



Revision of the genus *Cimeliomorpha* Diakonoff (Lepidoptera: Tortricidae)

NANTASAK PINKAEW^{1,3,4} & MARIANNE HORAK²¹Department of Entomology, Faculty of Agriculture at Kamphaengsaen, Kasetsart University, Kamphaengsaen Campus, Nakhon Pathom, Thailand, 73140. E-mail: agrnsp@ku.ac.th²The Australian National Insect Collection, CSIRO NRCA, GPO Box 1700, Canberra, ACT 2601, Australia.

E-mail: Marianne.Horak@csiro.au

³Center for Advanced Studies in Tropical Natural Resources, NRU-KU, Kasetsart University, Chatuchak, Bangkok, 10900, Thailand⁴Corresponding Author

Abstract

The enarmoniine genus *Cimeliomorpha* Diakonoff, 1966 is reviewed. Seven species are treated, and a key to the species is provided. Three named species, *C. cymbalora* (Meyrick), *C. novarana* (Felder & Rogenhofer), and *C. egregiana* (Felder & Rogenhofer), are redescribed, with the identity of *C. novarana* finally settled. Three new species, *C. jarujini*, **sp. n.**; *C. inflata*, **sp. n.**; and *C. perspinosa*, **sp. n.**, are described. *Cimeliomorpha nabokovi* Kuznetsov is included based on the original description. Illustrations of adults and genitalia of all species are provided, and the original hand-coloured images of *C. egregiana* and *C. novarana* are reproduced from a copy of the relevant book with unusually well-preserved plates.

Key words: new species, Enarmoniini, Olethreutinae, Thailand, New Guinea

Introduction

The tortricid tribe Enarmoniini contains many conspicuous moths, but the species of the genus *Cimeliomorpha* are among the most eye-catching. Their wing pattern is so unusual that the first species were described in two different families, *Grapholita novarana* (Nicobar Islands) and *Grapholita egregiana* (Ambon) by Felder & Rogenhofer (1875), and *Copromorpha cymbalora* (India) by Meyrick (1907). Recognising taxonomic affinities, Diakonoff (1949) synonymised *Copromorpha cymbalora* with *Grapholita novarana*, referring the taxon to *Enarmonia* Hübner [1825]. He later (Diakonoff 1966) described the new genus *Cimeliomorpha*, referring to it as “A genus of several brilliantly marked species which need revision” and treating *C. cymbalora*, the type species, and *C. novarana* as two separate species. Diakonoff (1966) figured only the head and wing venation for *Cimeliomorpha* as the genitalia of the male holotype of *C. cymbalora* had been figured by Clarke (1958). In his redescription of the genus, Obraztsov (1968) illustrated wing venation, the head, and male and female genitalia of *C. cymbalora* and also associated the genus with other taxa now known to belong to the Enarmoniini. Kuznetsov (1997) added *C. nabokovi* from Vietnam and realised that *Grapholita egregiana* also belonged to *Cimeliomorpha*, pointing to more undescribed species such as the apparently misidentified *C. egregiana* in Laithwaite et al. (1975). One apparently new *Cimeliomorpha* species collected during field work in Thailand and the discovery of two unnamed species in New Guinea material at the Australian National Insect Collection, and among specimens from the Natural History Museum, London, were the impetus for this comprehensive revision. Fortunately, in a copy of Felder & Rogenhofer’s (1875) ‘Die Reise der Oesterreichischen Fregatte Novara um die Erde’ held in the Australian National Insect Collection, the hand-coloured images are unusually well-preserved, which allows confident identification of *novarana* whose holotype cannot be located.

Materials and methods

This revision is based on material in the Kasetsart Kamphaengsaen Insect Collection (KKIC), Thailand; the Austra-

lian National Insect Collection (ANIC), CSIRO, Canberra; and The Natural History Museum (NHMUK), London. Latitude, longitude and elevation were recorded with a GARMIN GPSMAP 76CS. A Leica MZ95 stereomicroscope was used for examination and specimen measurement. 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. A Leitz Dialux 20 compound microscope was used to examine genitalia preparations. Genitalia preparation methods were adapted from Common (1990). The terminology for forewing patterns and genital structure follows Horak (1991, 2006).

***Cimeliomorpha* Diakonoff, 1966**

Cimeliomorpha Diakonoff, 1966: 50, fig. 1. Obraztsov, 1968: 185, figs 9–13; Robinson et al., 1994: 104, plate 17 fig. 5; Kuznetsov, 1997: 801, fig. 7; Brown et al., 2005: 177.

Type species: *Copromorpha cymbalora* Meyrick, 1907, by original designation.

Diagnosis. *Cimeliomorpha* has an unmistakable two-toned forewing pattern with a uniformly yellow or white basal half and a distal half with complex mostly black pattern on red-brown ground with raised silvery lines and spots, and a hindwing that is either white or orange at the base, with a narrow to wide blackish band around its margin. *Anthozela* Meyrick and some *Loboschiza* species also have a conspicuously two-toned forewing, but in the former the basal half is yellow and either speckled with black or suffused with orange, and in the latter the hindwing is not white or yellowish in its basal half. The genitalia of both sexes of *Cimeliomorpha* also indicate a close relationship with *Loboschiza*, but not with *Anthozela*. The wing venation with widely separated R_s and M_1 and parallel M_2 and M_3 in the hindwing (Fig. 3) is most similar to that of *Irianassa* Meyrick, but this is due rather to symplesiomorphy than to a close relationship as evidenced by the very different genitalia in both sexes.

Description. *Head.* Ocellus and chaetosemata well developed. Frons, vertex and labial palpus white in the *cymbalora*-group and yellow in the *egregiana*-group, labial palpus rather short, thick and upcurved, second segment slightly widened medially and apical segment triangular; antenna short, not reaching middle of wing, basal segments of flagellum covered with scales and remainder of flagellum only with few black scales dorsally; cilia minute.

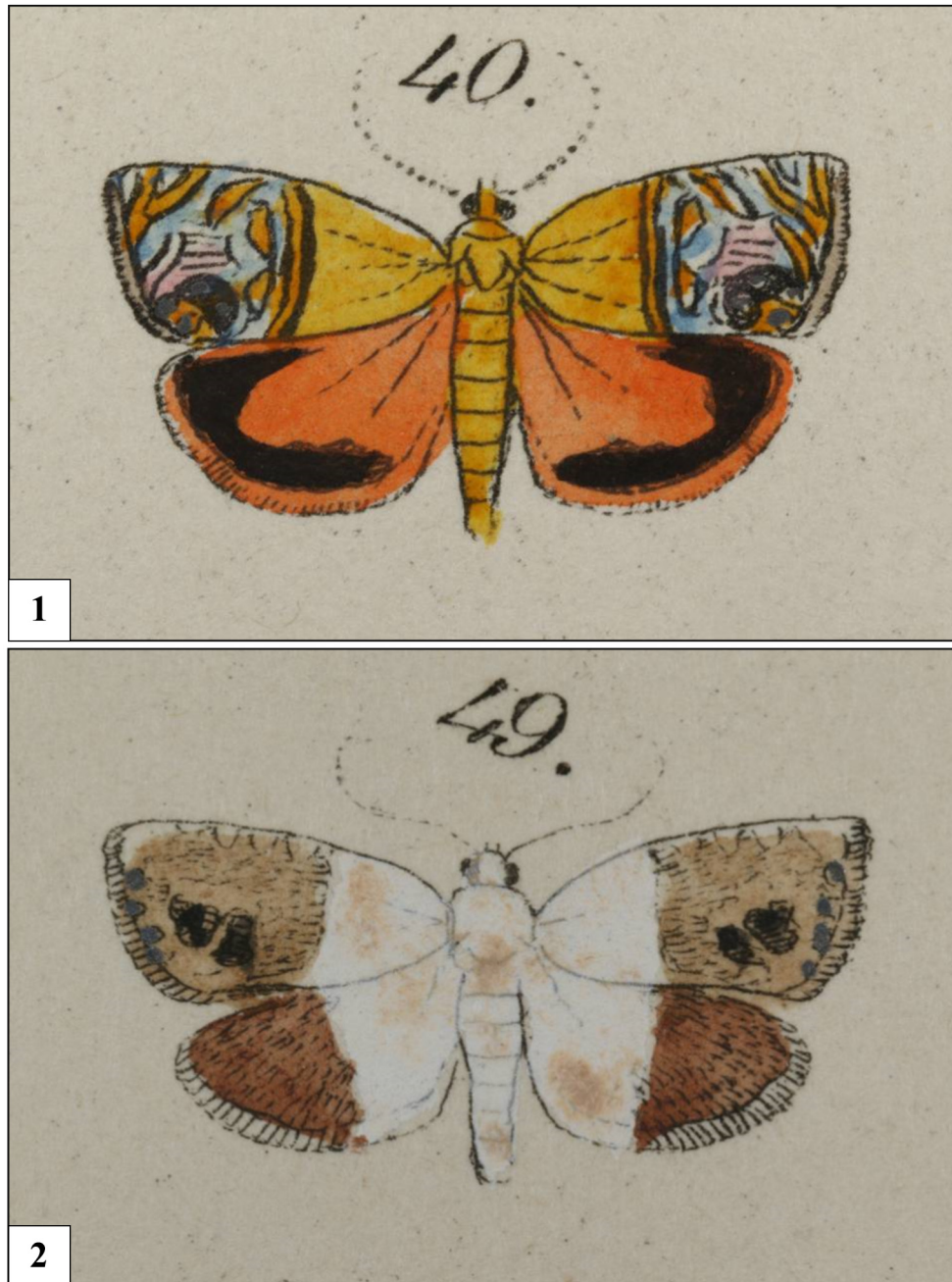
Thorax. Without raised posterior scale tufts. Pronotum, tegulae and mesonotum white in the *cymbalora*-group and yellow in the *egregiana*-group. Forewing length 5.8–9.9 mm; medium-sized to large. Forewing broadly subtriangular, costa evenly curved, male costal fold absent, termen rather round, weakly concave below apex; basal 2/5 of wing white in the *cymbalora*-group and yellow in the *egregiana*-group, distal 3/5 with light brown to orange brown ground colour, with a broad transverse silvery band along its inner margin, angled near costa, with 4–5 oblique silvery lines from costa, ocelloid patch a large bean-shaped to roundish area of white-tipped orange brown scales producing fine transverse white lines, with a central band of longitudinal blackish striation scattered with blackish dots, distally delineated by two convergent silvery streaks; with 4 large spots of raised silvery scales, shadowed by black and some orange: an angled series of three behind CuA_1 , the fourth at the anterior angle of the discal cell. Hindwing with broad blackish band along termen, basally white in the *cymbalora*-group and orange in the *egregiana*-group.

Abdomen. Male genitalia with tegumen rounded dorsally, pedunculus with large anterior subtriangular process, uncus absent, socii broad and hairy, vinculum moderately broad, valva with large ovate to subrectangular sacculus, cucullus variable in shape. Female genitalia with papillae anales elongate and moderately broad, densely setose; sternum VII moderately sclerotised, with patch of scale sockets on lamella postvaginalis, ductus bursae with short to long colliculum, corpus bursae with a small granulate signum or two horn-shaped signa.

Biology. Meyrick (1939) reported for *Laspeyresia cymbalora* Meyrick “Buitenzorg [Bogor, Java], bred March from larvae feeding on leaves of *Derris elliptica* Benth (Fabaceae) (Dr. J. van der Vecht).” To this is added a note by T.B.F. [Thomas Bainbrigge Fletcher] that the species in question is in fact *novarana* Felder & Rogenhofer.

The *cymbalora*-group. Forewing length 5.8–7.2 mm. Frons, vertex, labial palpus, pronotal collar, tegulae and mesonotum white. Forewing with basal 2/5 white; hindwing with basal half white; male genitalia with membrane next to juxta without setae, cucullus tip pointed and ending in short strong spine; female genitalia with one small signum, a granulate sclerite.

The *egregiana*-group. Forewing length 7.2–9.9 mm. Frons, vertex, labial palpus, pronotal collar, tegulae and mesonotum yellow. Forewing with basal 2/5 yellow; hindwing with basal part orange or at least with large orange patch in centre; male genitalia with membrane next to juxta with numerous short setae, cucullus distally rounded and not ending in a single long spine (*C. jarujini* with one strong spine centrally); female genitalia with two horn-shaped signa.



FIGURES 1–2. Illustrations of *Cimeliomorpha* species (as *Grapholitha*) in copy of Felder & Rogenhofer’s (1875) ‘Reise der Oesterreichischen Fregatte Novara um die Erde’ kept at the ANIC in Canberra. 1. *Grapholitha egregiana* F. & R. ♀, ‘Amboina (Doleschall)’ pl. 139, fig. 40. 2. *Grapholitha Novarana* F. & R. ♀, ‘ins. nicobarica Kondul (20. Martio 1858, Frauenfeld M. C.)’ pl. 137, fig. 49.

Key to the species of *Cimeliomorpha*

- 1 Basal area in fore- and hindwing white (*cymbalora*-group) 2
- Basal area in forewing yellow, in hindwing orange (*egregiana*-group)..... 4
- 2 Inner margin of blackish hindwing tip roughly straight. 3
- Inner margin of blackish hindwing tip curved (Figs. 10–11)..... *cymbalora*
- 3 Hindwing blackish tip comprising apical 1/3 (Figs. 14–15) *nabokovi*
- Hindwing blackish tip comprising nearly apical 1/2 (Figs. 12–13) *novarana*
- 4 Major part of hindwing orange. 5
- Major part of hindwing blackish (Figs. 22–23) *inflata*
- 5 Underside of hindwing with blackish patch on costa 6

- Underside of hindwing without blackish patch on costa except for black apex *jarujini*
- 6 Underside of hindwing with blackish longitudinal patch on costa extending to near wing base and weakly connected with black apex *egregiana*
- Underside of hindwing with blackish subelliptical patch on costa medially and weakly connected with black apex *perspinosa*

***Cimeliomorpha cymbalora* (Meyrick, 1907)**

(Figs. 3, 4, 10–11, 24, 35, 41–43)

Copromorpha cymbalora Meyrick, 1907: 152; Clarke, 1955: 110.

