Zootaxa 5759 (3): 241–275
https://www.mapress.com/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5759.3.2
http://zoobank.org/urn:lsid:zoobank.org:pub:32BE3556-1A97-4C52-9550-4947BDBB14E9

An Annotated Checklist of Newly Recorded Macromoth Species (Lepidoptera: Heterocera) with Host Plant Records from Peninsular Malaysia

SOFWAN BADRUD'DIN[1,3]*, HENRY S. BARLOW[2,4]* & KHALID FADIL[2,5]
[1]*School of Science, Monash University Malaysia, Subang Jaya, Malaysia*
[2]*Southdene Sdn. Bhd., No.7, Persiaran Titiwangsa 2, Titiwangsa, 53200, Kuala Lumpur, Malaysia*
[3] *sofwanbadr@gmail.com; https://orcid.org/0009-0000-8298-7686*
[4] *hsbar@hotmail.com; https://orcid.org/0009-0001-9516-8425*
[5] *sector1404@live.com; https://orcid.org/0009-0005-4974-7724*
**Corresponding authors*

Abstract

Numerous studies on moth diversity have been conducted in Borneo, Sumatra, and Thailand. However, research on species richness and distribution in the neighbouring region of Peninsular Malaysia remains relatively limited. This paper analyses two collections, primarily of macromoths collected (i) in the late 1960s to early 1970s by the late H F O'B Traill at Batang Berjuntai, Selangor and (ii) by H S Barlow as well as latterly by Sofwan Badrud'din and Khalid Fadil at Genting Tea Estate (GTE), Genting Sempah, Pahang, from 1971 to date. Comprehensive identification of 3,492 species from the GTE collection has produced many range extensions of moths previously not recorded from Peninsular Malaysia. In total, 309 species are new records for Peninsular Malaysia within 9 families; Erebidae (140), Geometridea (60), Nolidae (52), Noctuidae (22), Euteliidae (15), Drepanidae (6), Uraniidae (7), Notodontidae (5), Zygaenidae (2). Of these, 97 species are illustrated with some showcasing sexual dimorphism. Additionally, the genitalia and other structures of 17 selected species were illustrated, with several described in detail for the first time. Numerous morphospecies are excluded from this study's checklist due to their overwhelming numbers with estimation of 427 species.

Key words: species richness, Genting Tea Estate (GTE), Batang Berjuntai, female genitalia

Introduction

Peninsular Malaysia, located at the tip of the Indochinese peninsula bordered by Thailand in the north and Singapore to the south has a coastline on the Straits of Malacca where it neighbours the Indonesian island Sumatra. It is an ever-wet, evergreen tropical country containing many forest ecosystems, from ericaceous forest at high altitudes, down to lowland dipterocarp forest, mangrove forest, and peat swamp forest. Within these ecosystems insects are dominant in terms of species numbers and biomass (Fatimah & Catherine 2002). The order Lepidoptera, with an estimated number of more than 160,000 species is globally outnumbered only by the order Coleoptera (beetles) (Common 1990). Unfortunately, Peninsular Malaysian macroheterocera (hereinafter addressed as macromoths) diversity has been poorly studied in contrast to their sister taxa, the butterflies, Rhopalocera. Comprehensive moth studies have been undertaken extensively in the neighbouring countries of Thailand, Indonesia (Sumatra), and Borneo, leaving a big gap for Peninsular Malaysia. However, there are a few scattered studies throughout the literature focused on selected localities and moth families. Such studies include: Barlow & Woiwod (1989) recorded 1,593 species of moths (including pyraloids) during their Rothamsted light trapping exercise from September 1979 to October 1980 at Genting Tea Estate (GTE). Subsequently, Ashton *et al.* (2014) used the same dataset to analyse the alpha and beta diversity of moths in Malaysian rainforest with the addition of one new dataset from GTE (year 2000) and one new locality from Peninsular Malaysia (Sungai Halong in north Perak). In the new GTE dataset, they recorded 791 species spanning over 46 nights and recorded 2,795 species from 264 nights in Sungai Halong. Intachat *et al.* (2001) focused on the family Geometridae and recorded 392 species in Pasoh Forest Reserve, Negeri Sembilan. Bucsek (2012) studied the poorly known diversity of the tribe Lithosiini and Arctiini (Erebidae: Arctiinae) in Peninsular

Accepted by R. Zahiri: 19 Dec. 2025; published: 17 Feb. 2026

Malaysia. Ultimately, he listed 380 species and of these, he described 8 new genera, 107 new species, and 2 new subspecies. However, apart from Bucsek (2012), none of these papers reported on new moth records for Peninsular Malaysia.

This study deals with two private moth collections. The first is the late H F O'B Traill's collection. Traill collected moths from Bukit Blebo located at Batang Berjuntai, Selangor, and occasionally from elsewhere, particularly the now demolished Gap Resthouse near Fraser's Hill. At the time of his death in April 1985 his specimens were partially sorted by Dr J D Holloway, especially the superfamilies Geometroidea and Noctuoidea and stored in some 30 store boxes and bequeathed to HSB. He kept the collection adequately supplied with crushed mothballs and stored at GTE. Recently, SB succeeded in completely sorting all of Traill's specimens (except for pyraloids and thyridoids). Most were then donated to the Forest Research Institute of Malaysia (FRIM). Unfortunately, Traill's primary collection site, Batang Berjuntai, has been converted into oil palm plantations, resulting in the loss of its original habitat and biodiversity. The second collection was started by HSB in 1971 at Genting Tea Estate (GTE), Genting Sempah, Pahang, continuing to date with recent assistance from SB and Khalid Fadil. GTE consists of 96 acres of advanced secondary forest which has grown within through tea planted 100 years ago but was never managed as a tea estate. There is a small patch of primary forest of less than 2 acres. Since the completion of the Karak Expressway adjacent to GTE in 1975, the forest, more particularly on the Pahang side has been dramatically reduced as a result of the activities of developers, vegetable growers and unlawful resident. This has left a fragmented landscape where small islands of forest, often heavily degraded, are interspersed with land cleared for vegetable growing and hillsides covered with lalang and low shrubs. The primary objective of this paper is to highlight the newly recorded species of moths from Peninsular Malaysia with an updated distribution with some notes on selected species.

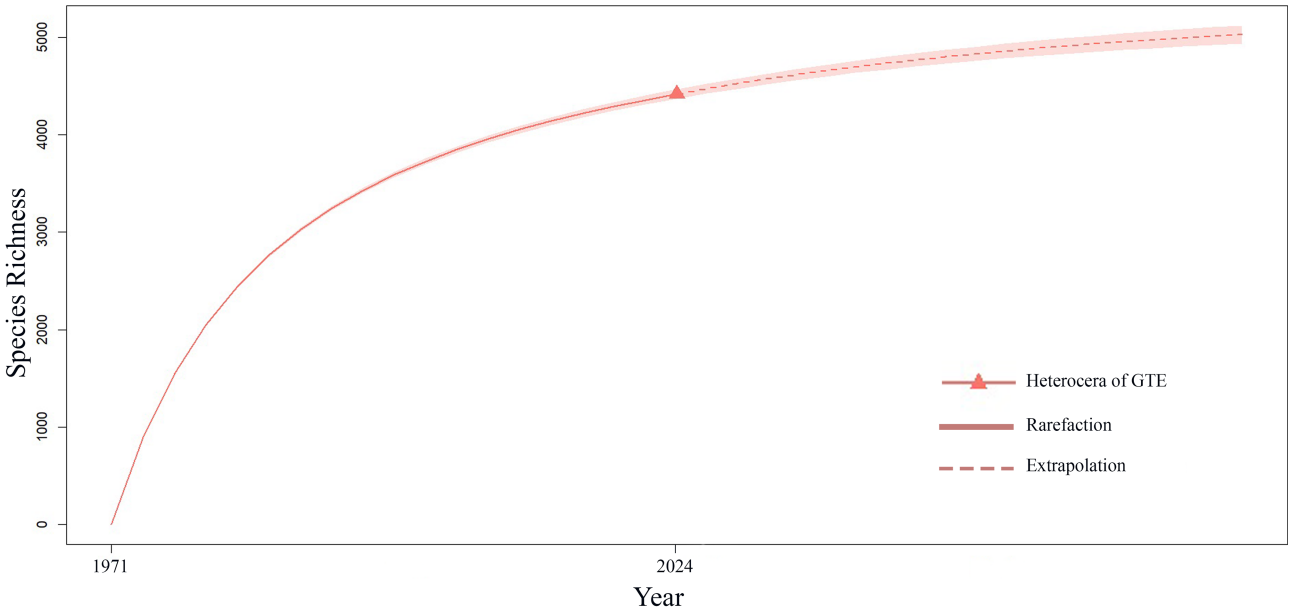

FIGURE 1. iNEXT species accumulation curve of macromoth species recorded in GTE from 1971 to 2024. Dotted line indicates extrapolation for the species richness to approach asymptote. The shaded region shows the 95% confidence interval based on unconditional standard deviation.

