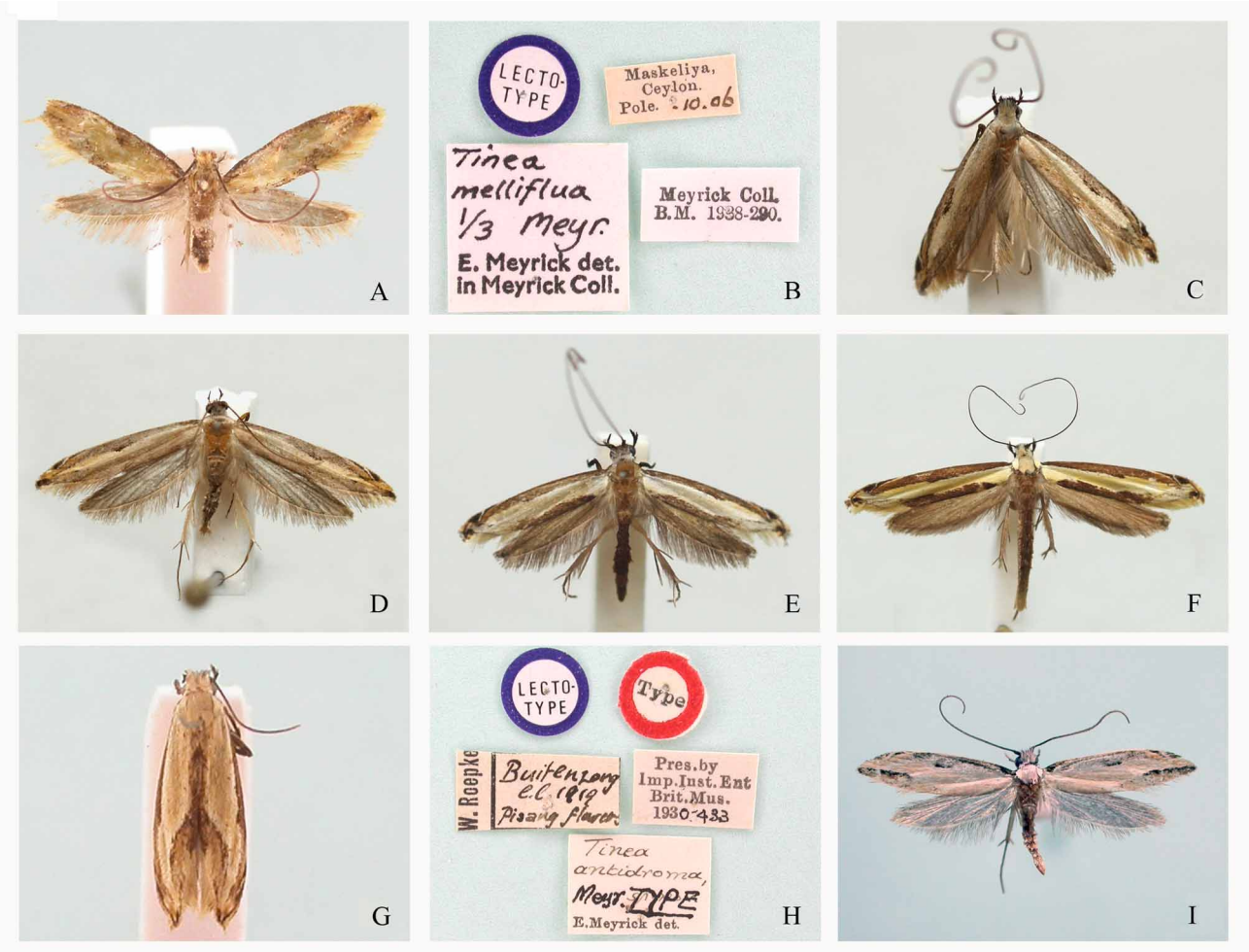

FIGURE 2. Adults and labels of *Tineovertex* spp. A–B. "*Tinea melliflua* Meyrick, 1911", Male, Lectotype; C. *Tineovertex fibriformis*, **sp. nov.**, Male, Holotype; D. *Tineovertex fibriformis*, **sp. nov.**, Female, Paratype; E. *Tineovertex expansa*, **sp. nov.**, Male, Holotype; F. *Tineovertex expansa*, **sp. nov.**, Female, Paratype; G–H. "*Tinea antidroma* Meyrick, 1911", Male, Lectotype; I. *Tineovertex elongata*, **sp. nov.**, Male, Holotype (also see Huang *et al.*, 2007: Fig. 2C).