Laspeyresia cymbalora; Meyrick, 1937: 99 [incorrectly synonymizing *Grapholita novarana* Felder & Rogenhofer]; 1939: 52 [misidentification of *novarana* as stated by a note added by T.B.Fletcher]; Clarke, 1958: 435, pl. 216, figs. 1, 1a.

Cimeliomorpha cymbalora; Diakonoff, 1966: 50, fig. 1; Obratsov, 1968: 183, figs. 3–7; Nedoshivina, 2010: 337, figs. 7a–c.

Diagnosis. This species differs from members of the *egregiana*-group by the pure white body and basal part of the fore- and hindwings. It is most similar to *C. novarana* in forewing pattern, but the inner edge of the blackish hindwing tip is deeply curved rather than straight and angled only below the costa as in *C. novarana*, and nearly reaches the anal angle. The valva of *C. cymbalora* is unique with a large cylindrical and distally projecting sacculus, a strongly sinuate costa and a transverse elliptical cucullus. The corpus bursae has an inconspicuous granulate signum, and the ductus bursae abruptly widens into the corpus bursae.

Description. *Head.* Frons and labial palpus white. Labial palpus porrect and rather slender, second segment widened medially, apical segment rather thick (Fig. 4). Antenna light brown, scape and pedicel white, flagellum with few black scales dorsally, with some scattered white scales in basal segments.

Thorax. Pronotal collar, tegulae and mesonotum white, without raised posterior scale tufts. Forewing broadly triangular, length 5.8–5.9 mm in males (n = 6) (Fig. 10), 6.0–6.5 mm in females (n = 2) (Fig. 11); costa evenly curved, male costal fold absent, termen rather rounded but weakly concave below apex; basal 2/5 of wing white; posterior 3/5 with brownish orange ground colour, its inner margin edged by very narrow black line, with a distinct transverse silvery band across middle of wing, angled near costa, with three oblique silvery lines from costa, the first ending in silvery spot at R₄, the second from apical 1/3 of costa to termen between M₁ and M₂, the third across apex, preceded by a parallel yellow band; ocelloid patch a large roundish area of white-tipped brownish orange scales producing fine transverse white lines, with longitudinal blackish striation, scattered with blackish, distally delineated by two convergent silvery streaks; with 4 large spots of raised silvery scales, shadowed by black, an angled series of three behind CuA₁, the fourth at the anterior angle of the discal cell; costa with 6–7 minute, dark brown dots along basal 2/5, with well-developed strigulae as black spots alternating with yellow streaks along apical 3/5 of costa; fringe brown. Underside of forewing dark brown with small yellowish grey spots along costa, with white patch basally, and white transverse band at basal 2/3, extending from Sc to dorsum. Hindwing white, apical part blackish, its inner margin irregular and strongly curved, extending from basal 1/3 costa to anal angle. Fringe light brown to CuA₁, then white; basal line somewhat darker. Underside of hindwing white, with area of blackish scaling as upper part except apical 1/3 of costa interrupted by transverse white patch.

Abdomen. Male genitalia (Figs. 24, 35) with tegumen moderately sclerotised, short and wide, dorsally round with sparse long setae, pedunculus with large, triangular process; socii broad, subovate, hairy; vinculum a short and wide band; juxta moderately large, caulis short, phallus moderately long, straight, slightly tapering to apex, vesica with numerous spine-shaped cornuti with sockets; valva with large cylindrical and distally projecting sacculus, densely hairy, followed by deep narrow emargination at base of cucullus; costa strongly sinuate; cucullus large, transversely elliptical, densely bristled and ending in a strong spine. Female genitalia (Figs. 41–43) with papillae anales densely setose; tergum VIII with moderately dense scale sockets posteriorly and on lateral triangular extensions; with bipartite patch of scale sockets on membranous lamella postvaginalis; sternum VII weakly sclerotised, posterior margin medially concave, with two small groups of separate dense scale sockets posterolaterally; entrance to ostium a small, shallow, membranous cup behind posterior margin of sternum VII; colliculum small, sclerotised, rather longer than wide; ductus bursae moderately long, narrow throughout, anterior 1/3 granulated, ductus seminalis narrow, arising from middle of ductus bursae; corpus bursae distinct, ovate, shorter than length of ductus bursae, granulated, and with one inconspicuous, slightly concave granulate signum.

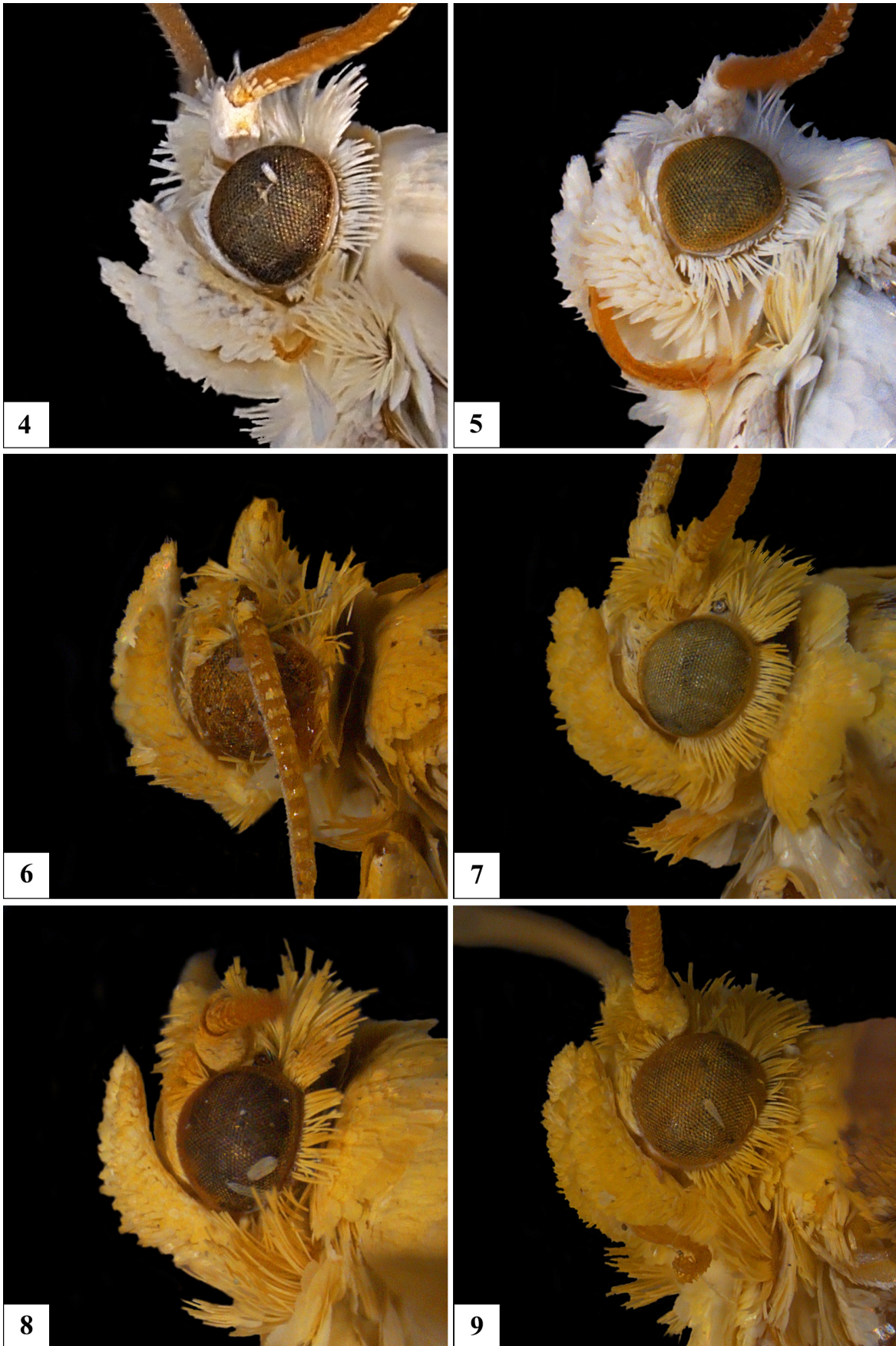
Lectotype. ♂ (NHMUK), Assam, Khasi Hills, genitalia slide JFGC7416.

Specimens examined. Thailand: 1♂, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°51'47"N 99°37'36"E,

200 m., 20 Oct 2006, specimen no. np1735, genitalia slide NP857, N. Pinkaew (KKIC); 1♂, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°55'25"N 99°39'49"E, 131 m., 20 Sep 2008, specimen no. np2893, N. Pinkaew (KKIC); 1♀, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°55'25"N 99°39'49"E, 131 m., 20 Sep 2008, specimen no. np2895, genitalia slide NP1235, N. Pinkaew (KKIC); 1♂, Chanthaburi Prov., Khao Khitchakut N.P., 12°51'04"N 102°12'10"E, 98 m., 8–9 Feb. 2013, specimen no. np5734, genitalia slide NP1936, N. Pinkaew (KKIC). India: 1♂, Assam., Rothschild Bequest, B.M.1939–1 (NHMUK); 1♀ Assam., Rothschild Bequest, B.M.1939–1, genitalia slide no. 33124 (NHMUK); 1♂, Assam., Lathimpor, 1910, H. Stevens, B.M. 1972–527 (NHMUK); 1♂, Khasi Hills, Jul 1906, B.M. genitalia slide no. 33125 (NHMUK).



FIGURE 3. Wing venation of *Cimeliomorpha cymbalora* male (Thailand, KKIC, np1735).



FIGURES 4–9. Labial palpi of *Cimeliomorpha* spp. 4. *C. cymbalora*, female (Thailand, KKIC, np2895). 5. *C. novarana*, female (Thailand, KKIC, np5789). 6. *C. egregiana*, male (Amboyna, Doherty, 1892 No.41343, NHMUK). 7. *C. jarujini*, male (Thailand, holotype). 8. *C. perspinosa*, male (West Papua, holotype). 9. *C. inflata*, male (Woodlark Id, holotype).

Distribution. India, Thailand (new record). Specimens from Thailand were collected from evergreen forest.

Comments. Clarke (1958) figured the adult and male genitalia of the lectotype, and David Lees of The Natural History Museum, London, kindly compared detailed genitalia photos of Thai material with the lectotype. Other material from Assam and Khasi Hills also agrees with the Thai specimens. *Cimeliomorpha cymbalora* and *C. novarana* were long treated as the same species, as discussed in detail under *C. novarana*.

***Cimeliomorpha novarana* (Felder & Rogenhofer, 1875)**

(Figs. 2, 5, 12–13, 25, 36, 44–46)

Grapholitha novarana Felder & Rogenhofer, 1875: pl. 137, fig. 49.

Laspeyresia cymbalora; Meyrick, 1937: 99 [*novarana* erroneously synonymised with *cymbalora*]; Meyrick, 1939: 52 [followed by note by T. B. Fletcher] that this food plant information refers to *novarana* and not *cymbalora*].

Enarmonia novarana; Diakonoff, 1949: 137 [revokes Meyrick's synonymisation of *novarana* with *cymbalora*].

Cimeliomorpha cymbalora; Robinson et al. 1994: 104, pl. 17 fig. 5 [misidentification].

Mehteria novarana; Brown et al. 2005: 416.

Diagnosis. This species differs from members of the *egregiana* group by the pure white basal half of fore- and hindwing. It is most similar to *C. nabokovi*; the two share a valva with a large ovate sacculus and a slender, curved cucullus. However, the phallus of *C. novarana* is shorter and relatively wider than that of *C. nabokovi*. The wing pattern is most similar to that of *C. cymbalora*, but the inner edge of the dark brown hindwing tip runs straight across the wing except near costa rather than strongly curved and extended nearly to the anal angle as in *C. cymbalora*.

Description. *Head:* Frons and labial palpus white. Labial palpus porrect and rather slender, second segment widened medially, apical segment rather thick (Fig. 5). Antenna light brown; scape, pedicel and flagellum with few black scales dorsally, with some scattered white scales on basal segments.

Thorax: Pronotal collar, tegulae and mesonotum white, without raised posterior scale tufts. Forewing broadly triangular, length 6.7–6.8 mm in males (n = 15) (Fig. 12), 7.1–7.2 mm in females (n = 11) (Fig. 13); costa evenly curved, male costal fold absent, termen rather rounded with slightly notch below apex; basal third of wing white, with 6–7 small, dark brown dots along costa; posterior 2/3 of wing with brownish orange ground colour, its inner margin edged by very narrow black line; with well-developed strigulae as black spots alternating with yellow spots along costa; with a distinct transverse silvery band across middle of wing, angled near costa, with three oblique silvery lines from costa, the first ending in silvery spot at R_4 , the second from apical third of costa to termen between M_1 and M_2 , the third across apex, preceded by a parallel yellow band; ocelloid patch large, roundish area of fine longitudinal white and grey striation scattered with black dots and distally delineated by two convergent, curved silvery streaks; with large 4 spots of raised silvery scales, shadowed by black, an angled series of three behind CuA_1 , the fourth at the anterior angle of the discal cell, with brown fringe scales along termen. Underside of forewing dark brown with small yellowish grey spots along costa, with white patch basally, and white transverse band at basal 2/3, extending from Sc to dorsum. Hindwing white with apical half black, its inner margin with black scaling extending to basal 1/3 costa and roughly straight from near anterior angle of discal cell to end of CuP . Underside of hindwing white, with area of blackish scaling as upper part. Fringe grey to CuA_1 , then white; basal line somewhat darker.