Materials & Methods

Collection Sites

In the case of both collections, specimens were taken when attracted to lights. In Traill's case this was from his bungalow overlooking a patch of coastal swamp forest adjacent to the Selangor River, as well as specimens attracted to the powerful floodlights on the boundaries of the tin mines then operating in the area from 1971 until 1979. Additional day-flying moths were netted.

The Traill collection included several Pyraloidea, Thyridoidea, and larger specimens from other 'micro' families.

The Pyraloidea and Thyridoidea have been analysed in some detail, see the first two volumes of 'A Preliminary Guide to Pyralid Moths of Borneo' (Sutton *et al.* 2015 & Whitaker *et al.* 2023). This also applies to the larger GTE collection, where 148 species of Thyridoidea and 1,116 species of Pyraloidea have been reported to date.

In the case of the Barlow collection, most specimens were taken at GTE mainly from a covered white-washed verandah and elsewhere in the property using a 150W tungsten bulb, and very recently LED lamp (LepiLED) (Brehm 2017) (fig. 2). GTE is situated at N 03° 21' 415", E 101° 47' 706", 668 m above sea level. The collection was supplemented by three one-year Rothamsted light trapping exercises (1979–80, 2000, and 2021) as well as casual daytime netting of specimens at the GTE. The specimens collected were killed using a deep freezer and later pined and set. Further additions to the collection were made from two one-year exercises using prawn and banana baits across GTE range from what were at the time of collection open orchard areas to secondary and near primary forest (Holloway *et al.* 2013). Some larvae were collected opportunistically and subsequently bred and reared. The host plants of the reared species were documented (Table 2).

FIGURE 2. Collection sites and their environment at GTE. **a.** White-washed verandah facing to the west. **b.** A maturing secondary forest facing to the north. **c.** An open area overlooking eastward.

Identification of Species

Both collections were carefully identified by SB and KF. Identification of species and distribution relied primarily on Holloway's 18 volumes 'The Moths of Borneo,' the Moths of Thailand series (Pinratana & Lampe 1990; Inoue *et al.* 1997; Zolotuhin & Pinratana 2005; Schintlmeister & Pinratana 2007; Černý & Pinratana 2009; Kononenko & Pinratana 2005 & 2013), Heterocera Sumatrana series (Kobes 1994; Kobes 1997; Kobes 2006; Kobes 2008; Kobes 2010a; Kobes 2010b; Kobes 2010c; Kobes 2014; Schintlmeister 1994a; Schintlmeister 1994b), updated with web searches of more recent publications, and also direct correspondence with the experts. Unidentified and undescribed morphospecies were excluded from the newly recorded species list due to their overwhelming numbers

with the exception of when visualising the species accumulation curve. The classification and arrangement follow Holloway's Moths of Borneo Part 2 (2011). These can be viewed at The Moths of Borneo Online (https://www.mothsofborneo.com/part-2/checklist-part2.php) with a full listing.

SB at the same time, took high-resolution photographs up to NHM data-basing standards (see Paterson *et al.* 2016) of all individual species of butterflies and moths. The photography technique and set up followed the same method as mentioned in Badrud'din & Barlow (2021).

Genitalia dissection was undertaken for species complexes and cryptic species. The dissection technique followed Robinson (1976) with modification on the staining process. The abdomen was extracted and briefly dipped in 95% ethanol before being transferred into a 10% KOH solution for maceration, which was heated for 15 minutes. The genitalia were then cleaned and dissected in 50% ethanol using a Nikon SMZ745T compound microscope before being stained with Pilot-brand ink for 20 minutes. Euparal was used to set the genitalia, and the slides were then labelled. Image of the genitalia were taken using a camera attachment that came together with the microscope. The genitalia terminology follows Klots (1970) and Sibatini (1972) and wing venations follows Wootton (1979).

Statistical Analysis

The function of species accumulation curve is to visualise and estimate the species richness of macromoths that occurs in GTE after 53 years of sampling. Described species together with morphospecies were included in the analysis of the species accumulation curve to obtain more accurate prediction of the macromoths species richness. The species accumulation curve was generated using the function iNEXT (Hsieh *et al.* 2016) in R (R core team 2024.12.0).

Specimen Repository

Most of the specimens were deposited in HSB private collection, the Genting Tea Estate (GTE) collection. Certain duplicate specimens went to the Natural History Museum, United Kingdom (NHMUK) and to the Lee Kong Chian Natural History Museum, Singapore (LKCNHM). The majority of Traill's specimens were deposited in FRIM.

Results & Discussions

In Badrud'din & Barlow (2021), we only detected one new record for Peninsular Malaysia, *Rhagastis diehli* Haxaire & Melichar, 2010 (Sphingidae), once thought to be endemic to Sumatra (Haxaire & Melichar 2010). However, after going through all 3,492 species of macromoths in the GTE collection, in total, we discovered that 309 species from 9 different families were newly recorded for Peninsular Malaysia (Table 1). Among these, the total subfamily richness was 36, while genus richness reached 210. The new distribution records for Peninsular Malaysia are shown by geographical category in the checklist below.

The two families contributing the highest number of newly recorded species were Erebidae and Geometridae, with 140 and 60 species, respectively. This finding aligns with global moth species diversity trends, where Erebidae has the highest species richness, followed by Geometridae (Nieukerken *et al.* 2011; Rajaei *et al.* 2022). The third most represented family was Nolidae, with 36 out of 52 recorded species belonging to the subfamily Nolinae.

The Nolinae subfamily has been historically understudied due to most of its members consisting of small moths (< 20mm wing span), and generally with whitish ground colour that make the subfamily difficult to work with (Holloway 2003). Additionally, many species were lumped into the genus *Nola*, often treated as a "wastebin genus", which made precise identification challenging. Thankfully, recent studies on Oriental and Palearctic Nolinae, carried out mainly by research teams from Budapest, Hungary, have made many identifications possible (László *et al.* 2005; László *et al.* 2010; László *et al.* 2015a; László *et al.* 2015b; László *et al.* 2015c; Joshi *et al.* 2019; László *et al.* 2020; László & Sterling 2020). There are still many more that need to be described, and within the GTE collection, there are approximately 16 morphospecies.

In Badrud'din & Barlow (2021), we recorded 3,391 species of macromoths in the GTE collection which has

risen over three years to 3,492 species. However, these figures are for species collected both within GTE and elsewhere. The number of species recorded exclusively from GTE was 3,054 in 2021 (unpublished), which has risen to 3,240 species as of 2024. Figure 1 provides a species accumulation curve for the Genting Tea Estate material locality, derived from the earliest date on the data label for each species series. It will be noted that even after 53 years of intensive collecting using multiple methods, the accumulation graph has still not quite reached asymptote, with the extrapolation estimating 3,750 with 95% confidence interval estimating between 3,664–3,836 species. Furthermore, there are still many morphospecies that intentionally excluded from the checklist below because of the sheer numbers. It is estimated that there are approximately 427 morphospecies yet to be described from the GTE collection alone, with the family Erebidae and Geometridae contributing the majority.

TABLE 1. Detail breakdown for newly recorded moth species in Peninsular Malaysia.

Family	Species Richness	Genus Richness	Subfamily Richness
Zygaenidae	2	2	2
Drepanidae	6	6	1
Uraniidae	7	4	1
Geometridae	60	45	6
Notodontidae	5	5	-
Erebidae	140	92	13
Noctuidae	22	17	8
Euteliidae	15	5	2
Nolidae	52	33	3
TOTAL	**309**	**210**	**36**

When comparing the moth fauna distribution relative to the neighbouring countries, 99 species were formerly reported from Borneo, 28 from Sumatra, 36 from Thailand, 57 from Borneo and Sumatra, 24 from Borneo and Thailand, 14 from Sumatra and Thailand, 22 from all three localities, and 29 from elsewhere. Most of these new records came from Barlow's collection at GTE. However, 13 species from Traill's collections in the lowland area align with previous recorded habitat. This indicates that further sampling in lowland forest localities might yield more new records of macromoths for Peninsular Malaysia.