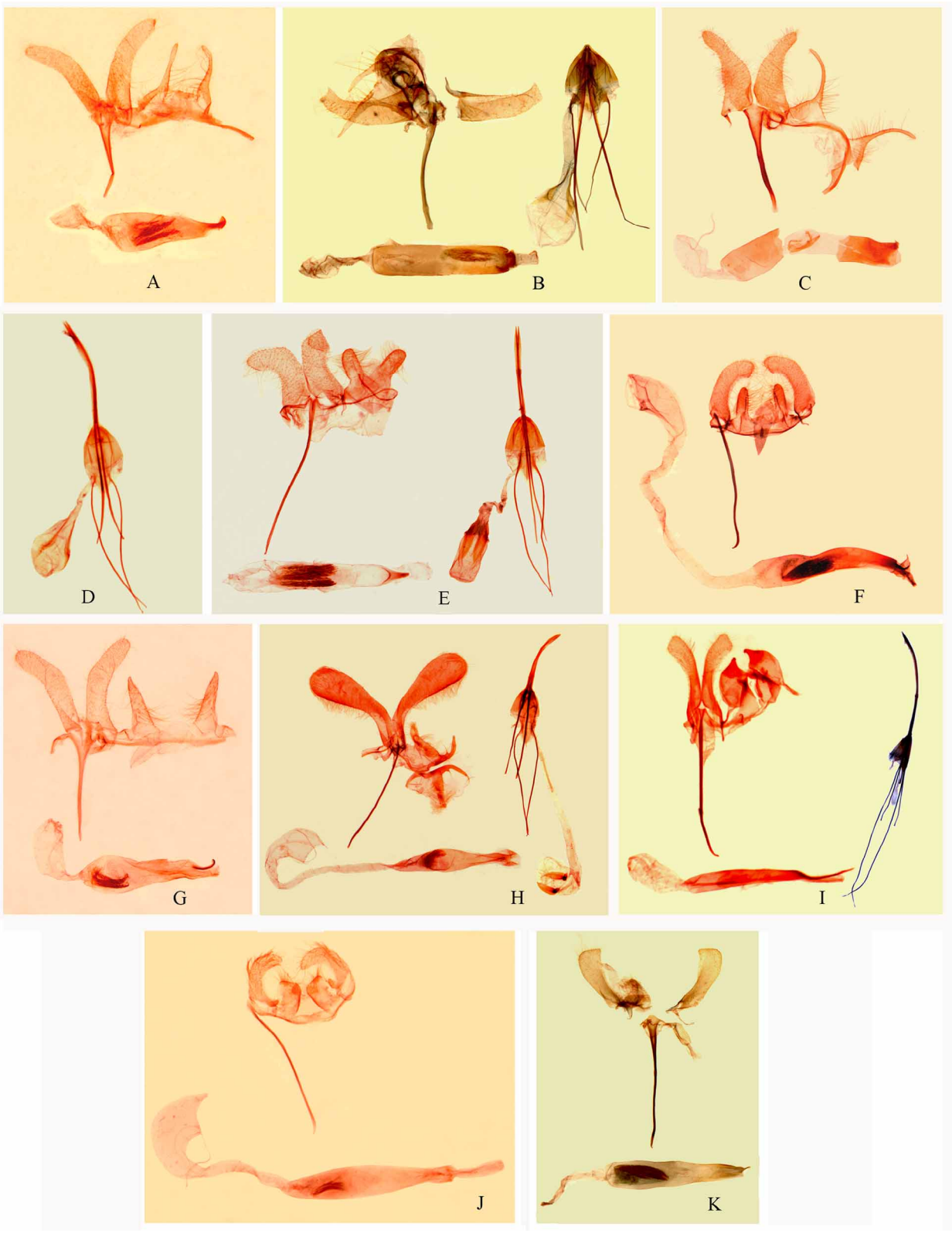

FIGURE 3. Genitalia of *Tineovertex* spp. A. "*Tinea melanochrysa* Meyrick, 1911", Male, Paralectotype; B. *Tineovertex gladiata* Huang, Hirowatari & Wang, 2007, (Left: Male, Holotype; Right: Female, Paratype); C. "*Tinea canicoma* Meyrick, 1911", Male, Paralectotype; D. *Tineovertex thailandia*, **sp. nov.**, Female, Holotype; E. "*Tinea sartoria* Meyrick, 1911", (Left: Male, Holotype; Right: Female); F. *Tineovertex hamoides*, **sp. nov.**, Male, Holotype; G. "*Tinea melliflua* Meyrick, 1911", Male, Paralectotype; H. *Tineovertex fibriformis*, **sp. nov.**, (Left: Male, Holotype; Right: Female, Paratype); I. *Tineovertex expansa*, **sp. nov.**, (Left: Male, Holotype; Right: Female, Paratype); J. "*Tinea antidroma* Meyrick, 1911", Male, Paralectotype; K. *Tineovertex elongata*, **sp. nov.**, Male, Holotype.

***Tineovertex fibriformis*, sp. nov.**
(Figs. 2C–D, 3H)

Diagnosis. This new species can be distinguished from other members of *Tineovertex* that have a white vertex and pronotum by the following characters: uncus lobes narrowly separated, short, and hooked with apical 1/3 filament-shaped; valva spatulate with apical 2/3 gradually becoming broad; and phallus with a forked apex.

Description. Forewing length about 6.8 mm in male, about 7.7 mm in female; antenna length about 7.0 mm in male, about 8.0 mm in female (Fig. 2C–D).