Abdomen. Male genitalia (Figs. 25, 36) with tegumen moderately sclerotised, short and wide, dorsally round with dense scale sockets, pedunculus with large, distally rounded, anterior subtriangular process; uncus absent; socii ovate, hairy; vinculum short and wide; juxta moderately large, caulis short; phallus short, wide and slightly tapering to apex, vesica with several spine-shaped cornuti with sockets; valva with costa evenly convex, with large ovate, hairy and distally projecting sacculus, followed by narrow deep emargination at base of curved, long, slender, tapering, hairy cucullus, ending in a strong spine. Female genitalia (Figs. 44–46) with papillae anales densely setose; tergum VIII with moderately dense scales sockets posteriorly and on lateral triangular extensions; membranous lamella postvaginalis with dense microtrichia and only few apical scale sockets; sternum VII weakly sclerotised, posterior margin with roundish emargination; entrance to ostium a large long funnel behind posterior margin of sternum VII; colliculum small, sclerotised, ring-like, wider than long; ductus bursae gradually widening into corpus bursae, moderately long, granulated anterior to colliculum, ductus seminalis arising just below colliculum; corpus bursae small, granulate, with a rather small, concave granulate signum.

Holotype. ♀, 'ins. nicobarica, Kondul (20. Martio 1858, Frauenfeld M.C.)' (could not be located, see Comments; data as in figure caption of original description).

Specimens examined. Thailand: 1♀, Kanchanaburi Prov., Thong Pha Phum N.P., 14°39'02"N 98°31'40"E, 850 m., 17 Aug 2002, specimen no. np330, genitalia slide NP442, N. Pinkaew (KKIC); 1♂, Kanchanaburi Prov., Thong Pha Phum N.P., 14°39'02"N 98°31'40"E, 850 m., 18 Jul 2003, specimen no. np804, genitalia slide NP757, N. Pinkaew (KKIC); 1♂, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°75'48"N 99°52'99"E, 126 m., 18 Apr 2007, specimen no. np2275, N. Pinkaew (KKIC); 1♂, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°75'48"N 99°52'99"E, 126 m., 10 Mar 2008, specimen no. np2571, N. Pinkaew (KKIC); 1♀, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°75'48"N 99°52'99"E, 126 m., 10 Mar 2008, specimen no. np2566, genitalia slide NP1236, N. Pinkaew (KKIC); 1♀, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°75'48"N 99°52'99"E, 126 m., 2 May 2008, specimen no. np2668, N. Pinkaew (KKIC); 1♀, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°75'48"N 99°52'99"E, 126 m., 8 Oct 2008, specimen no. np2908, N. Pinkaew (KKIC); 1♂, Trat Prov., Trat Agroforestry R.St., 12°23'43"N 102°40'32"E, 30 m., 19–20 Oct 2011, specimen no. np5458, N. Pinkaew (KKIC); 1♂, Trat Prov.: Ang-et Com. For., 12°36'04"N 102°19'50"E, 33 m., 22–23 Dec 2011, specimen no. np8817, N. Pinkaew (KKIC); 1♂, Chanthaburi Prov., Entomol. R.St. (East), 13°02'22"N 102°16'88"E, 199 m., 5 Aug. 2013, specimens no. np5912, N. Pinkaew (KKIC); 1♂, Chanthaburi Prov., Entomol. R.St. (East), 13°02'22"N 102°16'88"E, 199 m., 5 Aug. 2013, specimens no. np5914, N. Pinkaew (KKIC); 1♂, Chanthaburi Prov., Entomol. R.St. (East), 13°02'22"N 102°16'88"E, 199 m., 5 Aug. 2013, specimens no. np5915, N. Pinkaew (KKIC); 1♂, Chanthaburi Prov., Entomol. R.St. (East), 13°02'22"N 102°16'88"E, 199 m., 5 Aug. 2013, specimen no. np5917, genitalia slide NP2002, N. Pinkaew (KKIC); 1♀, Chanthaburi Prov., Entomol. R.St. (East), 13°02'22"N 102°16'88"E, 199 m., 5 Aug. 2013, specimens no. np5913, N. Pinkaew (KKIC); 1♀, Chanthaburi Prov., Entomol. R.St. (East), 13°02'22"N 102°16'88"E, 199 m., 5 Aug. 2013, specimen no. np5916, genitalia slide NP2001, N. Pinkaew (KKIC); 1♂, Chanthaburi Prov., Khao Khitchakut N.P., 12°51'04"N 102°12'10"E, 98 m., 9–10 Apr 2013, specimen no. np5788, genitalia slide NP1960, N. Pinkaew (KKIC); 1♀, Chanthaburi Prov., Khao Khitchakut N.P., 12°51'04"N 102°12'10"E, 98 m., 9–10 Apr 2013, specimen no. np5789, genitalia slide NP1961, N. Pinkaew (KKIC); 1♂, Chonburi Prov., Khao Kheow Open Zoo, 13°12'45"N 101°04'12"E, 275 m., 16 Oct 2015, specimen no. np7876, N. Pinkaew (KKIC); 1♂, Nakhon Nayok Prov., Khao Yai N.P., 14°17'13"N 101°23'37"E, 400 m., 2 May 2016, specimen no. np8604, N. Pinkaew (KKIC). Sarawak: 1♂, foot of Mt. Dulit, Junction of rivers, Tinjar & Lejok, 26 IX 1932 (light trap) (NHMUK); 1♂, foot of Mt. Dulit, Junction of rivers, Tinjar & Lejok, 26 VII 1932, Oxford Univ. Exp., B.M. Hobby & A.W. Moore. B.M. 1933–254 (NHMUK); 1♀, foot of Mt. Dulit, Junction of rivers, Tinjar & Lejok, 26 VII 1932, Oxford Univ. Exp., B.M. Hobby & A.W. Moore. B.M. 1933–254 (Abdomen missing) (NHMUK); 1♀, Optocla (blad), De.v.d. Veckl, Bhulentong, Brit. Mus. 1938–158, 27 III 1935 (NHMUK); 1♀, on *Derris elliptica* (leaves), Buitenzorg, 11 I 1937, Coll. Tjoo Tjien Mo. 1938–158, B.M. genitalia slide no. 33126 (NHMUK). Sumatra: 1♂, Pematang Siantar, i 1995, A. Kallies, B.M. genitalia slide no. 33127 (NHMUK). S.W. Celebes: 1♀, Pangean, near Maros. 2,000 ft. March 1938, J.P.A. Kalis, B.M. 1938–397 (Abdomen missing) (NHMUK).

Distribution. Nicobar Island, Thailand (new record), Malaysia, Indonesia. Specimens from Thailand were collected from evergreen and dry evergreen forest.

Comments. The type of *novarana*, already a fragment by 1937, could not be located despite searches by Kevin Tuck and David Lees in the NHMUK and Martin Lödl in the Naturhistorisches Museum, Vienna. As discussed by Diakonoff (1949), Meyrick (1937) treated *novarana* and *cymbalora* as synonymous based on a study of the fragmentary type specimen of *novarana* he states to have borrowed from Vienna. However, because in his copy of Felder & Rogenhofer (1875), the bases of the fore- and hindwing of the hand-coloured figure of *novarana* are blackish instead of clear white as in the type specimen, he concluded that he could not adopt Felder & Rogenhofer's name. Diakonoff (1949) rejected this, based on the figure of *novarana* in his copy of 'Die Reise der Fregatte Novara', even though he reports that in the figure in his copy the colour of the body is yellow and the basal parts of the wing are orange. The figure of *novarana* in the copy held in the ANIC perfectly agrees with Figs. 9 and 10, with a white body and white base to both fore- and hindwing, and the dividing line across both wings nearly straight (Fig. 2). It is well known that pigments in hand-coloured plates may be unstable with especially lead white turning black if exposed to sulphur dioxide, but the image in the ANIC copy looks perfect with just a hint of faint pink discolouration. Establishing the true wing pattern of *novarana* allowed identification of one of the unknown *Cimeliomorpha* from Thailand as this species, described from the Nicobar Islands across the Andaman Sea from Thailand and southern Myanmar, with a distribution extending across South East Asia to Indonesia.

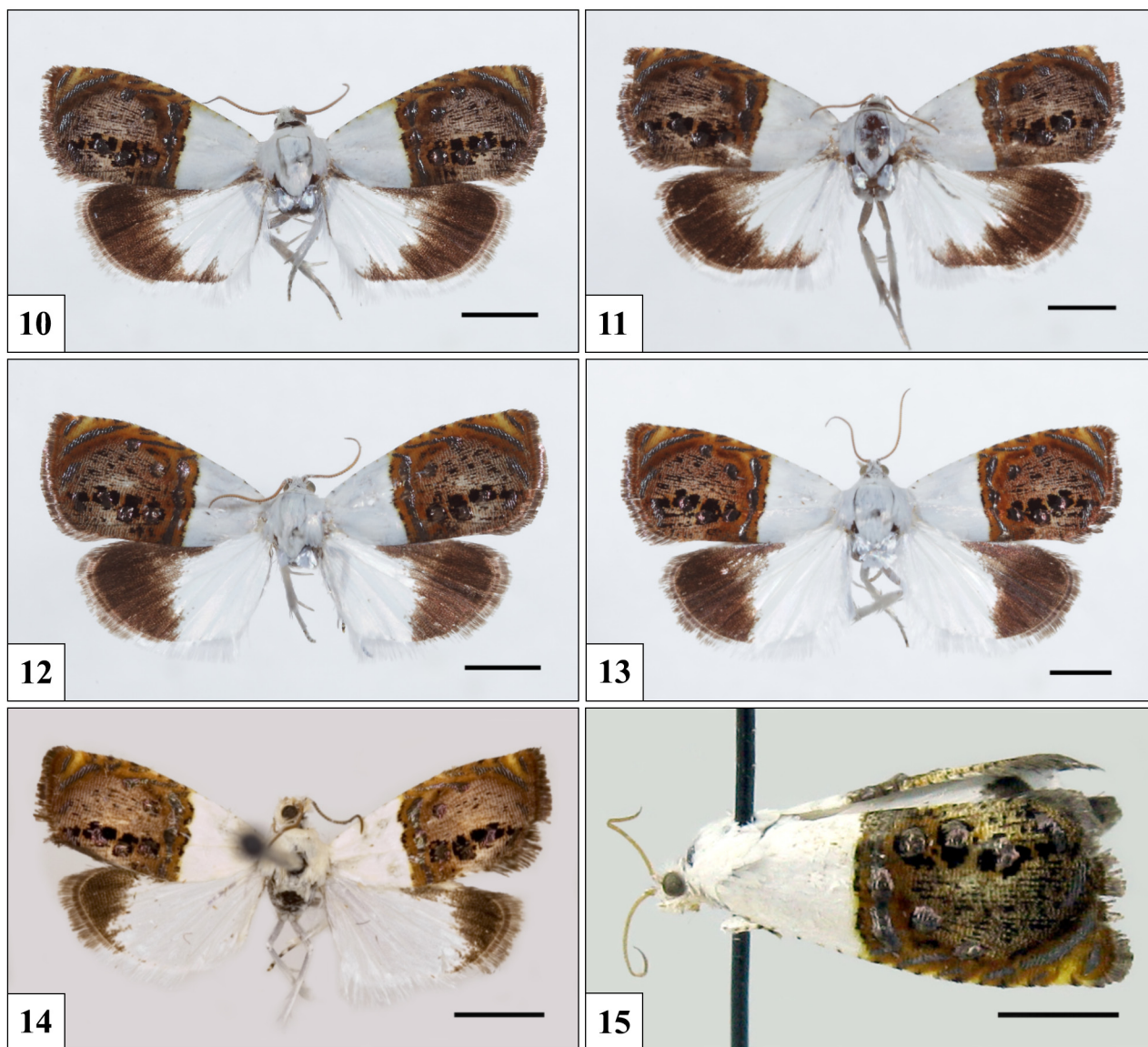
***Cimeliomorpha nabokovi* Kuznetsov, 1997**

(Figs. 14–15, 26, 47–48)

Cimeliomorpha nabokovi Kuznetsov, 1997: 801, fig. 7; Nedoshivina, 2010: 337, figs 8a–c.

Diagnosis. This species differs from members of the *egregiana* group by its white body and white basal area of fore- and hindwings. From the other two species with a white wing base, it differs in the shape of the dark patch on the hindwing tip which is small and restricted to the apical third in *C. nabokovi* whilst it occupies at least the apical half of the hindwing in *C. cymbalora* and *C. novarana*. The male genitalia of *C. nabokovi* are very similar to those of *C. novarana*, but the phallus of *C. nabokovi* is relatively longer and more parallel-sided.

Description. *Head and Thorax* (Figs. 14–15): Photos provided by Svetlana Nedoshivina. *Abdomen*: Male genitalia (Fig. 26) as in Kuznetsov (1997). Female genitalia (Figs. 47–48) as in Nedoshivina (2010).