Newly recorded macromoths from Peninsular Malaysia

The following is the checklist of newly recorded macromoths from Peninsular Malaysia. Bold numbers indicate previously only recorded from **1**. Borneo, **2**. Sumatra, **3**. Thailand. The symbol asterisk (*****) indicates the species that Traill collected and type locality is indicated with (TL). The classification of subfamilies and their lower taxonomic ranks followed Holloway's (2011) arrangement except for Notodontidae which follows St Laurent *et al.* (2025) and Geometridae: Sterhhinae which follows Sihvonen *et al.* (2020). Notes were also made on some moths regarding their collection, taxonomy and a few errors from previous publications.

FAMILY ZYGAENIDAE

Subfamily PROCRIDINAE

Tribe Artonini

1. *Clelea chala* Moore, 1859 **1**. Java (TL), Borneo, Peninsular Malaysia.

Subfamily CHALCOSIINAE

Tribe Cyclosiini

2. *Corma maculata* Hampson, 1893 **2**. NE India (TL), China, Vietnam, Sumatra, Peninsular Malaysia.

FAMILY DREPANIDAE

Subfamily DREPANINAE

Tribe Drepanini

3. *Zusidava sinuosa* Moore, 1888. NE Himalaya (TL), Myanmar, Peninsular Malaysia.
4. *Macrauzata fenestraria* Moore, 1868. India, Nepal, Bengal (TL), Japan (Joshi *et al.* 2020), Peninsular Malaysia.
5. *Euphalacra discipuncta* Holloway, 1976 **1**. Borneo (TL), Peninsular Malaysia.
6. *Phalacra nigrilineata* Warren, 1922 **2**. Sumatra (TL), Peninsular Malaysia.
7. *Microblepsis cupreogrisea* Hampson, 1895 **1,2**. NE Himalaya, S Myanmar (TL), Borneo, Sumatra, Peninsular Malaysia.

Tribe Oretini

8. *Oreta pingorum* Holloway, 1998 **1**. Buru, Borneo (TL), New Guinea, Sulawesi, Peninsular Malaysia.

FAMILY URANIIDAE

Subfamily EPIPLEMINAE

9. *Pseudodirades transgrisea* Holloway, 1976 **1**. Borneo (TL), Peninsular Malaysia.
10. *Dysaethria nigrifrons* Hampson, 1896 **1**. Borneo, Java, Myanmar (TL), Flores, Peninsular Malaysia.
11. *Dysaethria walkeri* Holloway, 1998 **1**. Borneo (TL), ?Sumatra, Peninsular Malaysia.
12. *Dysaethria albolilacina* Holloway, 1998 **1**. Borneo (TL), Sulawesi, Peninsular Malaysia.
13. **Dysaethria danum* Holloway, 1998 **1**. Borneo (TL), Peninsular Malaysia.
14. *Phazaca cesena* Swinhoe, 1902 **1**. Borneo (TL), Peninsular Malaysia.
15. *"Epiplema" saccata* Holloway, 1998 **1**. Borneo (TL), Peninsular Malaysia.

FAMILY GEOMETRIDAE

Subfamily DESMOBATHRINAE

Tribe Eumeleini

16. *Eumelea feliciata* Guenée, 1857 **1,2**. Bangladesh (TL), NE Himalaya, Sumatra, Borneo, Sula Is., Sulawesi, Moluccas, Peninsular Malaysia.

Subfamily GEOMETRINAE

Tribe Pseudoterpnini

17. **Orthorisma netunaria* Guenée, 1857 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.
18. *Dindica olivacea* Inoue,1990 **1,2,3**. N.E. Himalaya, Borneo, Sumatra, Philippines (TL), Peninsular Malaysia.

Tribe Geometrini

19. **Ornithospila avicularia* Guenée, 1857 **1,2**. Borneo, Sumatra, NE Himalaya (TL), Philippines, Peninsular Malaysia.
20. *Eucyclodes gavissima* Walker,1861 **1,2**. Indian Subregion (TL) to Taiwan, Sumatra, Borneo, Peninsular Malaysia.
21. *Chlorochromodes albicatena* Warren, 1896 **1,2**. NE Himalaya (TL), Sumatra, Borneo, Peninsular Malaysia.
22. *Thalassodes opalina* Butler, 1880 **3**. China, Taiwan, India (TL), Thailand, Peninsular Malaysia.
23. *Chlorissa aquamarina* Hampson, 1895 **1**. NE Himalaya (TL), Borneo, Peninsular Malaysia.
24. *Chloristola setosa* Holloway, 1996 **1**. Borneo (TL), Peninsular Malaysia.
25. *Cyclothea disjuncta* Walker, 1861 **2**. Sri Lanka (TL), India, Sumatra, N China, Peninsular Malaysia.
26. *Idiochlora xanthochlora* Swinhoe, 1894 **1,2**. NE Himalaya (TL), Borneo, Sumatra, Peninsular Malaysia.
27. *Berta tridentijuxta* Holloway, 1996 **1**. Borneo (TL), Sulawesi, Seram, Peninsular Malaysia.
28. *Berta vaga* Walker, 1861 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.
29. *Rhanidopsis alleni* Holloway, 1996 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.

Subfamily ENNOMINAE

Tribe Hypochrosini

30. *Fascellina albicordis* Prout, 1932 **1**. Borneo (TL), Peninsular Malaysia.
31. *Fascellina quadrata* Holloway, 1993 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.
32. *Corymica specularia* Moore, 1868. India, China (TL), Peninsular Malaysia.
33. *Pseudomiza obliquaria* Leech, 1897 **1,2**. China (TL), Taiwan, Bhutan, Peninsular Malaysia.

Tribe Baptini

34. *Hypulia strictiva* Prout, 1932 **1**. Borneo (TL), Peninsular Malaysia.
35. *Yashmakia veneris* Warren, 1901 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.
36. *Parasynegia sundastriaria* Holloway, 1993 **1**. Borneo (TL), Peninsular Malaysia.
37. **Synegia thamiosticta* Prout, 1931 **1,2**. Mentawi (TL), Borneo, Sumatra, Peninsular Malaysia.

Tribe Cassymini

38. **Zamarada denticulata* Fletcher, 1974 **1,2**. Borneo (TL), Sumatra, Cambodia, Peninsular Malaysia.
39. *Cassyma chrotadelpha* Sommerer & Stüning, 1992 **1,2**. Borneo, Sumatra (TL), Peninsular Malaysia.
40. *Hydatocapnia demensa* Prout, 1935. Java (TL), Peninsular Malaysia.
41. *Peratophyga hypsicyma* Prout, 1916 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.

Tribe Eutoeini

42. *Zeheba lucidata* Walker, 1862 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.

Tribe Lithinini

43. *Pareclipsis umbrata* Warren, 1894. S China (ssp. *kwantungensis* Wehrli, 1940), Nepal (ssp. *umbrata* Warren, 1894), E India (TL), Peninsular Malaysia.

Tribe Boarmiini

44. *Hyposidra altiviolescens* Holloway, 1993 **1**. Borneo (TL), Peninsular Malaysia.
45. *Psilalcis calcicola* Holloway, 1993 **1**. Borneo (TL), Peninsular Malaysia.
46. *Psilalcis albibasis* Hampson, 1895. India (TL), Nepal, Myanmar, S China, Taiwan, Peninsular Malaysia.
47. *Psilalcis intermedia* Warren, 1899 **2,3**. Indochina, Java (TL), Philippines, Sumatra, Bhutan, Peninsular Malaysia.
48. *Psilalcis holzwegensis* Sato, 2008 **2**. Sumatra (TL), Peninsular Malaysia.
49. *Diplurodes diehli* Sato, 2006 **2**. Sumatra (TL), Peninsular Malaysia.
50. *Diplurodes sinecoremata* Holloway, 1993 **1,2**. Borneo (TL), Sumatra, Philippines, Peninsular Malaysia.
51. *Ectropidia minilepidaria* Sato, 2006 **2**. Sumatra (TL), Peninsular Malaysia.
52. *Nigriblephara semiparata* Walker, 1861 **1**. Borneo (TL), Peninsular Malaysia.
53. *Monocerotesa proximesta* Holloway, 1993 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.