Male. *Head.* Vertex and frons white. *Thorax.* Dorsum and tegula white. Forewing creamy-white with apex black, about 5.5–5.6 × as long as wide including fringe (about 5.2–5.3 × as long as wide excluding fringe); costa with a broad irregular black streak from base to basal 2/3, dilated in middle reaching 1/3 across wing; a narrow and nearly straight black streak along dorsum and termen from dorsum base to apex, irrorated gold-yellow scales. Hindwing brownish gray, 2.3–2.4 × as long as wide including fringe (4.1–4.2 × as long as wide excluding fringe). Abdomen. Male genitalia (Fig. 3H: left) with uncus lobes narrowly separated, short and hooked, about 0.4 × length of valva, curved ventrally, apical 1/3 filament-shaped. Saccus entirely rod-shaped, slightly longer than valva in length. Valva spatulate, basal 1/3 narrow, apical 2/3 gradually broadened, apex rounded. Phallus nearly straight, basal part swelling, apex forked, about 1.1 × length of valva; vesica with cornuti consisting of mass of minute spines.

Female. Very similar to male. Female genitalia (Fig. 3H: right) with corpus bursae small, spherical, bering a pair of large wedge-shaped signa. Entire corpus bursae very long, about 1.8 × length of apophysis anterioris.

Type material. Holotype, male, MALAYSIA: Cameron Highlands, 15–23.VIII.1986, leg. G.S. Robinson, BM. 1986-299, with genitalia slide no. 32136 in BMNH. Paratype, 1 female, same data to holotype, except genitalia slide no. 32137 in BMNH. All types deposited in BMNH.

Bionomics. Seasonal occurrence: August, with host unknown.

Distribution. Malaysia.