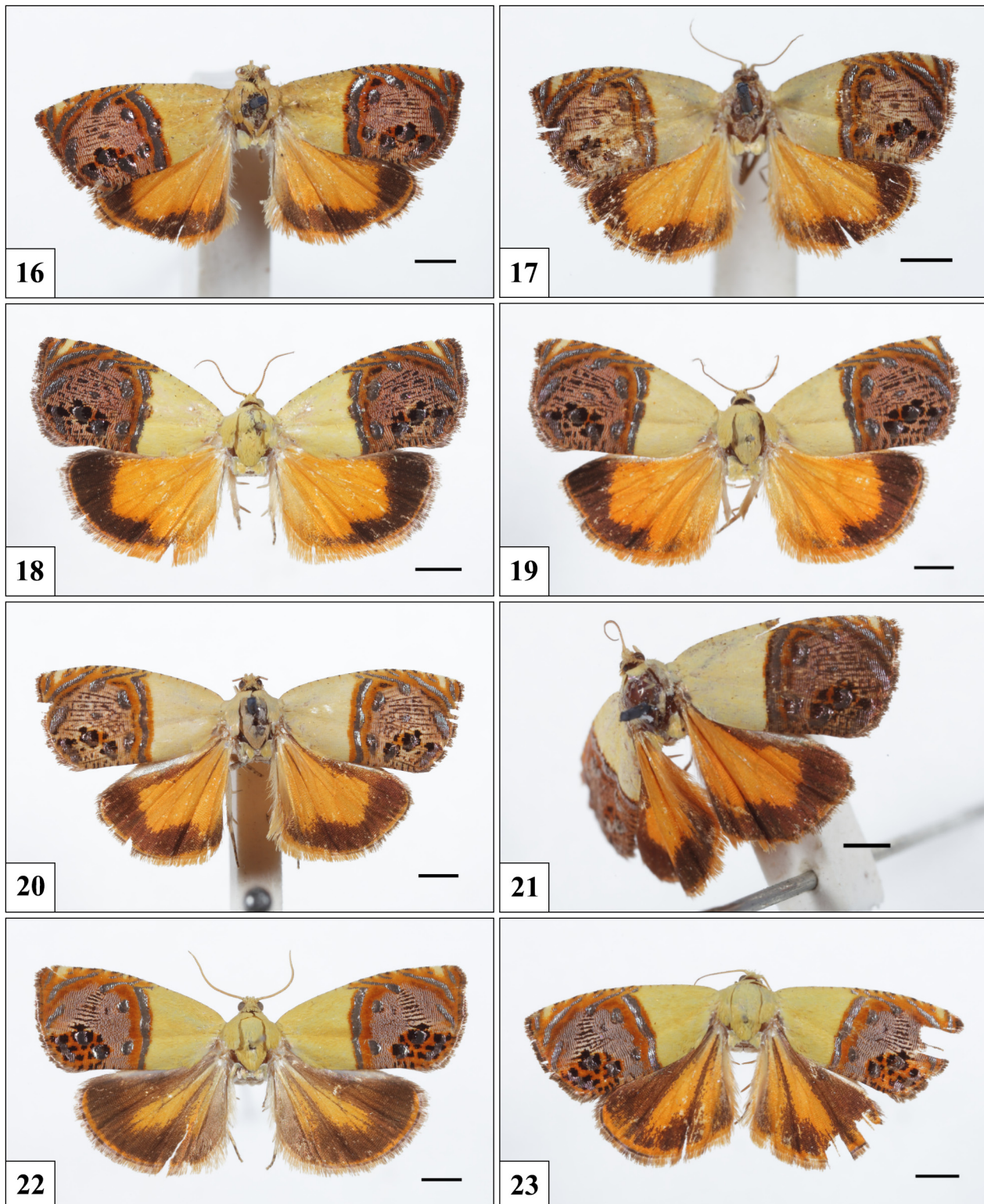


FIGURES 10–15. Adults of *cymbalora* group (scale bars = 2 mm). 10. *C. cymbalora*, male (Thailand, KKIC, np2895). 11. *C. cymbalora*, female (Thailand, KKIC, np5734). 12. *C. novarana*, male (Thailand, KKIC, np5916). 13. *C. novarana*, female (Thailand, KKIC, np5917). 14. *C. nabokovi*, male (Vietnam, courtesy of S. V. Nedoshivina). 15. *C. nabokovi*, female (Vietnam, courtesy of S. V. Nedoshivina).

Holotype. ♂ (ZISP), S. Vietnam, prov. Gialai-Kontum, Tramlap, 20 km N Buenluoi, 900 m, 1 XII 1988, V. Kuznetsov leg.

Distribution. Vietnam.

Comments. We have not examined *C. nabokovi*, but the statement that in the alleged female of *C. nabokovi* “the brown spot on the hindwing is somewhat larger [than in the male]” (Nedoshivina, 2010) raises some concern because in all other *Cimeliomorpha* species the hindwing pattern is diagnostic for the species and not sexually dimorphic. Given the very similar female genitalia, this specimen could be *C. novarana*.



FIGURES 16–23. Adults of *egregiana* group (scale bars = 2 mm). 16. *C. egregiana*, male (Amboyna, Doherty, 1892 No.41343, NHMUK). 17. *C. egregiana*, female (Amboyna, Doherty, 1892 No.41344, NHMUK). 18. *C. jarujini*, male holotype (Thailand). 19. *C. jarujini*, female paratype (Thailand, KKIC, np1852). 20. *C. perspinosa*, male holotype (West Papua). 21. *C. perspinosa*, female paratype (Papua New Guinea, NHMUK). 22. *C. inflata*, male holotype (Woodlark Id). 23. *C. inflata*, female paratype (Woodlark Id, ANIC).

Cimeliomorpha egregiana (Felder & Rogenhofer, 1875)

(Figs. 1, 6, 16–17, 27–28, 37, 49–51)

Graphloitha egregiana Felder & Rogenhofer, 1875: pl. 139, fig. 40.

Cydia egregiana; Laithwaite et al. 1975: 187, fig. 14h [misidentification of *inflata* as *egregiana*]

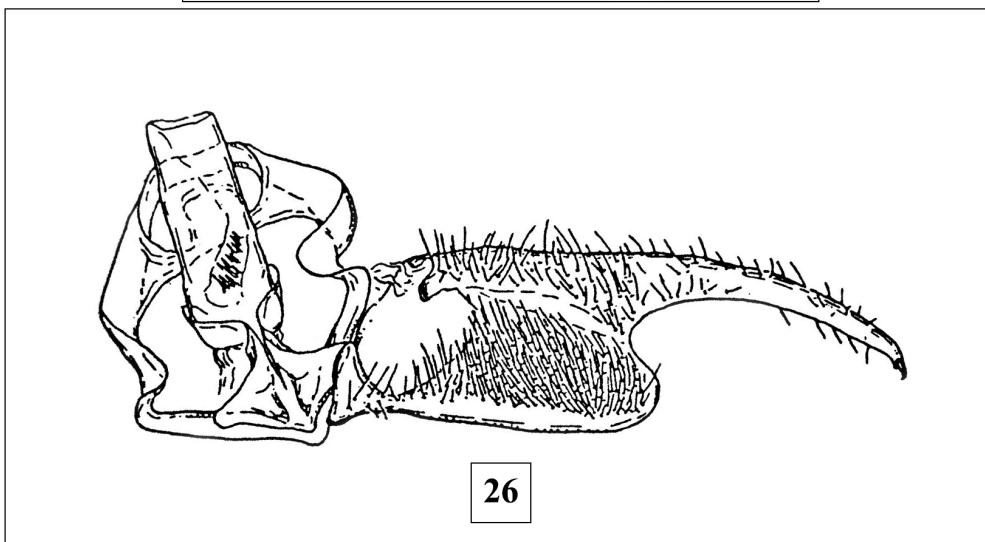
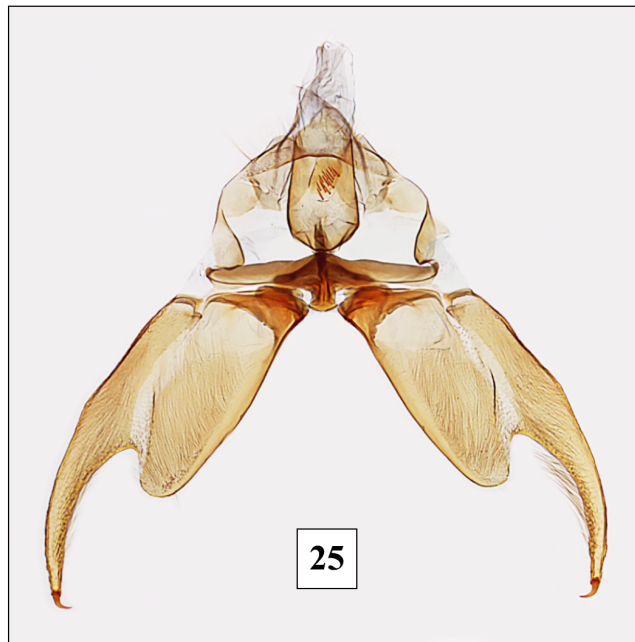
Diagnosis. This species differs from members of the *cymbalora* group by the yellowish basal half of forewing and mostly orange hindwing. It is similar to *C. perspinosa*, *C. jarujini*, and *C. inflata* in forewing pattern, but the extent of blackish markings on the hindwing separates the four species. In *C. egregiana* the blackish mark reaches the anal angle and stops there unlike in *C. inflata* where it ends before reaching the angle or in *C. jarujini* where it extends along the anal margin. In *C. egregiana* and *C. perspinosa* the blackish markings are similar on the upper side, but on the underside there is a blackish longitudinal patch on costa extending to near wing base and weakly connected with black apex only in *C. egregiana*. The valva of *C. egregiana* is unique, simple, straight, and with only a shallow excavation before the cucullus, and the sterigma in the female has a strongly sclerotised spout from its ventral margin and the signa are conspicuously unequal, one with a long scobinate base.

Description. *Head:* Frons and labial palpus pale yellowish. Labial palpus porrect and rather slender, second segment slightly widened medially, apical segment rather thick (Fig. 6). Antenna light brown, scape, pedicel and basal segments of flagellum yellow, flagellum with few black scales dorsally.

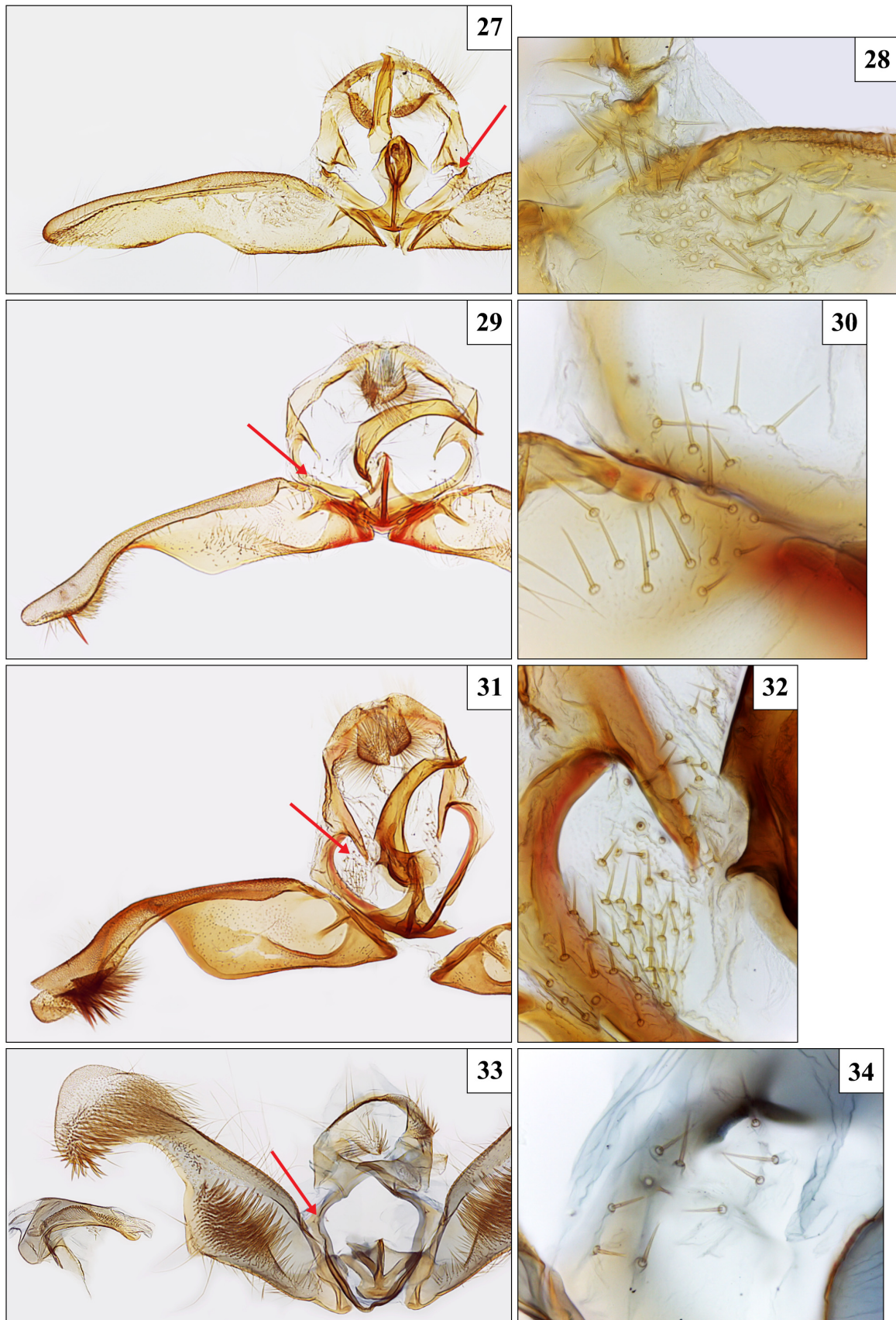
Thorax: Pronotal collar, tegula, and mesonotum yellowish, without raised posterior scale tufts. Forewing broadly subtriangular, length 8.7 mm in male ($n = 1$) (Fig. 16), 7.2 mm in female ($n = 1$) (Fig. 17); costa evenly curved, male costal fold absent, termen rather round with slightly notch below apex, basal half of wing yellowish with 8 small dark brown dots along costa; posterior half of wing with brownish orange ground colour, with well-developed strigulae as black spots alternating with yellow spots along costa, with distinct transverse silvery band across middle of wing, angled near costa, its inner margin irregularly edged, black scales followed by an orange band; with four oblique silvery lines from costa, first ending in silvery spot at R_4 , second narrow and short extending to R_2 , third from $3/4$ costa to termen at M_2 , fourth across apex preceded by a parallel yellow subtriangular mark; ocelloid patch a large roundish area of fine longitudinal blackish striation on whitish ground, scattered with black dots and distally delineated by two convergent silvery streaks, with 4 large spots of raised silvery scales, shadowed by black and some orange, an angled series of 3 behind CuA_1 , fourth at anterior angle of discal cell. Underside of forewing dark brown around margin, with small yellowish grey triangles alternating with black spots along costa, with large orange patch medially, with brown fringe along termen. Hindwing orange with blackish band along edge except in anal area; wing margin edged with narrow orange line, inner margin of blackish band roughly rectangular. Underside of hindwing orange, blackish margin roughly as on upper surface, with blackish longitudinal patch on costa extending to near wing base and weakly connected with black apex, fringe brownish grey to M_3 , then orange.