ENNOMINAE *incertae sedis*

54. *Pseudocassyma uniformis* Holloway, 1997 **1**. Borneo (TL), Peninsular Malaysia.
55. *Pseudocassyma sundagraphoides* Holloway, 1993 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.

Subfamily STERRHINAE

Tribe Cosymbiini

56. *Chrysocraspeda marginata* Warren, 1897 **1,2**. India (TL), Borneo, Sumatra, Peninsular Malaysia.
57. *Chrysocraspeda rubricata* Swinhoe, 1903 **1,2,3**. Thailand (TL), Sumatra, Borneo, Peninsular Malaysia.
58. *Chrysocraspeda dipyramida* Prout, 1918 **1,2**. S Myanmar (TL), Sumatra, Borneo, Peninsular Malaysia.
59. *Chrysocraspeda rubraspersa* Holloway, 1997 **1,2**. Sumatra, Borneo (TL), Peninsular Malaysia.
60. **Chrysocraspeda tristicula* Swinhoe, 1885 **1,2**. Indian subregion (TL), Sumatra, Borneo, Philippines, Sumbawa, Peninsular Malaysia.
61. *Perixera argyrommoides* Holloway **1**. Borneo (TL), Peninsular Malaysia.

Tribe Cyllopodini

62. *Organopoda perorbata* Prout, 1937 **1**. Bali (TL), Borneo, Peninsular Malaysia.
63. *"Metallaxis" semipurpurascens* Hampson, 1896. NE Himalaya (TL), Hong Kong (Holloway 1997), India ((Sondhi *et al.* 2022); Moths of India website), Peninsular Malaysia.
64. *Discoglypha aureifloris* Warren, 1896. China (Xian *et al.* 2022), India (TL), Peninsular Malaysia.

Tribe Scopulini

65. *Scopula satsumaria* Leech, 1897 **1,2**. Japan (TL), NE Himalaya, Sumatra, Borneo, China, Peninsular Malaysia.
66. *Scopula pithogona* Prout, 1938 **1**. Java (TL), Sulawesi, Borneo, Peninsular Malaysia.
67. *Scopula desita* Walker, 1861 **2**. Australia (Queensland & NSW) (TL), Philippines, Sunda Islands, Tenimber Is., Peninsular Malaysia.

Subfamily LARENTIINAE

Tribe Trichopterygini

68. *Sauris quassa* Prout, 1932 **1**. Borneo (TL), Peninsular Malaysia.

Tribe Eupitheciini

69. *Collix mesopora* Prout, 1932 **1**. Wallacea, Borneo (TL), Peninsular Malaysia.
70. *Carbia calefacta* Prout, 1941 **1**. Borneo (TL), Peninsular Malaysia.
71. *Celaenaclystis telygeta* Prout, 1932 **1**. Borneo (TL), Peninsular Malaysia.
72. *Eois plumbacea* Warren, 1894 **1**. Borneo (TL), Mentawi Is., Peninsular Malaysia.
73. *Eois versata* Walker, 1861 **1**. Borneo (TL), Mentawi Is., Peninsular Malaysia.

Tribe Asthenini

74. *Palpoctenidia phoenicosoma* Swinhoe, 1895. China, Taiwan, India (TL), Korea, Japan (Choi 2009), Peninsular Malaysia.

Tribe Xanthorhoini

75. *Xanthorhoe saturata* Guenée 1858. Himalaya (TL), Japan, China, Taiwan, Philippines, Peninsular Malaysia.

FAMILY NOTODONTIDAE

Subfamily SPATALIINAE

76. *Changea siamensis* Schintlmeister, 2007 **3**. Thailand (TL), Peninsular Malaysia.

Subfamily HETEROCAMPINAE

77. *Stauroplitis annulata* Gaede, 1930 **1,2,3**. Thailand, Borneo, Sumatra (TL), Peninsular Malaysia.

Subfamily NOTODONTINAE

78. *Omichlis dimorpha* Kiriakoff, 1974 **1,2**. Borneo, Sumatra (TL), Peninsular Malaysia.

Subfamily SCHACHIINAE

79. *Liparopsis dierli* R. & E. Bender, 1984 **1,2**. Borneo, Sumatra (TL), Peninsular Malaysia.

Subfamily CHADISRINAE

80. *Chadisra borneensis* Holloway, 1983 **1**. Borneo (TL), Peninsular Malaysia.

FAMILY EREBIDAE

Subfamily LYMANTRIINAE

Tribe Lymantriini

81. *Lymantria strigatoides* Schintlmeister, 1994 **2**. Sumatra (TL), Peninsular Malaysia.

Tribe Nygmiini

82. *Toxoproctis celidota* Collenette, 1932 **2**. Java (TL), Sumatra, Peninsular Malaysia.
83. *Toxoproctis deliana* van Eecke, 1928 **1,2**. Sumatra (TL), Borneo, Peninsular Malaysia.
84. *Nygmia punctatofasciata* van Eecke, 1928 **1,2**. Sumatra (TL), Borneo, Peninsular Malaysia.
85. *Choerotricha indistincta* Rothschild, 1920 **1,2**. Sumatra (TL), Borneo, Peninsular Malaysia.
86. *"Euproctis" u-grisea* Holloway, 1976 **1**. Borneo (TL), Peninsular Malaysia.
87. *"Euproctis" pseudoarna* Holloway, 1999 **1**. Borneo (TL), Peninsular Malaysia.
88. *Euproctis asteroides* Collenette, 1938 **2**. Sumatra (TL), Peninsular Malaysia.
89. *Euproctis canescens* Rothschild, 1920 **2**. Sumatra (TL), Peninsular Malaysia.
90. *Nygmia xanthura* Swinhoe, 1907 **2**. Sumatra (TL), Peninsular Malaysia.
91. *Medama spatulidorsum* Holloway, 1976 **1**. Borneo (TL), Peninsular Malaysia.

Tribe Arctornithini

92. *Arctornis flora* Swinhoe, 1903 **1,2**. Sumatra (TL), Borneo, Peninsular Malaysia.
93. *Arctornis magnaclava* Holloway, 1999 **1**. Borneo (TL), Peninsular Malaysia.
94. *Arctornis bilobuncus* Holloway, 1999 **1**. Borneo (TL), Peninsular Malaysia.
95. *Arctornis calcariphallus* Holloway, 1999 **1**. Borneo (TL), Peninsular Malaysia.
96. *Arctornis rhopica* Toxopeus, 1948 **1,2**. Sumatra, Borneo (TL), Peninsular Malaysia.
97. *Arctornis ferruginicosta* Holloway, 1999 **1**. Borneo (TL), Peninsular Malaysia.

Tribe Leucomini

98. *Leucoma ochripes* Moore, 1879 **1**. NE Himalaya (TL), Yunnan, Borneo, Peninsular Malaysia.

Tribe Lymantriini

99. *Pendria rinaria* Moore, 1860 **2**. Sumatra, Java (TL), Peninsular Malaysia.

Subfamily ARCTIINAE

Tribe Syntomini

100. *Caeneressa everetti* Rothschild, 1910 **1**. Natuna Is., Borneo (TL), Peninsular Malaysia.
101. *Caeneressa ericssoni* Rothschild, 1912 **2**. Sumatra (TL), Peninsular Malaysia.

Tribe Lithosiini

102. *Striatella hypoprepioides* Walker, 1862 **1,2**. Sumatra, Borneo (TL), Peninsular Malaysia.

Subfamily AGANAINAE

103. *Mecodina agrestis* Swinhoe, 1890. Myanmar (TL), India, Hong Kong, Peninsular Malaysia.
104. *Mecodina aequilinea* Hampson, 1926. NE India (TL), Hong Kong, Peninsular Malaysia.