Etymology of specific epithet. From the Latin *fibriformis* (=like a filament), referring to the uncus with apical 1/3 filamentose.

Remarks. The new species is known only from Malaysia.

***Tineovertex expansa*, sp. nov.**
(Figs. 2E–F, 3I)

Diagnosis. This new species can be distinguished from other members of *Tineovertex* with white vertex and pronotum by the following characters: termen creamy-white, vesica with cornuti indistinct, corpus bursae small without signum.

Description. Forewing length 8.5–9.0 mm in male, 12.5–14.5 mm in female; antenna length about 9.5 mm in male, about 14.0 mm in female (Figs. 2E–F).

Male. *Head.* Vertex and frons entirely white. *Thorax.* Dorsum and tegula entirely white. Forewing slender and long, about 5.0–5.2 × as long as wide including fringe (about 4.8–5.0 × as long as wide excluding fringe); costa with a broad irregular black streak from base to near apex, dilated in middle reaching about 3/7 across wing; subapical costa with two distinct white costal strigulae and two distinct dark black spots; apex with a dark black circular spot irrorated with white scales; a black streak along dorsum from basal 1/6 to tornus, an indistinct curved black streak present from tornus to apex. Hindwing relatively brown, 2.8–3.0 × as long as wide including fringe (4.5–4.7 × as long as wide excluding fringe). *Abdomen*. Male genitalia (Fig. 3I: left) with uncus lobes narrowly separated, basally enlarged and apical part triangular with apex hooked, about 0.5 × length of valva. Saccus rod-shaped, entirely slender, about 1.4 × length of valva. Valva rectangular, slightly constricted at middle, curved dorsally. Phallus slender and tapered; apical 1/4 part connate, vesica with cornuti indistinct.

Female. Very similar to male. Female genitalia (Fig. 3I: right) with corpus bursae small, lacking signum. Entire corpus bursae about 1/4 × length of apophysis anterioris.

Type material. Holotype, male, MALAYSIA: Pahang, 11–29.XI.1981, leg. K.R. Tuck, BM. 1981-549, with the genitalia slide No. 32141 in BMNH. Paratypes, 1 male, MALAYSIA: Perak, Gunong Hijan, 1891, leg. L. Walsingham, BM. 1910-427, with genitalia slide no. 32142 in BMNH; 1 female, MALAYSIA: West Pahang, 2.II.1982,

leg. H.S. Barlow, BM. 1986-312, with genitalia slide no. 32143 in BMNH; 1 female, BRUNEI: Upper Temburong, 21.VI.1981, leg. T.W. Harman, BM. 1989-124, with genitalia slide no. 32144 in BMNH. All types deposited in BMNH.

Bionomics. Seasonal occurrence: February to November; the host is unknown.

Distribution. Malaysia, Brunei.

Etymology of specific epithet. From the Latin *expansa* (=enlarged), referring to the enlarged base of the uncus.

Remarks. *Tineovertex expansa* is the largest species of the genus.

Tineovertex antidroma (Meyrick, 1931)

(Figs. 2G–H, 3J)

Tinea antidroma Meyrick 1931: 95 (type locality: Java (Indonesia)).
Tineovertex antidroma: Robinson *et al.* 1994: 31; Robinson & Tuck 1996: 10; Huang *et al.* 2007: 42 (misidentification).

Diagnosis. This species is similar to *T. elongata*, but is easily distinguished from the latter by the characters discussed in the diagnosis of *T. elongata*.

Description. Forewing length 5.0–6.0 mm, antenna length 5.5–6.5 mm in male (Figs. 2G–H).