Abdomen. Male genitalia (Figs. 27–28, 37) with tegumen moderately sclerotised, short and wide, dorsally round with dense setae, pedunculus with large anterior triangular process, lightly sclerotised; socii narrowly ovate, hairy; vinculum short and wide band; juxta rather small, caulis short, phallus moderately long, slender, with curved ventrodistal point; membrane next to juxta with numerous short setae; valva straight and simple, with only shallow ventromedial emargination, with large basal opening, sacculus with dense setae along margin, cucullus wide, broadly elliptical, moderately setose, with small upcurved triangular point in middle of ventral margin, and rounded apex. Female genitalia (Figs. 49–51) with papillae anales densely setose; tergum VIII with moderately dense scale sockets posteriorly, and very dense on lateral triangular extensions; sterigma a lightly sclerotised plate with a strongly sclerotised, small, tongue- to gutter-shaped anterior projection, with dense microtrichia and moderately dense scale sockets ventrolaterally, on posterolateral extensions patch of moderately dense scale sockets; sternum VII weakly sclerotised, posterior margin weakly concave, with very dense scales sockets near posterior margin; sterigma sclerotised forming subcircular patch, posterior part extending divert, oblique outwardly, with dense microtrichiae surrounding small ostium bursae especially beyond ostium posteriorly and moderately dense scale sockets along margin; antrum small, rather short, anterior part forming subtriangular, strongly sclerotised, colliculum rather short, weakly sclerotised; ductus bursae very narrow, widening and granulate approaching corpus bursae; ductus seminalis arising from near entrance of corpus bursae; corpus bursae large, longer than ductus bursae, granulate, with two horn-shaped signa with unequal scobinate bases, one much longer and larger than the other.

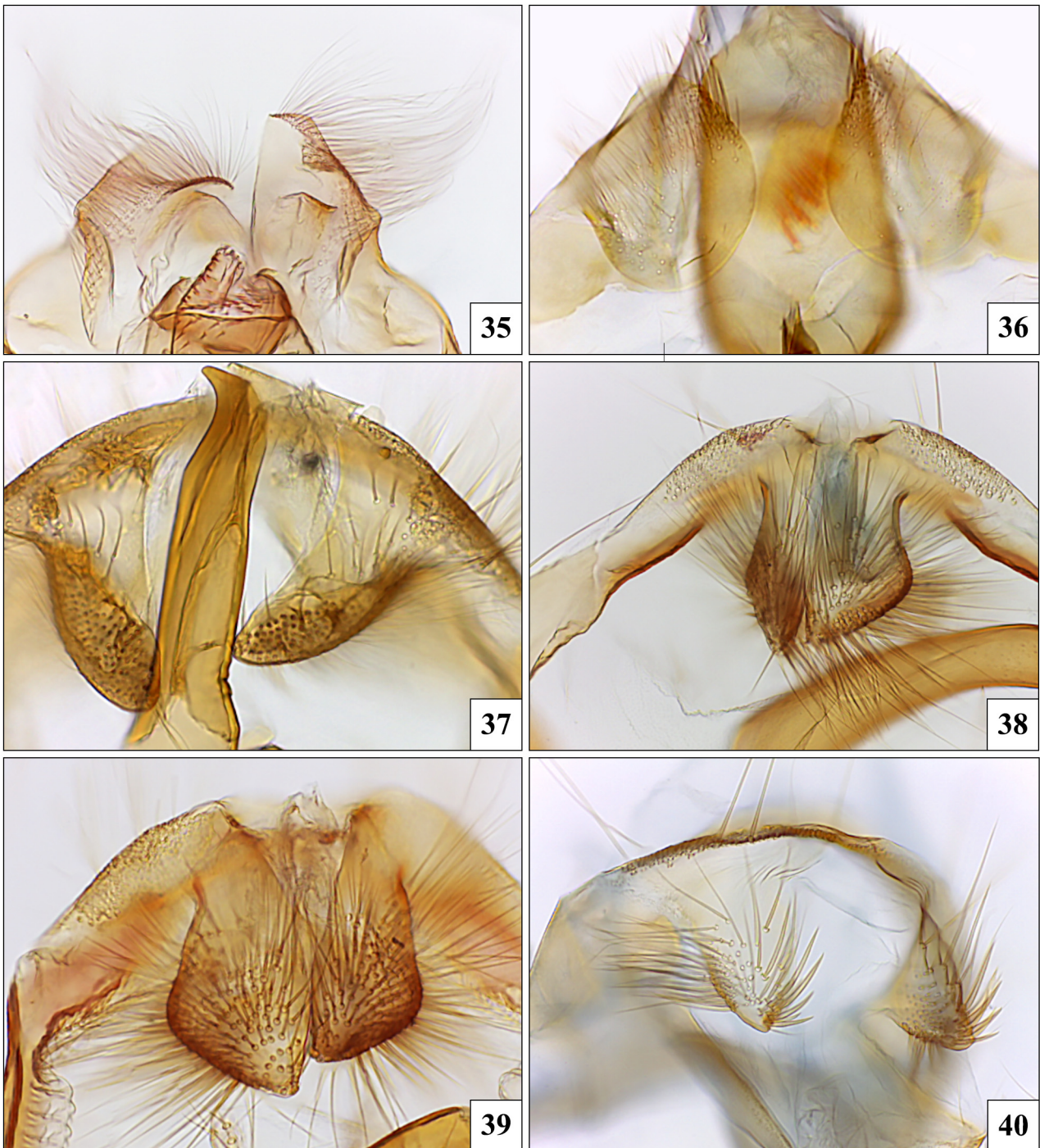
Holotype. ♀ (NHMUK), ‘Doleschal 1859. Amboina’, ‘Novara CXXXIX. f 40. *Grapholitha egregiana* n. Ambon ♀’, ‘Felder Coll. Rothschild 1913-86’, ‘FELDER’S TYPE’, ‘609’. ‘B.M. genitalia slide No. 11771’, ‘NHMUK 010921397’.



FIGURES 24–26. Male genitalia of *cymbalora* group. 24. *C. cymbalora* (Thailand, KKIC, genitalia slide NP1936). 25. *C. novarana* (Thailand, KKIC, genitalia slide NP2001). 26. *C. nabokovi* (reproduced from Kuznetsov, 1997).



FIGURES 27–34. Male genitalia of *egregiana* group. 27. *C. egregiana* (Amboyna, B.M. genitalia slide no. 33120). 28. *C. egregiana*, spines (right valva). 29. *C. jarujini* (Thailand, holotype). 30. *C. jarujini*, spines (left valva). 31. *C. perspinosa* (West Papua, holotype). 32. *C. perspinosa*, spines (left valva). 33. *C. inflata* (Woodlark, holotype). 34. *C. inflata*, spines (left valva) (Paratype, B.M. genitalia slide no. 33131).



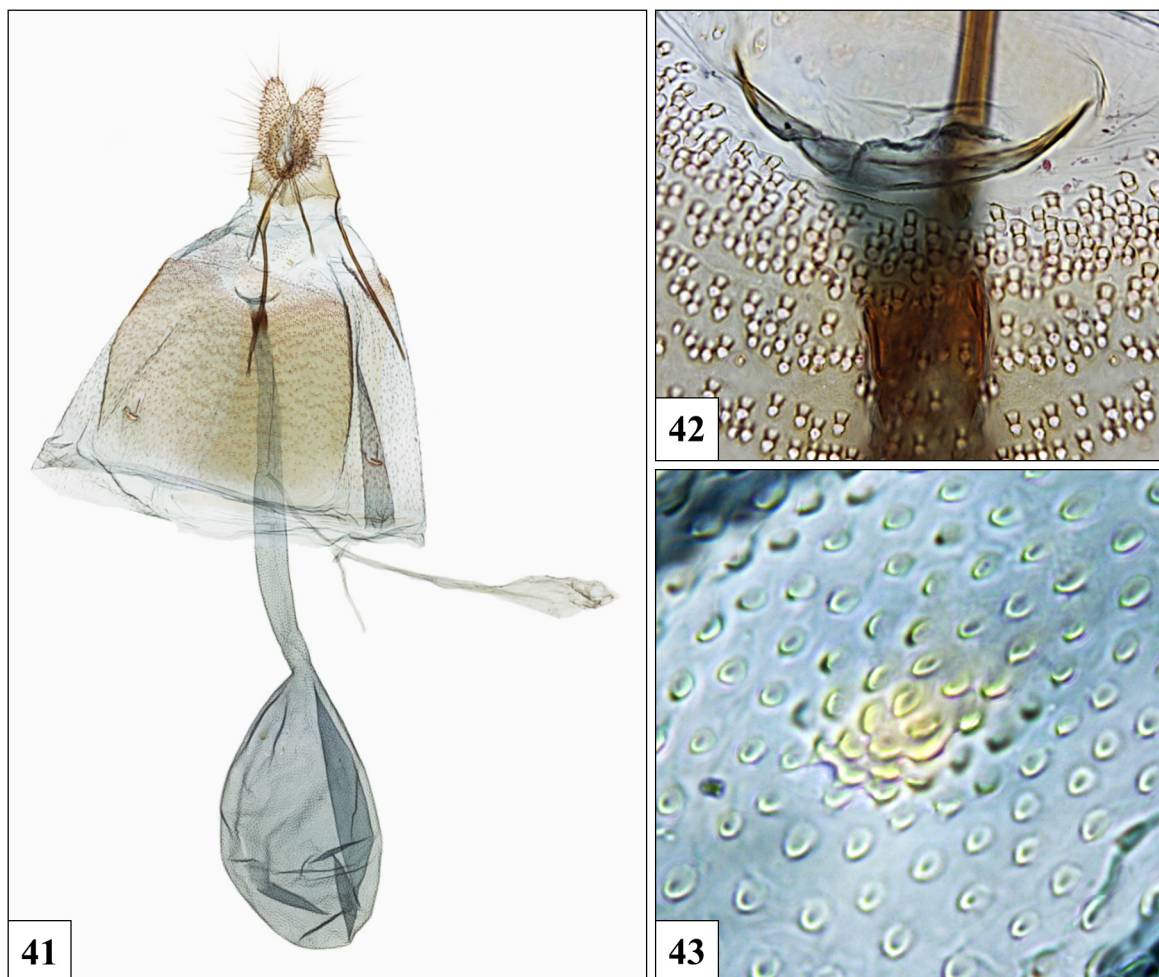
FIGURES 35–40. Socii of *Cimeliomorpha* spp. 35. *C. cymbalora* (Thailand, KKIC, genitalia slide NP1936). 36. *C. novarana* (Thailand, KKIC, genitalia slide NP2001). 37. *C. egregiana* (Amboyna, B.M. genitalia slide no. 33120). 38. *C. jarujini* (Thailand, holotype). 39. *C. perspinosa* (West Papua, holotype). 40. *C. inflata* (Woodlark, holotype)

Specimens examined. Indonesia: 1♂, Amboyna, Doherty, 1892, no. 41344, Walsingham Collection 1910–427, B.M. genitalia slide no. 33121 (NHMUK), 1♀, Amboyna, Doherty, 1892, no. 41343, Walsingham Collection 1910–427, B.M. genitalia slide no. 33120 (NHMUK).

Distribution. Ambon Island (Maluku Islands), Indonesia.

Comments. The hindwing pattern is distinct in all *Cimeliomorpha* species, except in *C. egregiana* and *C. perspinosa*, but the distributions of the latter two are widely separated, and their genitalia are very different. The figure in ‘Die Reise der Oesterreichischen Fregatte Novara um die Erde’ agrees with the other specimens from Ambon studied for this revision, with the black band reaching the anal angle in the hindwing and stopping there (Fig. 1).

For confirmation, David Lees (NHMUK) kindly compared photos of wing pattern and of the genitalia slide of the female figured herein from Ambon with the holotype, and sent us a photo of the type genitalia. The two specimens share the characteristic, small, tongue-shaped projection below the ostium and have one of the two signa with a much longer basal plate, even though the ovipositor lobes look dissimilar due to their different positions.



FIGURES 41–43. *Cimeliomorpha cymbalora* (Assam, B.M. genitalia slide no. 33124). 41. Female genitalia. 42. Ostium. 43. Signum.