Subfamily HERMINIINAE

105. *Bertula momusalis* Walker, 1859 **1**. Singapore, Borneo (TL), Peninsular Malaysia.
106. *Bertula erectilinea* Swinhoe, 1902 **1**. Borneo (TL), Peninsular Malaysia.
107. *Bertula picta* Pagenstecher, 1894 **1**. Java (TL), Borneo, Peninsular Malaysia.
108. *Raphiscopa viridialis* Holloway, 2008 **1**. Borneo (TL), Peninsular Malaysia.
109. *Egnasides rudmuna* Swinhoe, 1905 **1**. Borneo (TL), Peninsular Malaysia.
110. *Alelimma apicalis* Hampson, 1895 **3**. Thailand, Myanmar (TL), Vietnam, Peninsular Malaysia.
111. *Idia substigmata* Holloway, 2008 **1,2,3**. Thailand, Sumatra, Borneo (TL), Peninsular Malaysia.
112. *"Hadennia" kimae* Holloway, 2008 **1,2**. Thailand, Singapore, Borneo (TL), Peninsular Malaysia.
113. *Hadennia nigerrima* Swinhoe, 1918 **1,3**. Nias (TL), Borneo, Thailand, Peninsular Malaysia.
114. *Adrapsa alsusalis* Walker, 1859 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.
115. *Adrapsa scopigera* Moore, 1885. Indian subregion (TL), Peninsular Malaysia.
116. *Polypogon annulata* Leech, 1900 **3**. S China (TL), Thailand, Vietnam, Peninsular Malaysia.
117. *Polypogon warleyi* Holloway, 2008 **1**. Borneo (TL), Peninsular Malaysia.
118. *Sinarella griseola* Holloway, 2008 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.
119. *Progonia oileusalis* Walker, 1859 **1,3**. Indian subregion, Borneo (TL), Ryukyu Is., Philippines, Taiwan, Thailand, Peninsular Malaysia.
120. *Progonia kurosawai* Owada, 1987 **1**. Indian subregion, Borneo, Japan (TL), Myanmar, Sulawesi, Peninsular Malaysia.
121. *Naarda purpurisigna* Holloway, 2008 **1**. Borneo (TL), Peninsular Malaysia.
122. *Chusaris retatalis* Walker, 1859. Sri Lanka (TL), Peninsular Malaysia.
123. *Naarda serra* Holloway, 2008 **1**. Borneo (TL), Peninsular Malaysia.

Subfamily PANGRAPTINAE

124. **Episparis minima* Pelletier, 1982 **1**. Borneo (TL), Peninsular Malaysia.
125. **Focillistis sita* Felder & Rogenhofer, 1874 **1,2**. Sumatra, Sulawesi (TL), Borneo, Peninsular Malaysia.
126. *"Egnasia" conifer* Hampson, 1926 **1,3**. Thailand, Philippines (TL), Borneo, Peninsular Malaysia.
127. *Throana amyntoralis* Walker, 1859 **1**. Singapore, Borneo (TL), Peninsular Malaysia.
128. *Acharya franconia* Swinhoe, 1903 **1,2,3**. Thailand, Java (TL), Sumatra, Borneo, Peninsular Malaysia.

Subfamily HYPENINAE

129. *Hepatica orbicularis* Holloway, 2005 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.
130. *Gonoglasa nigripalpis* Walker, 1863 **1,2,3**. Thailand, Sumatra, Borneo (TL), Peninsular Malaysia.
131. *Catada agassizi* Holloway, 2008 **1**. Borneo (TL), Peninsular Malaysia.
132. *Catada bellaria* Lödl & Paumkirchner, 2001 **1**. Borneo (TL), Peninsular Malaysia (Langkawi Is.).
133. *Lophomilia diehli* Kononenko & Behounek, 2009 **2,3**. Thailand, Sumatra (TL), Korea, Peninsular Malaysia.

Subfamily RIVULINAE

134. *Rivula robinsoni* Holloway, 2008 **1**. Borneo (TL), Peninsular Malaysia.
135. *Rivula mageei* Holloway, 2008 **1**. Borneo (TL), Peninsular Malaysia.
136. *Rivula sordida* Walker, 2008 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.

Subfamily SCOLIOPTERYGINAE

137. *Savara biradulata* Holloway, 2005 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.
138. *Falana bilineata* Holloway, 2005 **1**. Borneo (TL), Peninsular Malaysia.
139. **Anomis figlina* Butler, 1889. India (TL), Sri Lanka, Nepal, Myanmar, Laos, Vietnam, S China, S Japan, Philippines, Indonesia, New Guinea, Melanesia, Australia, Peninsular Malaysia.
140. *"Anomis" cupienda* Swinhoe, 1903 **1,2,3**. New Guinea, Borneo (TL), Thailand, Sumatra, Peninsular Malaysia.

Subfamily CALPINAE

141. *Oraesia argyrosigna* Moore, 1884 **3**. Sri Lanka (TL), Java, Sulawesi, New Guinea, Melanesia, New Caledonia, S Japan, S China, S India, Thailand, Peninsular Malaysia.

Subfamily HYPENODINAE

142. *Disca paulum* Fibiger, 2007 **3**. Thailand (TL), Peninsular Malaysia.
143. *Tactusa pars* Fibiger, 2010 **3**. Thailand (TL), China, Peninsular Malaysia.
144. *Dextella alleni* Fibiger, 2011 **3**. Thailand (TL), Peninsular Malaysia.
145. *Alienia cambodiaa* Qi & Han, 2017. Cambodia (TL), Peninsular Malaysia.
146. *Bellulia mariannae* Fibiger, 2008 **3**. Thailand (TL), Peninsular Malaysia.
147. *Schrankia obstructalis* Walker, 1866 **1**. Borneo (TL), Peninsular Malaysia.
148. *Feathalina postreducta* Holloway, 2008 **1**. Borneo (TL), Peninsular Malaysia.

Subfamily BOLETOBIINAE

149. *Artigisa nigrosignata* Walker, 1863 **1,3**. Borneo (TL), Thailand, Indian Subregion, Peninsular Malaysia.
150. *Diomea diffusifascia* Swinhoe, 1901 **1,3**. Borneo (TL), Thailand, Peninsular Malaysia.
151. *Diomea rotundata* Walker, 1858 **1,2,3**. Sri Lanka (TL), Indian Subregion, Taiwan, Sumatra, Borneo, Philippines, Sumba, New Guinea, Sulawesi, SW China, Thailand, Peninsular Malaysia.
152. *Diomea tricuspida* Hampson, 1926 **1**. Borneo (TL), Peninsular Malaysia.
153. *Diomea dialitha* Hampson, 1926 **1**. Borneo (TL), Peninsular Malaysia.
154. **Panilla combusta* Hampson, 1895 **1,2**. N.E Himalaya (TL), Borneo, Sumatra, Peninsular Malaysia.
155. *Panilla poliochroa* Hampson, 1914 **1,3**. Borneo (TL), Thailand, Philippines, Taiwan, Peninsular Malaysia.
156. *Anatatha maculifera* Butler, 1889 **3**. Thailand, N India (TL), Taiwan, Peninsular Malaysia.
157. *Drepanorhina shelfordi* Swinhoe, 1904 **1**. Borneo (TL), Peninsular Malaysia.
158. *Araeopteron rufescens* Hampson, 1910 **1**. Sri Lanka (TL), Borneo, Peninsular Malaysia.
159. *Araeopteron goniophora* Hampson, 1907 **1**. Sri Lanka (TL), Borneo, Peninsular Malaysia.
160. *Araeopteron proleuca* Hampson, 1907. Sri Lanka, India (TL), Peninsular Malaysia.
161. *Araeopteron flaccida* Inoue, 1958. Japan (TL), Korea, Peninsular Malaysia.
162. *Niaccaba sumptualis* Walker, 1866 **1**. Sri Lanka (TL), Sulawesi, Ryukyu Is., Borneo, Peninsular Malaysia.