Male. *Head.* Vertex and frons pale ochreous to white. *Thorax.* Dorsum and tegula white. Forewing with termen gold-yellow, about 3.4–3.7 × as long as wide including fringe (about 3.2–3.4 × as long as wide excluding fringe); costa with a broad irregular black streak from base to near apex, dilated at middle and reaching 1/4 across wing; a black streak along dorsum from basal 1/3 to tornus, and a very narrow curved black streak from tornus to apex, separating creamy-white and gold-yellow areas. Hindwing brownish gray, 1.7–1.9 × as long as wide including fringe (3.0–3.2 × as long as wide excluding fringe). Abdomen. Male genitalia (Fig. 3J) with uncus lobes widely separated, quadrate, about 0.5 × length of valva, with a very short ventral slender process in lateral view. Saccus rod-shaped, slender throughout, about 2.4 × length of valva. Valva entirely narrow, L-shaped, nearly vertically curved dorsally at basal 3/5. Phallus nearly straight, stout, gradually swollen at middle, about 2.8 × length of valva; vesica with cornuti consisting of many minute spines.

Female. Unknown.

Type material. Lectotype (in BMNH), male, INDONESIA: Java, 1919, leg. W. Roepke, BM. 1930-438. Paralectotypes (in BMNH), 11 males, same data as lectotype, with genitalia slide no. 32128 in BMNH.

Bionomics. Seasonal occurrence: May to November; the host is unknown.

Distribution. Indonesia, India, W. Malaysia, Java, Sabah, New Guinea.

Remarks. This species is known to be distributed widely from India to New Guinea (Robinson & Tuck 1996).

Tineovertex elongata, sp. nov.

(Figs. 2I, 3K)

Diagnosis. This new species is very similar to *T. antidroma* (Meyrick, 1931), but the two can be distinguished by the slender ventral process of the uncus — very long in *T. elongata*, very short in *T. antidroma*.

Description. Male. Forewing length 6.3–7.2 mm, antenna length 5.5–6.5 mm (Fig. 2I; also see Huang *et al.*, 2007: fig. 2C).

Male. *Head.* Vertex pale white. Frons pale brown. *Thorax.* Dorsum smooth white, tegula white except anterior black margin. Forewing elongate with apex rounded, about 2.4–2.8 × as long as wide including fringe (about 3.3–3.4 × as long as wide excluding fringe); costa with a faint irregular black streak from base to near apex, dilated at middle where it reaches 1/3 across wing; a narrow and indistinct black streak along termen from dorsum beyond middle to apex. Hindwing brownish gray. 1.8–1.9 × as long as wide including fringe (3.3–3.6 × as long as wide excluding fringe). *Abdomen.* Male genitalia (Fig. 3K; also see Huang *et al.* 2007: fig. 6) with uncus elongate triangular, lobes narrowly separated, vertically-curved ventrally at middle with apex narrow and pointed. Saccus elongate, rod-shaped, about 1.4 × length of valva. Valva rectangular, gradually broader apically. Phallus nearly straight, about 1.8 × length of valva; apex with a pointed process slightly curved ventrally; vesica with cornuti consisting of mass of thick spines.

Female. Unknown.

Type material. Holotype, male, CHINA: Hainan, Chuangjiang, Bawangling National N.R., Donger-lingchang, 1000 m altitude, 26.X.2006, light trapping, leg. G.H. Huang and Z. Li. Deposited in HUNAU. Paratypes. 1 male, THAILAND: Loei, Phu Rua, 800 m altitude, 15–19.VIII.1987, light trapping, leg. S. Moriuti, T. Saito, Y. Arita & Y. Yoshiyasu; 1 male, THAILAND: Chiang Mai, Doi Inthanon, 1300 m altitude, 1–3.XI.1985, light trapping, leg. S. Moriuti, T. Saito & Y. Arita. Paratypes deposited in OPU.

Bionomics. Seasonal occurrence: August to November; the host is unknown.

Distribution. China (Hainan), Thailand.

Etymology of specific epithet. From the Latin *elongata* (= long), referring to the very long the bilobed narrowly long separated uncus being vertically-curved ventrally at middle of the male genitalia.

Remarks. This new species was previously misidentified as *T. antidroma* (Meyrick, 1931) by Huang *et al.* (2007) owing to their similar appearance. Examination of the type material revealed that genitalia of these two species are quite different.

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