***Cimeliomorpha jarujini*, sp. n.**

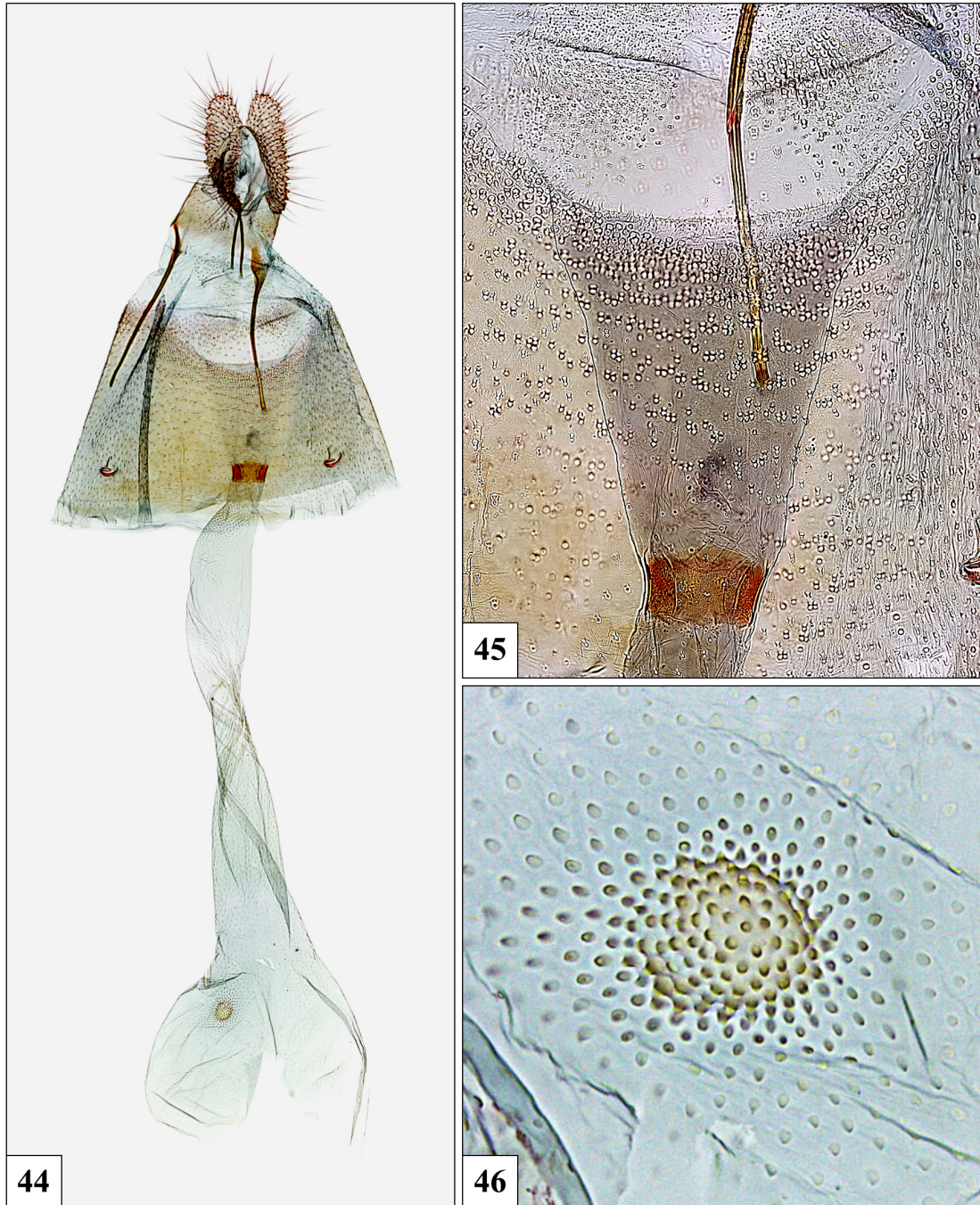
(Figs. 7, 18–19, 29–30, 38, 52–54)

Diagnosis. This species differs from members of the *cymbalora* group by the yellowish basal 2/5 of the forewing and a mostly orange hindwing. It is similar to all other species of the *egregiana* group in forewing pattern, but in the hindwing the short crescent-shaped blackish band is diagnostic: it reaches neither the base of the costa nor the anal angle, or at most only as some scattered scales, unlike all other species of the *egregiana* group. The valva of *C. jarujini* is most similar to that of *C. perspinosa*, but the cucullus of the former is less densely setose and has a central single large spine.

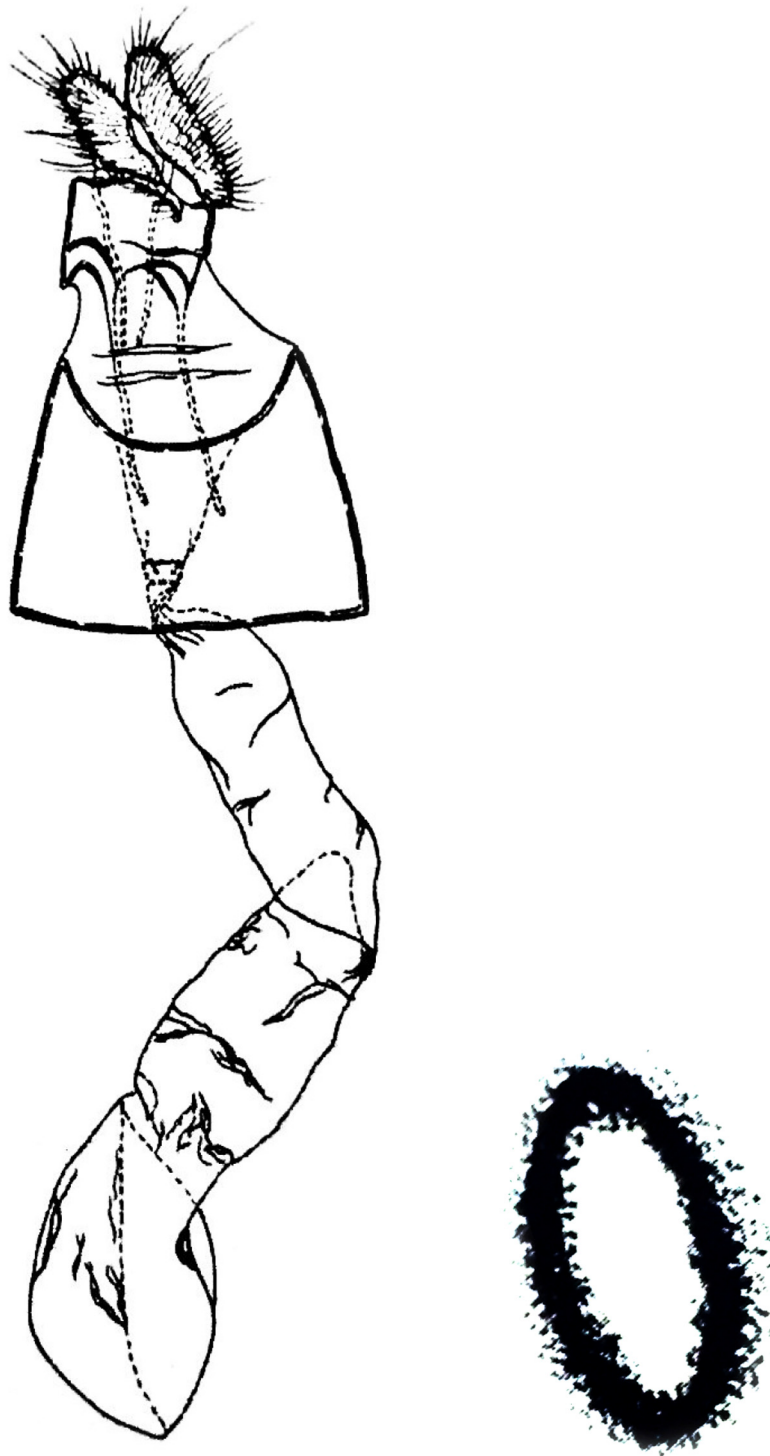
Description. *Head.* Frons and labial palpus pale yellowish. Labial palpus porrect and rather slender, second segment slightly widened medially, apical segment rather thick (Fig. 7). Antenna light brown, scape and pedicel yellow with black scales dorsally, basal segments of flagellum yellow, flagellum with few black scales dorsally.

Thorax. Pronotal collar, tegula and mesonotum yellowish, without raised posterior scale tufts. Forewing broadly subtriangular, length 8.5–8.6 mm in males ($n = 3$) (Fig. 18), 9.7–9.8 mm in females ($n = 2$) (Fig. 19); costa evenly curved, male costal fold absent, termen rather round with slightly notch below apex, basal half of wing yellowish with 8 small dark brown dots along costa; posterior half of wing with light brown ground colour, with well-developed strigulae as black spots alternating with yellow spots along costa, with distinct transverse silvery band across

middle of wing, angled near costa, its inner margin irregularly edged with very narrow light brown line; with five oblique silvery lines from costa, the first ending in silvery spot at R_{4+5} , the second narrow and short extending to R_{2+3} , the third from $3/4$ costa to termen at M_{2+3} , followed by the fourth narrow and short line extending to R_{4+5} , the fifth across apex preceded by a parallel yellow subtriangular mark; ocelloid patch a large roundish area of fine irregular longitudinal blackish striation on whitish ground, scattered with black dots and distally delineated by two convergent silvery streaks, with large and 5 rather small spots of raised silvery scales, shadowed by black and some orange, an angled series of 3 behind CuA_1 , the fourth at the anterior angle of the discal cell and the fifth in the middle of the ocelloid patch. Underside of forewing dark brown around margin, except basal half on dorsum, with small yellowish grey subtriangles alternating with black spots along costa, with large orange patch medially, with brown fringe along termen. Hindwing orange with crescent-shaped blackish band apically, not reaching base of costa nor anal angle; wing margin edged with narrow orange line. Underside of hindwing orange, blackish margin apically roughly as on upper surface, fringe brownish grey to M_3 , then orange.



FIGURES 44–46. *Cimeliomorpha novarana* (Thailand, KKIC, genitalia slide NP1961). 44. Female genitalia. 45. Ostium. 46. Signum.



47

48

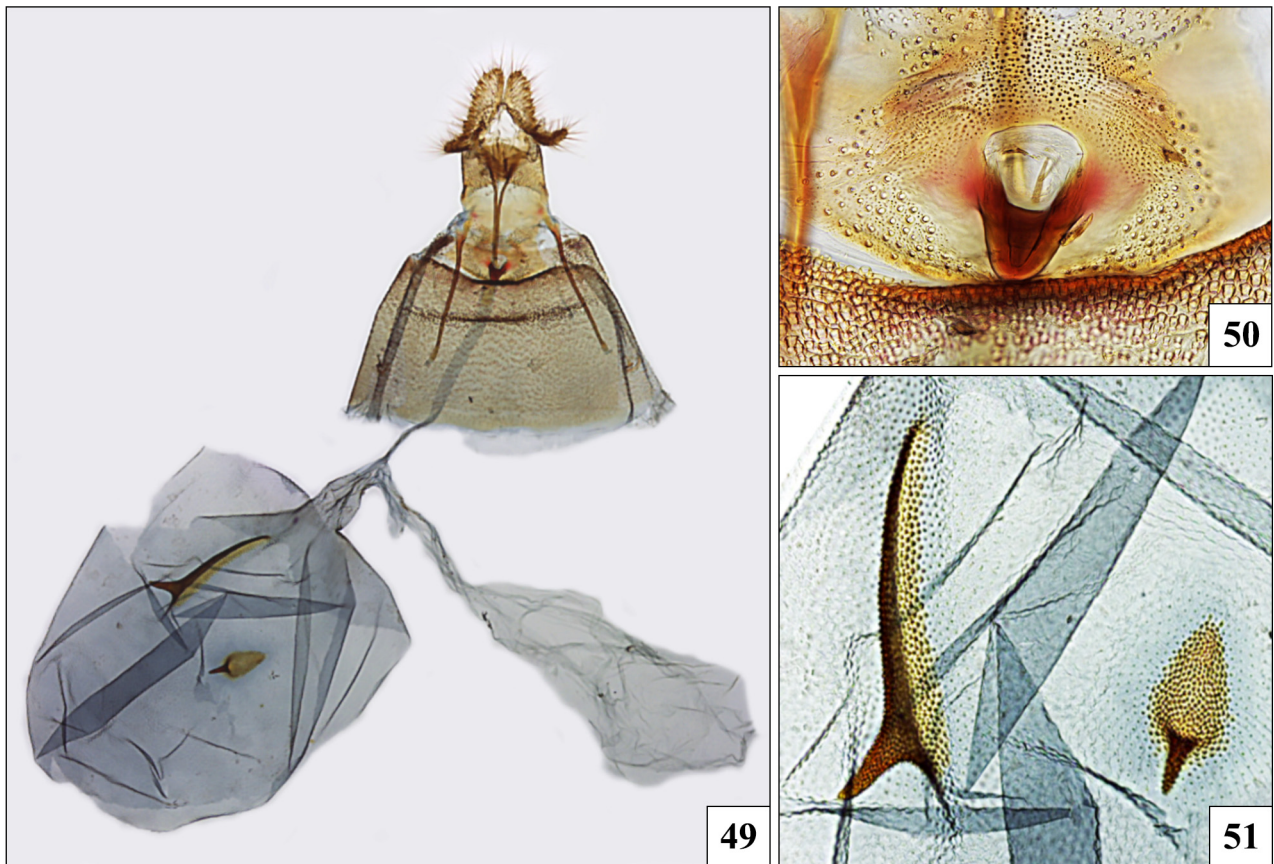
FIGURES 47–48. *Cimeliomorpha nabokovi* (reproduced from Nedoshivina 2010). 47. Female genitalia. 48. Signum.