163. *Acidaliodes strenualis* Hampson, 1914 **1**. Borneo (TL), Peninsular Malaysia.
164. *Hyriodes leucocraspis* Hampson, 1910 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.
165. *Laspeyria cf. poecilota* Turner, 1908 **3**. Queensland (TL), Thailand, Peninsular Malaysia.
166. *Obana vagipennata* Walker, 1862 **1**. New Guinea, Borneo (TL), Sulawesi, Peninsular Malaysia.
167. *Hyposada serendipitatis* Holloway, 2009 **1**. Sri Lanka, Borneo (TL), Peninsular Malaysia.
168. *Corgatha pseudominor* Holloway, 2009 **1**. Borneo (TL), Peninsular Malaysia.
169. *Hypenagonia longipalpis* Hampson, 1912 **1**. Indian subregion, Sri Lanka (TL), Borneo, Peninsular Malaysia.
170. *Thermosara diapyra* Hampson, 1926. New Guinea (TL), Peninsular Malaysia.
171. *Condate nabalua* Holloway, 1976 **1**. Borneo (TL), Peninsular Malaysia.
172. *Tamba cf. kaingaran* Holloway, 2011 **1**. Borneo (TL), Peninsular Malaysia.
173. *Tamba submicacea* Walker, 1869 **1,2,3**. India (TL), Thailand, Borneo, Sumatra, Peninsular Malaysia.
174. *Tamba diaphora* Prout, 1932 **1,2,3**. Vietnam (TL), Thailand, Sumatra, Borneo, Seram, Peninsular Malaysia.
175. *Tamba occidinawa* Holloway, 2005 **1,2,3**. India, Sulawesi, Sumatra, Thailand, Borneo (TL), Peninsular Malaysia.
176. *Tipasa renalis* Moore, 1885 **1**. Taiwan, Borneo, Sri Lanka (TL), Peninsular Malaysia.
177. *"Tipasa" eubapta* Hampson, 1926 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.
178. **"Olulis" iuga* Swinhoe, 1901 **1**. Borneo (TL), Peninsular Malaysia.
179. *Dunira subapicalis* Swinhoe, 1905 **2,3**. India (TL), Thailand, Taiwan, Sumatra, Peninsular Malaysia.
180. *Dunira maculapex* Hampson, 1893 **1,3**. Thailand, Sri Lanka (TL), Borneo, Peninsular Malaysia.
181. *Eublemma quadrapex* Hampson, 1891 **3**. India (TL), Sri Lanka, Myanmar, Taiwan, S Japan, Bali, Australia, Andamans, Nicobar Is., Philippines, Thailand, Peninsular Malaysia.
182. *Eublemma bacchusi* Holloway, 2009 **1**. Borneo (TL), Peninsular Malaysia.
183. *Eublemma undilinea* Warren, 1913 **3**. Thailand, New Guinea (Muyua Is.) (TL), Australia, Peninsular Malaysia.
184. *Mesocopsis posticata* Walker, 1866 **1**. Borneo (TL), Peninsular Malaysia.
185. *"Mataeomera" oxoniorum* Holloway, 2009 **1**. Borneo (TL), Peninsular Malaysia.

Subfamily EREBINAE

186. *Heterospila nigripalpis* Walker, 1869 **1,2,3**. India (TL), Sumatra, Borneo, Thailand, Peninsular Malaysia.
187. *Trigonodes disjuncta* Moore, 1882. India (TL), Peninsular Malaysia.
188. *Dierna strigata* Moore, 1867 **3**. India (TL), Thailand, Laos, Cambodia, Vietnam, Nepal, Bangladesh, Taiwan, China, Peninsular Malaysia.
189. *Ophiusa tirhaca* Cramer, 1777 **3**. Africa (TL), Portugal, Spain, S France, Italy, Mallorca, Corsica, Sardinia, Sicily, Crete, SE Europe, S Asia, China, Australia, Thailand, Vietnam, Taiwan, Korea, Russian Far East, S Russia, Peninsular Malaysia.
190. *Ericeia sobria* Walker, 1858 **1**. Queensland (TL), New Guinea, Borneo, Kei Is., Peninsular Malaysia.
191. *Hypopyra pallidigera* Holloway, 2005 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.
192. *Ischyja anna* Swinhoe, 1902 **1**. Borneo (TL), Singapore, Peninsular Malaysia.
193. *Papuacola albisigillata* Warren, 1903 **1,2**. New Guinea (TL), Sulawesi, Sumatra, Borneo, Peninsular Malaysia.
194. *Fodina oriolus* Guenée, 1852 **3**. Bangladesh (TL), Thailand, China, Nepal, India, Indochina, Peninsular Malaysia.

EREBIDAE *incertae sedis*

195. *Asta subnigra* Holloway, 2005 **1,2**. India, Sumatra, Borneo (TL), Peninsular Malaysia.
196. *Pseudosphetta umbrosa* Holloway, 2005 **1,2**. Sumatra, Borneo (TL), Peninsular Malaysia.

197. *Aphypena violacea* Holloway, 2005 **1**. Borneo (TL), Peninsular Malaysia.
198. *Oglasa costimacula* Wileman, 1915 **1,3**. Taiwan (TL), Borneo, Thailand, Peninsular Malaysia.
199. *"Oglasa" pachycnemis* Hampson, 1926 **1**. Borneo (TL), Peninsular Malaysia.
200. *Chorsia quentini* Kobes, 2010 **1,2,3**. Borneo, Thailand, Sumatra (TL), Peninsular Malaysia.
201. *Chorsia maculosa* Walker, 1863 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.
202. *Chorsia williamsi* Holloway, 2005 **1**. Borneo (TL), Peninsular Malaysia.
203. *Chorsia carjacobsi* Holloway, 2005 **1**. Borneo (TL), Sulawesi, Peninsular Malaysia.
204. *Chorsia hemicyclopis* Hampson, 1926 **1,3**. Borneo (TL), Thailand, Peninsular Malaysia.
205. **Chorsia rufitincta* Hampson, 1918 **1,2**. Sumatra, Borneo (TL), Peninsular Malaysia.
206. *Chorsia kingi* Holloway, 2005 **1**. Borneo (TL), Peninsular Malaysia.
207. *Chorsia griffini* Holloway, 2005 **1**. Borneo (TL), Peninsular Malaysia.
208. *Chorsia dinglei* Holoway, 2005 **1**. Borneo (TL), Peninsular Malaysia.
209. *Lignicida echana* Swinhoe, 1905. Philippines (TL), Bali, Peninsular Malaysia.
210. *Aburina uniformis* Swinhoe, 1919 **1,2,3**. NE Himalaya, Sumatra (TL), Borneo, Thailand, Peninsular Malaysia.
211. *Meekistrotia bacchusi* Holloway, 2009 **1,2,3**. Thailand, Sumatra, Borneo (TL), Peninsular Malaysia.
212. *Meekistrotia molybdota* Hampson, 1910 **3**. Thailand, India (TL), Peninsular Malaysia.
213. *Anachrostis fulvicilia* Hampson, 1926 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.
214. *Holocryptis erubescens* Hampson, 1893 **1**. Sri Lanka (TL), Thailand, Vietnam, Japan, India Peninsular Malaysia.
215. *Tadaxa lintona* Swinhoe, 1901 **1**. Borneo (TL), Peninsular Malaysia.
216. *Scedopla umbrosa* Wileman, 1916 **3**. Taiwan (TL), Thailand, Peninsular Malaysia.
217. *Heterospila duplexa* Moore, 1882 **3**. Thailand, N India (TL), Peninsular Malaysia.
218. *Radara subcupralis* Walker, 1866. India, Africa (TL), Queensland, Peninsular Malaysia.
219. *Stenocarsia sthenoptera* Swinhoe, 1895 **1**. India (TL), Borneo, Singapore, Peninsular Malaysia.

FAMILY NOCTUIDAE

Subfamily BAGISARINAE

220. *Dyrzela violacea* Holloway, 1989 **1**. Borneo (TL), Peninsular Malaysia.
221. **Xanthodes intersepta* Guenée, 1852 **1,2**. Thailand, India (TL), Nicobar Is., Sri Lanka, Nepal, Vietnam, Sumatra, Java, Sulawesi, Philippines, Taiwan, Japan, Peninsular Malaysia.

Subfamily PANTHEINAE

222. *Tambana entoxantha* Hampson, 1894 **2,3**. Thailand, Vietnam, Laos, India (TL), Nepal, China, Java, Sumatra, Peninsular Malaysia.
223. *Ecpatia triangulata* Holloway, 2009 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.
224. *Ecpatia lingulata* Holloway, 2009 **1**. Borneo (TL), Sumatra, Peninsular Malaysia.
225. **Ecpatia sciachroa* Hampson, 1926 **3**. Sri Lanka (TL), Philippines, Thailand (Pellinen & Mutanen 2019), Peninsular Malaysia.
226. *Donda eurychlora* Walker **2,3**. India (TL), Nepal, Himalaya, Thailand, Timor, Flores, Sumatra, Sumbawa, Peninsular Malaysia.

Subfamily ACRONICTINAE

227. *Simyra conspersa* Moore, 1881 **3**. India (TL), Bangladesh, Thailand, Peninsular Malaysia.

Subfamily ERIOPINAE

228. *Callopistria leucobasis* Hampson, 1908. China, Taiwan, Java (TL), Sulawesi, Peninsular Malaysia.