Abdomen. Male genitalia (Figs. 29–30, 38) with tegumen moderately sclerotised, short and wide, dorsally round with dense scale sockets dorsolaterally, pedunculus with slender, curved, pointed anterior process; socii broadly subtriangular, close together, hairy; vinculum moderately long band; juxta rather small, caulis rather short, phallus moderately long, slender and strongly curved, with long ventrodistal point; membrane next to juxta with numer-

ous short setae; valva with deep emargination ventromedially at base of cucullus, sacculus large, subrectangular, with short, scattered setae, concentrated along ventral margin of basal opening, dense setae along margin, cucullus rather short and flat, with rounded apex, inner surface with numerous, short spiniform setae, with one much larger spine medially. Female genitalia (Figs. 52–54) with papillae anales densely setose; tergum VIII with moderately dense scale sockets posteriorly and on lateral triangular extensions; sterigma large, semicircular plate with sinuate posterior margin, variably sclerotised, with dense scale sockets posteriorly, posteromedially with raised longitudinal ridge ending in two anterior arms partially encircling small round ostium; sternum VII weakly sclerotised, posterior margin with deep, U-shaped excavation with very dense scale sockets along margin; colliculum weakly sclerotised, long and slender; ductus bursae very narrow except for granulate anterior 1/4; ductus seminalis arising from anterior 1/3 of ductus bursae; corpus bursae ovate, shorter than length of ductus bursae, with two equal-sized horn-shaped signa.

Holotype. ♂. Thailand: Nakhon Si Thammarat Prov., Khao Nan N.P. 8°55'25"N 99°39'49"E, 131 m., 6 Feb. 2008, N. Pinkaew, specimen no. np2589, genitalia slide NP1382. Deposited in KKIC.

Paratypes. Thailand: 1♀, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°51'47"N 99°37'36"E, 207 m., 24 Nov 2006, specimen no. np1799, genitalia slide NP816, N. Pinkaew (KKIC); 1♀, Thailand, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°55'25"N 99°39'49"E, 131 m., 22 Dec 2006, specimen no. np1852, genitalia slide NP1234, N. Pinkaew (KKIC); 1♂, Thailand, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°55'25"N 99°39'49"E, 131 m., 20 Jan 2007, specimen no. np1937, genitalia slide NP856, N. Pinkaew (KKIC); 1♂, Thailand, Nakhon Si Thammarat Prov., Khao Nan N.P., 8°55'25"N 99°39'49"E, 131 m., 11 Jan 2008, specimen no. np2574, genitalia slide NP1233, N. Pinkaew (NHMUK).



FIGURES 49–51. *Cimeliomorpha egregiana* (Amboyna, B.M. genitalia slide no. 33121). 49. Female genitalia. 50. Ostium. 51. Signa.

Etymology. This species is named after the late Jarujin Nabhitabahta, the first director of The Thailand Natural History Museum.

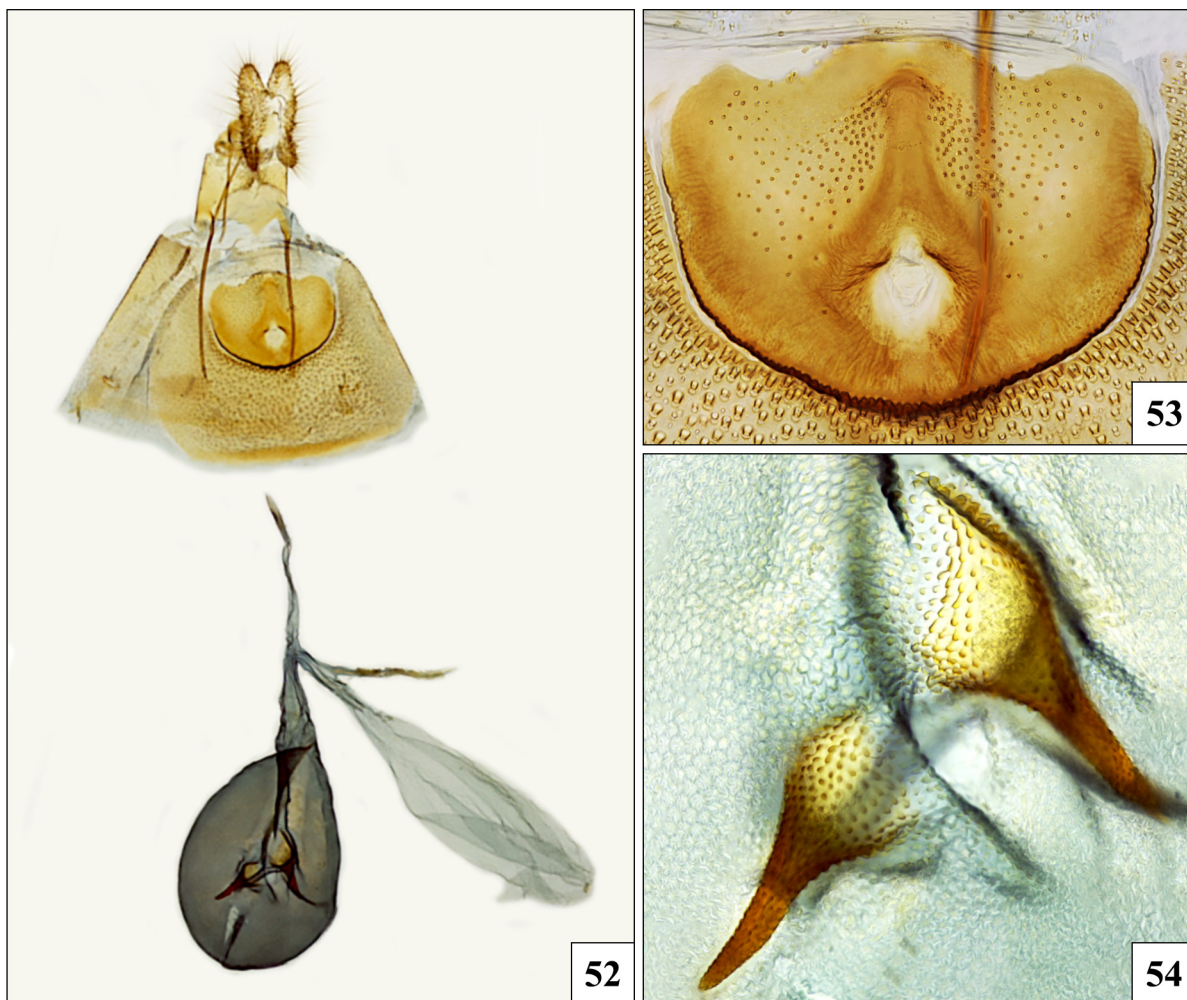
Distribution. Southern Thailand (Nakhon Si Thammarat). Specimens were collected from evergreen forest.

Cimeliomorpha perspinosa, sp. n.

(Figs. 8, 20–21, 31–32, 39, 55–58)

Diagnosis. This species differs from members of the *cymbalora* group by the yellow basal 2/5 of the forewing and a mostly orange hindwing. It is similar to the other species of the *egregiana* group in forewing pattern. The hindwing above is similar to that of *C. egregiana* with the black band reaching to the anal angle but not beyond, while in *C. jarujini* it ends before the anal angle, and in *C. perspinosa* it extends also along the anal margin. A diagnostic difference on the ventral side of the hindwing separates *C. perspinosa* with the subelliptical patch on costa medially from *C. egregiana* with a longitudinal blackish patch on costa. The valva of *C. perspinosa* is most similar to that of *C. jarujini*, but the cucullus of *C. perspinosa* has a dense tuft of equally large spines, whereas *C. jarujini* has a single, much larger spine.

Description. *Head.* Frons, vertex, and labial palpus pale yellowish. Labial palpus porrect and rather slender, second segment slightly widened medially, apical segment rather thick (Fig. 8). Antenna light brown, scape, pedicel, and basal segments of flagellum yellow, remains of flagellum with few black scales dorsally on each segment.



FIGURES 52–54. *Cimeliomorpha jarujini* (paratype, Thailand, KKIC, genitalia slide NP1234). 52. Female genitalia. 53. Osmium. 54. Signa.

Thorax. Without raised posterior scale tufts; pronotal collar, tegula and mesonotum yellow. Forewing broadly subtriangular, length 9.6 mm in male ($n = 1$) (Fig. 20), 9.9 mm in female ($n = 1$) (Fig. 21); costa evenly curved, male costal fold absent, termen rather round, weakly concave below apex, basal 2/5 of wing yellow, distal 3/5 of wing with orange brown ground colour, with a broad transverse silvery band along its inner margin, angled near costa, inwardly followed by broad orange brown band in male, but inner margin of transverse silvery band in female edged with a narrow black line; with five additional oblique silvery lines from costa, first ending in silvery spot at R_4 , second narrow and short extending to R_2 , third from 3/4 costa to termen at M_2 , the fourth narrow and short extend-

ing to R_4 , fifth across apex preceded by a parallel yellow subtriangular mark; ocelloid patch a large roundish area of white-tipped orange brown scales producing fine transverse white lines, with fine longitudinal blackish striation, scattered with blackish dots, distally delineated by two convergent silvery streaks; with a smaller central and four larger spots of raised silvery scales, shadowed by black and some orange, an angled series of 3 behind CuA_1 , fifth at the anterior angle of the discal cell, costa with 8 minute dark brown dots along basal 2/5, remainder with black spots alternating with yellow spots; fringe brown with dark basal line. Underside of forewing orange with dark brown around margin except basal half of dorsum, with small yellowish grey triangles alternating with black spots along costa. Hindwing orange with blackish band along edge except in anal area; wing margin edged with narrow orange line, inner margin of blackish band roughly rectangular; fringe brown, with dark basal line to CuP , then gradually paler to white. Underside of hindwing orange, blackish margin roughly as on upper surface extending along edge except along anal margin, costa with blackish subelliptical patch medially and weakly connected with black apex.



FIGURES 55–58. *Cimeliomorpha perspinosa* (Papua New Guinea, B.M. genitalia slide no. 33122). 55. Female genitalia. 56. Ostium. 57–58. Signa.

Abdomen. Male genitalia (Figs. 31–32, 39) with tegumen moderately sclerotised, short and wide, dorsally round with dense setae, pedunculus with moderately large anterior narrowly triangular process; uncus absent; socii moderately large, lobe-shaped, hairy; gnathos membranous arising from near middle of tegumen; vinculum a mod-

erately long, curved band, moderately sclerotised; juxta rather small, caulis rather short; phallus slender, moderately long and curved, with ventrodiscal point; anellus surrounding base of phallus and extending obliquely, membrane next to juxta with numerous short setae; valva with large basal opening and deep emargination at base of cucullus, sacculus large, subrectangular, basally with short, sparse setae, dorsal margin with dense scale sockets, and with group of moderately dense scale sockets on ventral margin of basal opening; cucullus rather small, with rounded apex, outer surface with dense scale sockets, inner surface with dense bristles. Female genitalia (Figs. 55–58) with papillae anales densely setose; tergum VIII with moderately dense scale sockets posteriorly and on lateral triangular extensions; sterigma large, semicircular, strongly sclerotised, posterior margin lightly sinuate, with dense scale sockets except anteriorly and on raised rim dorsally around ostium; sternum VII sclerotised especially along anterior margin, posterior margin with deep, rectangular excavation, with very dense scale sockets medially and along posterior margin; colliculum long and slender, sclerotised; ductus bursae very narrow except for granulate anterior fourth; ductus seminalis arising from anterior 1/3 of ductus bursae; corpus bursae ovate, shorter than length of ductus bursae, with two nearly equal, sinuate, horn-shaped signa.

Holotype. ♂, [West Papua] New Guinea: Mimika R. VII 1910, F.R. Wollaston, 1911-229, 350405, B.M. genitalia slide no. 33123 (NHMUK).

Other material examined. Papua New Guinea: 1♀, Bastian [New Britain], Doherty, 1892, no. 42356, Walsingham Collection 1910-427, B.M. genitalia slide no. 33122 (NHMUK).

Etymology. The specific epithet refers to the cluster of bristles on the cucullus.

Distribution. New Guinea: West Papua (Indonesia) and New Britain (Papua New Guinea).