Subfamily NOCTUINAE

229. *Feliniopsis leucostigma* Moore, 1867 **3**. Thailand, India, Bangladesh (TL), Nepal, Peninsular Malaysia.
230. *Feliniopsis opposita* Walker, 1865 **3**. Thailand, India, Sri Lanka (TL), Nepal, Peninsular Malaysia.
231. *Callyna jugaria* Walker, 1858 **3**. Thailand, India (TL), Sri Lanka, Bangladesh, Nepal, Vietnam, S China, Philippines, Taiwan, Peninsular Malaysia.
232. *Prometopus asahina* Kobes, 1985 **1,2**. ?Thailand, Sumatra (TL), Borneo, Peninsular Malaysia
233. *Mythimna* (*Hyphilare*) *intertexta* Chang, 1991 **1,2,3**. Thailand, Borneo, Sumatra, India, Nepal, Taiwan (TL), Peninsular Malaysia.
234. *Mythimna* (*Sablia*) *griseofasciata* Moore, 1881 **3**. Thailand, N India (TL), Pakistan, Nepal, Peninsular Malaysia.
235. *Pseudeustrotia semialba* Hampson, 1894 **3**. Thailand, Myanmar (TL), N India, Myanmar, SW China, Peninsular Malaysia.
236. *Pseudeustrotia dimera* Hampson, 1910 **3**. N India (TL), Nepal, Thailand, Peninsular Malaysia.
237. *Mudaria rudolfi* Kobes, 1982 **2,3**. Thailand, Sumatra (TL), Peninsular Malaysia.

NOCTUINAE *incertae sedis*

238. *Bagada spicea* Guenée, 1852 **2,3**. Thailand, India, Sri Lanka, Nepal, Vietnam, Sumatra, Java (TL), Sulawesi, Cebu, Taiwan, China, Peninsular Malaysia.

Subfamily AGARISTINAE

239. *Episteme nipalensis* Butler, 1875 **3**. Thailand, Myanmar, India, Nepal (TL), China, Peninsular Malaysia.
240. *Scrobigera amatrix* Westwood, 1848 **3**. India (TL), Nepal, China, Thailand, Vietnam, Peninsular Malaysia.
241. *Sarbanissa kiriakoffi* Kobes, 1985 **2**. Sumatra (TL), Peninsular Malaysia.

NOCTUIDAE *incertae sedis*

242. *Elusa puncticeps* Walker, 1863 **1,3**. Thailand, Borneo (TL), Peninsular Malaysia.

FAMILY EUTELIIDAE

Subfamily EUTELIINAE

243. *Marathyssa incisa* Kobes, 1994 **1,2**. Sumatra (TL), Java, Borneo, Peninsular Malaysia.
244. *Marathyssa harmonica* Hampson, 1897 **2,3**. Thailand, N India (TL), Sumatra, Peninsular Malaysia.
245. *Atacira affinis* Hampson, 1918 **3**. Taiwan (TL), Thailand, S Japan, Peninsular Malaysia.
246. *Atacira caesia* Roepke, 1938 **1,2,3**. Thailand, Sumatra, Sulawesi (TL), Borneo, Peninsular Malaysia.
247. *Atacira waterstradti* Holloway, 1985 **1,2**. Borneo (TL), Sumatra, Sulawesi, Bali, Peninsular Malaysia.
248. *Atacira smarti* Holloway, 1985 **1,2**. Borneo (TL), Sumatra, Sulawesi, Bali, Peninsular Malaysia.
249. *Atacira olivacea* Holloway, 1985 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.

250. *Atacira melanephra* Hampson, 1912 **3**. Thailand, Japan, Sri Lanka, India (TL), Peninsular Malaysia.
251. *Chlumetia brunnea* Kobes, 2008 **2**. Sumatra (TL), Peninsular Malaysia.
252. *Chlumetia tombaga* Kobes, 2008 **2,3**. Thailand, Sumatra (TL), Peninsular Malaysia.
253. *Anigraea homochroa* Hampson, 1912 **1,2**. New Guinea, Borneo (TL), Sumatra, Peninsular Malaysia.

Subfamily STICTOPTERINAE

Tribe Odontodini

254. *Lophoptera punctapex* Holloway, 1976 **1,2**. Borneo (TL), Sumatra, Peninsular Malaysia.
255. *Lophoptera squammilinea* Holloway, 1985 **1,2**. NE Himalaya, Sumatra, Borneo (TL), Peninsular Malaysia.
256. *Lophoptera negretinoides* Holloway, 1985 **1**. Borneo (TL), Peninsular Malaysia.
257. *Lophoptera belli* Holloway, 1985 **1,2**. S India, Sumatra, Borneo (TL), Peninsular Malaysia.

FAMILY NOLIDAE

Subfamily NOLINAE

258. *Ctenane labuana* Swinhoe, 1904 **1**. Philippines (László, Ronkay & Ronkay 2015b) Borneo (TL), Peninsular Malaysia.
259. *Ctenane trianguloquelinea* van Eecke, 1912 **1,2,3**. Sumatra, N Thailand, Java (László, Ronkay & Ronkay 2015b) (TL), Borneo, Peninsular Malaysia.
260. *Leucobaeta hemiphaea* Hampson, 1905 **1,3**. Thailand, Philippines, Java (TL), Peninsular Malaysia.
261. *Meganola tenebrosa* Hampson, 1896 **1,3**. Thailand, India, Bhutan (TL), Nepal, Borneo, Peninsular Malaysia.
262. *Meganola cuneifera* Walker, 1862 **1,3**. Nepal, Bhutan, Thailand, NE Himalaya, Borneo (TL), Vietnam, Peninsular Malaysia.
263. *Meganola pseudobasalactifera* László, Ronkay & Ronkay, 2015 **2**. Sumatra (TL), Peninsular Malaysia.
264. *Evonima ochritincta* Hampson, 1901 **2,3**. India, China, Thailand, Sri Lanka (TL), Indonesia, Taiwan, Peninsular Malaysia.
265. *Evonima ronkaygabori* Han & Hu, 2019. China (TL), Peninsular Malaysia.
266. *Manoba obfuscata* László, Ronkay & Ronkay, 2014 **2**. Sumatra (TL), Peninsular Malaysia.
267. *Manoba punctilineata* Hampson, 1896 **1**. NE Himalaya, Bhutan (TL), Borneo, Myanmar, Philippines, Sulawesi, Peninsular Malaysia.
268. *Manoba lativittata* Moore, 1888 **3**. India (TL), Thailand, Peninsular Malaysia.
269. *Nanola subbasalactifera* László, Ronkay & Ronkay, 2014 **2**. Philippines (TL), Java, Sumatra, Peninsular Malaysia.
270. *Nanola rothschildi* László, Ronkay & Ronkay, 2015 **2**. Philippines (TL), Sumatra, Peninsular Malaysia.
271. *Hampsonola tarkabarka* László, Ronkay & Witt, 2010 **3**. Thailand (TL), Peninsular Malaysia.
272. *Hampsonola diehli* László, Ronkay & Ronkay, 2015 **1,2**. Sumatra (TL), Borneo, Peninsular Malaysia.
273. *Njalkanola bimaculata* van Eecke, 1920 **2,3**. Thailand, Cambodia, India, Sumatra, Java (László, Ronkay & Witt 2010) (TL), Peninsular Malaysia.
274. *Inouenola grisalis* Hampson, 1893. Sri Lanka (TL), SW China, Vietnam (László, Ronkay & Witt 2010), Peninsular Malaysia.
275. *Fragilonola igorkostjuki* László, Ronkay & Witt, 2010 **2,3**. Thailand (TL), Sumatra, Peninsular Malaysia.
276. *Spininola maliatthoides* László, Ronkay & Ronkay, 2014 **2**. Sumatra (TL), Peninsular Malaysia.
277. *Calonola orbiculata* László, Ronkay & Witt, 2010 **1,2,3**. Laos, Borneo, Thailand (TL), Sumatra, Peninsular Malaysia.
278. *Sumatranola costamacula* László, Ronkay & Ronkay, 2013 **1,2**. Sumatra (TL), Borneo, Peninsular Malaysia.