***Cimeliomorpha inflata*, sp. n.**

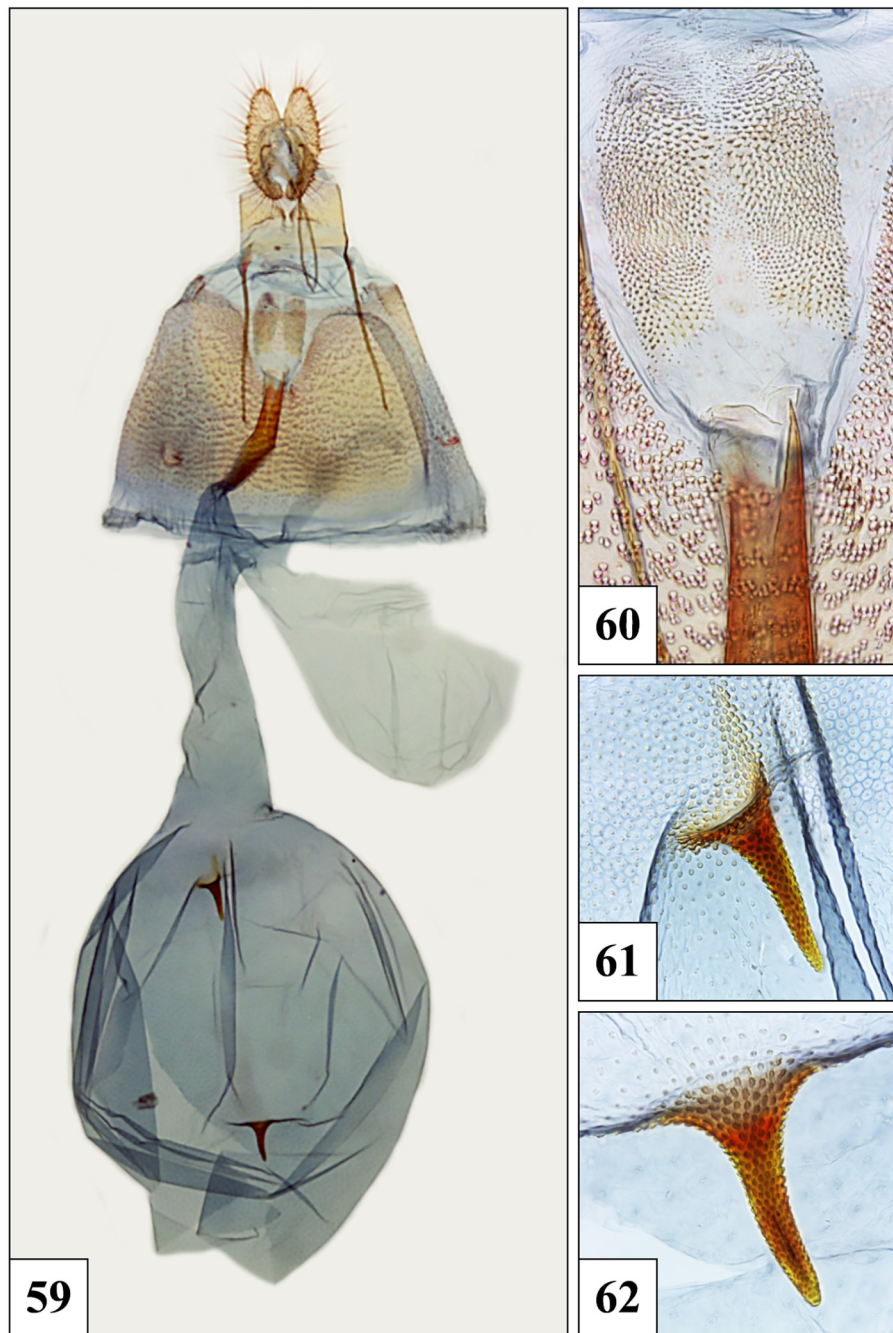
(Figs. 9, 22–23, 33–34, 40, 59–62)

Cydia egregiana; Laithwaite et al. 1975: 187, fig. 14h [misidentification]

Diagnosis. This species differs from members of the *cymbalora* group by the yellow basal 2/5 of the forewing and the partially orange hindwing. From other species in the *egregiana* group it differs by the very distinct but short, black, longitudinal fine striation in the ocelloid patch, and by the orange scales in the hindwing restricted to a bipartite median patch. The valva of *C. inflata* is unique, with a large and swollen cucullus, and the female genitalia are diagnostic with two elliptical patches of scale sockets on the membranous lamella postvaginalis and a very long colliculum.

Description. *Head.* Frons, vertex and labial palpus yellow. Labial palpus porrect and rather slender, second segment slightly widened medially, apical segment rather thick (Fig. 9). Antenna light brown, scape, pedicel and basal segments of flagellum yellow, flagellum with few black scales dorsally except on basal segments.

Thorax. Without raised posterior scale tufts, pronotal collar, tegula and mesonotum yellow. Forewing broadly subtriangular, length 9.5–9.6 mm in males (n = 6) (Fig. 22), 9.0–9.1 mm in females (n = 6) (Fig. 23); costa evenly curved, male costal fold absent, termen rather round, weakly concave below apex, basal 2/5 of wing yellow; distal 3/5 of wing with orange brown ground colour, with a broad transverse silvery band along its inner margin, angled near costa, inwardly followed by a narrow, irregular, orange line; with four additional oblique silvery lines from costa, first ending in silvery spot at R₄, second narrow and short extending to R₂, third from 3/4 costa to termen between M₁ and M₂, fourth across apex preceded by a parallel yellow subtriangular mark following a small silvery spot below costa; ocelloid patch a large bean-shaped area of white-tipped orange brown scales producing fine transverse white lines, medially with narrowly subtriangular band of fine longitudinal blackish striation, distally delineated by two convergent silvery streaks, and tornal area with orange brown ground; with 4 large spots of raised silvery scales, an angled series of 3 behind CuA₁ with two distal ones shadowed by black, fourth at anterior angle of the discal cell; with indistinct minute dark brown dots on costa, with well-developed strigulae as black spots alternating with yellow spots along costa; fringe brown. Underside of forewing dark brown, with large yellowish grey patch across 2/5 extending from M-stem to dorsum and a yellowish grey patch at posterior angle of discal cell. Hindwing blackish except for narrow orange band along termen and a narrow bipartite orange patch between middle of discal cell and anal region, interrupted along CuP; fringe brown with dark basal line to near anal angle, then gradually paler to white. Underside of hindwing orange, broad irregular blackish band along termen and anal region and irregular blackish patch medially on costa.



FIGURES 59–62. *Cimeliomorpha inflata* (paratype, Woodlark Id., ANIC genitalia slide 8909). 59. Female genitalia. 60. Ostium. 61–62. Signa.

Abdomen. Male genitalia (Figs. 33–34, 40) with tegumen moderately sclerotised, short and wide, dorsally round with dense scale sockets dorsally, pedunculus with large anterior subtriangular process; uncus absent; socii moderately large, subtriangular, with dense bristles gnathos a moderately sclerotised band; vinculum a moderately long and curved band, moderately sclerotised; juxta rather small, caulis short, phallus moderately long, slightly curve ventrally, ventrodistal point and swollen, with dense cornuti sockets, base surrounded by anellus; membrane next to juxta with numerous short setae; valva with deep emargination at base of cucullus; sacculus large, subtriangular with small subtriangular lobe projecting from angle, with large patch of dense spiniform setae next to basal opening, with moderately dense setae along dorsal margin neck with numerous very short spiniform setae posteriorly; cucullus moderately large, swollen, subtriangular, with rounded cone-shaped apex, outer surface with dense scale sockets, inner surface with dense setae and a spine cluster at apex. Female genitalia (Figs. 59–62) with papillae anales densely setose; tergum VIII with moderately dense scale sockets posteriorly and on lateral triangular extensions; sterigma membranous, two parallel, longitudinal, elliptical patches of dense microtrichiae posterior to small

round ostium; sternum VII moderately sclerotised, posterior margin with deep V-shaped emargination containing sterigma, with dense scales sockets especially near posterior margin; colliculum very long, 1/3 length of ductus bursae, strongly sclerotised; ductus bursae long, gradually widening towards corpus bursae, granulate in anterior half; ductus seminalis arising from middle of ductus bursae; corpus bursae rounded, much shorter than length of ductus bursae, with two equal, horn-shaped, nearly straight signa.

Holotype. ♂, Papua New Guinea: ‘Woodlark Island, Kulumadau, 20 Jan–6 May 1957, W.W. Brandt’, genitalia slide T1781 (ANIC).

Paratypes. Papua New Guinea: 1 ♀, St. Matthias I., June 1923, A.F. Eichhorn, Brit. Mus. 1930–32, B.M. genitalia slide no. 33133 (NHMUK); 1 ♀, Woodlark Island, Kulumadau, 20 Jan–6 May 1957, W.W. Brandt, genitalia slide 8909 (ANIC); 1 ♂, Woodlark Id., d’ Entrecasteaux, E. Papuan Is., Meek 1897 no. 18101, Walsingham Collection, 1910–427, B.M. genitalia slide no. 33128 (NHMUK); 1 ♀, Woodlark, A.S. Meek, Adams Bequest, B.M. 1912–399, B.M. genitalia slide no. 33130 (NHMUK); 1 ♀, Woodlark Id., d’ Entrecasteaux, E. Papuan Is., Meek 1897, 18103, Walsingham Collection 1910–427, B.M. genitalia slide no. 33129 (NHMUK); 1 ♂, Woodlark Id., d’ Entrecasteaux, E. Papuan Is., Meek 1897, 18102, Walsingham Collection 1910–427, B.M. genitalia slide no. 33118 (NHMUK). 1 ♂, Goodenough Id., d’ Entrecasteaux, E. Papuan Is., Meek 1897 no. 18116, Walsingham Collection, 1910–427, B.M. genitalia slide no. 33132 (NHMUK); 1 ♂, Bougainville, A.S. Meek, Paravicini Coll., B.M. 1937–383, B.M. genitalia slide no. 33131 (NHMUK); 1 ♀, Bougainville, A.S. Meek, Paravicini Coll., B.M. 1937–383, B.M. genitalia slide no. 33117 (NHMUK). 1 ♂, Guadalcanal, Solomon Isl., Meek 1901, Paravicini Coll., B.M. 1937–383, B.M. genitalia slide no. 33119 (NHMUK); 1 ♀, Florida Is. [The Nggela Islands], A.S. Meek, Adams Bequest, B.M. 1912–399, B.M. genitalia slide no. 33116 (NHMUK).

Etymology. The specific epithet refers to the swollen appearance of the cucullus (inflata=swollen).

Distribution. Papua New Guinea (St. Matthias Island near New Britain, and Woodlark, Goodenough and Bougainville islands) and Solomon Islands (Guadalcanal and The Nggela Islands).

Acknowledgements

This research was supported by funds provided by the TRF/BIOTEC Special Program for Biodiversity Research and by Training grants BRT_R 149008 and BRT_R_150017. We are most grateful to the late Jarujin Nabhitabahta, the first Director of the Thailand Natural History Museum, for his help during collecting trips at Khao Nan National Park, South Thailand. We thank Kevin Tuck, The Natural History Museum, UK, for the loan of specimens, and Svetlana Nedoshivina for her generosity in providing photos of *Cimeliomorpha nabokovi*. We are indebted to David Lees for comparing genitalia photos of Thai material with genitalia slides of type material at the NHMUK, and for providing some critical genitalia photos. Particular thanks go to Kevin Tuck and Martin Lödl, Naturhistorisches Museum Wien, for their efforts in trying to locate the holotype of *Grapholita novarana* in their respective institutions. Permission to republish *Cimeliomorpha* figures initially published in *Atalanta* and in *Entomologicheskoe Obozrenie* is gratefully acknowledged, with thanks to U. Eitschberger and B. Korotyaev. Last but not least, we thank Sopita Muadsub for genitalia dissections and photography.

References

- Brown, J.W. (2005) *Tortricidae (Lepidoptera). World catalogue of insects. Vol. 5.* Apollo Books, Stenstrup, 741 pp.
- Clarke, J.F.G. (1955) *Catalogue of the specimens of Microlepidoptera in the British Museum (Natural History) described by Edward Meyrick. Vol. 1.* British Museum (Natural History), London, 322 pp.
- Clarke, J.F.G. (1958) *Catalogue of the specimens of Microlepidoptera in the British Museum (Natural History) described by Edward Meyrick. Vol. 3.* 599 pp.
- Common, I.F.B. (1990) *Moths of Australia.* Melbourne University Press, Melbourne, 535 pp.
<https://doi.org/10.1071/9780643101227>
- Diakonoff, A. (1949) Notes on synonymy of some South Asiatic Microlepidoptera. *Bijdragen tot de Dierkunde*, 28 (1), 133–139.
- Diakonoff, A. (1966) Records and descriptions of South Asiatic Microlepidoptera. *Tijdschrift voor Entomologie*, 15, 167–202.

- Felder, C. & Rogenhofer, A.F. (1875) *Reise der Oesterreichischen Fregatte Novara um die Erde. Zoologischer Theil. Band 2 (Abtheilung 2). Heft 5.* Kaiserlich-K., Wien, 384 pp.
- Horak, M. (1991) Morphology. In: Van der Geest, L.P.S. & Evenhuis, H.H. (Ed.), *World Crop Pest, Tortricid Pests, Their Biology, Natural Enemies and Control.* Elsevier, Amsterdam, pp. 1–22.
- Horak, M. (2006) *Olethreutine Moths of Australia (Lepidoptera: Tortricidae).* Monographs on Australian Lepidoptera. Vol. 10. CSIRO Publishing, Collingwood, 522 pp.
<https://doi.org/10.1071/9780643094086>
- Kuznetsov, V.I. (1997) New species of tortricid moths of the subfamily Olethreutinae (Lepidoptera, Tortricidae) from the south of Vietnam. *Entomologicheskoe Obozrenie* 76 (4), 797–812. [in Russian]
- Laithwaite, E., Watson, A. & Whalley, P.E.S. (1975) *The Dictionary of Butterflies and Moths in Colour.* Michael Joseph, London, 296 pp.
- Meyrick, E. (1907) Descriptions of Indian Micro-Lepidoptera. *The Journal of the Bombay Natural History Society*, 17 (5), 137–160.
<https://doi.org/10.1111/j.1365-2311.1939.tb01022.x>
- Meyrick, E. (1937) *Exotic Microlepidoptera.* 5 (4). Taylor and Francis, London, 32 pp. [pp. 97–128]
- Meyrick, E. (1939) New Microlepidoptera with notes on others. *Transactions of the Entomological Society, London*, 89, 47–62.
- Nedoshivina, S.V. (2010) A catalogue of type specimens of the Tortricidae described by V.I. Kuznetsov from Vietnam and deposited in the Zoological Institute, St. Petersburg. *Atalanta*, 41 (3/4), 335–347.
- Obraztsov, N.S. (1968) Descriptions and records of South Asiatic Laspeyresiini (Lepidoptera: Tortricidae). *Journal of the New York Entomological Society*, 76 (3), 176–192.
- Robinson, G.S., Tuck, K.R. & Shaffer, M. (1994) *A Field Guide to the Smaller Moths of South-East Asia.* The Natural History Museum, London, 308 pp.