279. *Membranola lampang* Pellinen, 2012 **3**. Thailand (TL), Cambodia, Peninsular Malaysia.
280. *Casminola arminbecheri* László, Ronkay & Witt, 2010 **1,2,3**. Borneo, Thailand (TL), Sumatra, Peninsular Malaysia.
281. *Furanola karsholti* László, Ronkay & Ronkay, 2013 **2**. Sumatra (TL), Peninsular Malaysia.
282. *Barnanola sumatra* László, Ronkay & Witt, 2010 **1,2,3**. Borneo, Thailand, Sumatra (TL), Peninsular Malaysia.
283. *Leuconola wilsonae* Holloway, 2003 **1**. Borneo (TL), Peninsular Malaysia.
284. *Wittonola latifasciata* László, Ronkay & Ronkay, 2015 **2**. Cambodia (TL), Sumatra, Peninsular Malaysia.
285. *Nola canioralis* Walker, 1863 **1,3**. China, Thailand, Moluccas, Sulawesi, Borneo (TL), Peninsular Malaysia.
286. *Nola fisheri* Holloway, 2003 **1**. Borneo (TL), Peninsular Malaysia.
287. *Nola erythrostigmata* Hampson, 1894 **1,3**. India (TL), Bhutan, Borneo, Thailand, Peninsular Malaysia.
288. *Nola kanshireiensis* Wileman & South, 1916. Taiwan (TL), China, Peninsular Malaysia.
289. *Nola basinigra* Pellinen, 2012 **3**. Thailand (TL), Peninsular Malaysia.
290. *Nola gyurii* László, Ronkay & Ronkay, 2014. Vietnam (TL), Laos, Cambodia, Nepal, Peninsular Malaysia.
291. *"Nola" nigrolineata* van Eecke, 1926 **2**. Sumatra (TL), Peninsular Malaysia.
292. *"Nola" transwallacea* Holloway, 2003 **1**. Borneo (TL), Sulawesi, Seram, Peninsular Malaysia.
293. *Selca latifascialis* Walker, 1866 **1,2**. Sumatra (László, Ronkay & Ronkay 2015b), Borneo (TL), Peninsular Malaysia.

Subfamily CHLOEPHORINAE

294. *Giaura robusta* Moore, 1888 **1**. India (TL), Borneo, Palawan, Peninsular Malaysia.
295. *Giaura nigrilineata* Wileman & West, 1929. Philippines (TL), Peninsular Malaysia.
296. *Garella docilis* Butler, 1881 **3**. Thailand, S Africa, Nigeria, Sudan, Saudi Arabia, Yemen, Oman, Iran, S Pakistan (TL), India, Sri Lanka, Peninsular Malaysia.
297. *Garella curiosa* Swinhoe, 1890 **3**. Thailand, Myanmar (TL), Java, Sulawesi, New Guinea, Australia, Peninsular Malaysia.
298. *Hylophilodes dubia* Prout, 1926 **1,2**. Sumatra, Palawan, Borneo (TL), Peninsular Malaysia.
299. *Hylophilodes pseudorientalis* Prout, 1921 **2,3**. India (TL), Laos, N Vietnam, Thailand, Sumatra, Peninsular Malaysia.
300. *Tortriciforma razowskii* Kobes, 1992 **2,3**. Sumatra (TL), Thailand, Peninsular Malaysia.
301. *Tyana flavitegulae* Rothschild, 1920 **2**. Sumatra (TL), Peninsular Malaysia.
302. *Xenochroa argentipuncta* Holloway, 1976 **1,2**. Sumatra, Borneo (TL), Peninsular Malaysia.
303. *Xenochroa sindarrayensis* Kobes, 1997 **2**. Sumatra (TL), Peninsular Malaysia.
304. *Didigua viridifusa* Kobes, 1997 **1,2,3**. Sumatra, Borneo (TL), Thailand, Peninsular Malaysia.
305. *Titulcia javensis* Warren, 1916 **2**. Java (TL), Sumatra, Peninsular Malaysia.
306. *Labanda carinata* Holloway, 2003 **1**. Borneo (TL), Peninsular Malaysia.
307. *Earias luteolaria* Hampson, 1891 **1**. India (TL), Sri Lanka, Borneo, Australia, Hong Kong, Peninsular Malaysia.
308. *Earias brevipennis* Warren, 1916. Bacan (TL), Peninsular Malaysia.

Subfamily RISOBINAE

309. *Risoba sumatrana* Kobes, 2006 **2**. Sumatra (TL), Peninsular Malaysia.

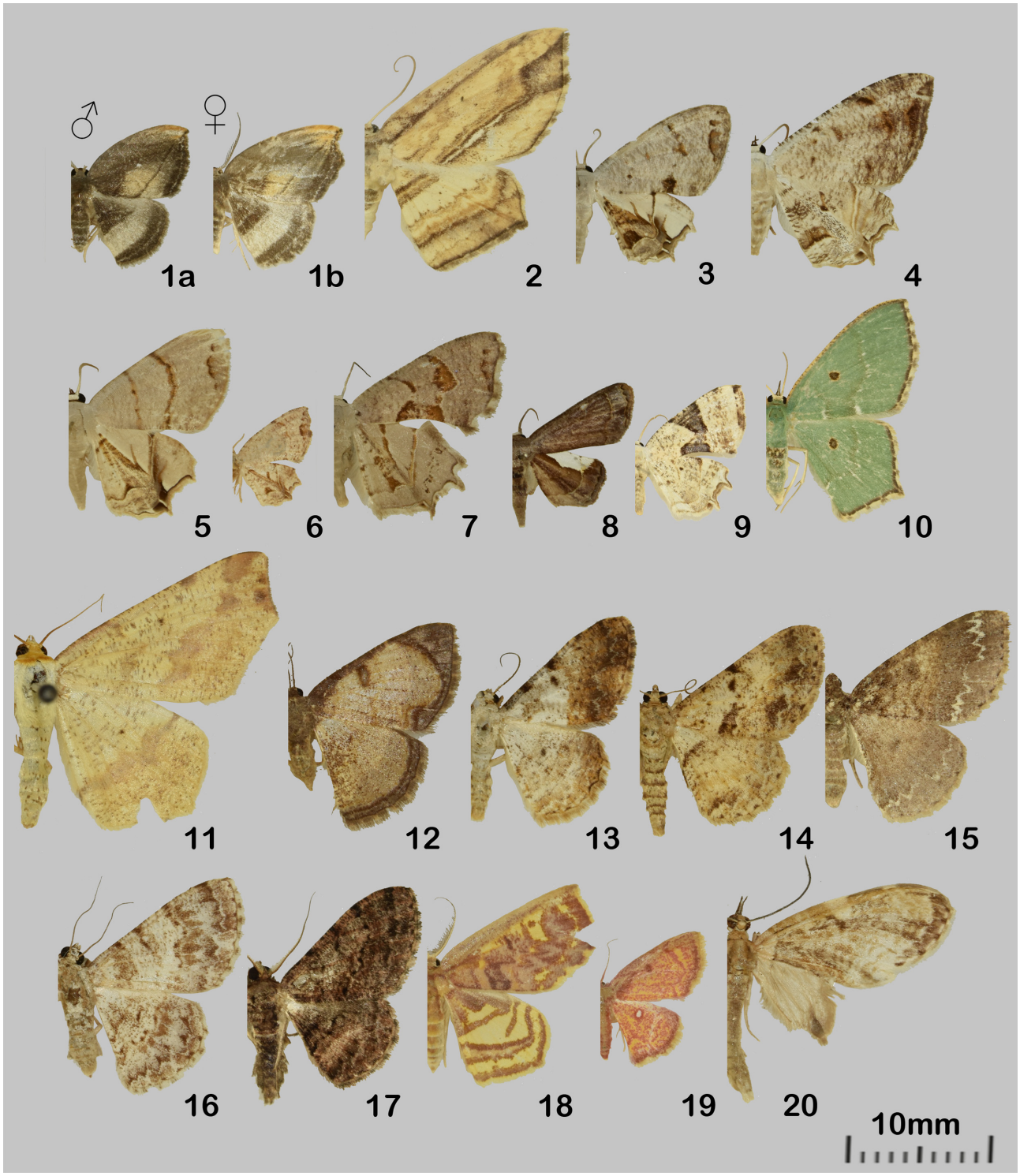

FIGURE 3. Drepanidae. 1a. Male, *Microblepsis cupreogrisea;* 1b. Female, ditto; **Uraniidae**. 2. *Phalacra nigrilineata*; 3. *Dysaethria albolilacina*; 4. *Dysaethria nigrifrons*; 5. *Dysaethria walkeri*; 6. *Dysaethria danum*; 7. *Epiplema saccata*; 8. *Phazaca cesena*; 9. *Pseudodirades transgrisea*; **Geometridae**. 10. *Cyclothea disjuncta*; 11. *Pareclipsis umbrata*; 12. *Hydatocapnia demensa*; 13. *Psilalcis albibasis*; 14. *Psilalcis intermedia*; 15. *Psilalcis holzwegensis*; 16. *Diplurodes diehli*; 17. *Ectropidia minilepidaria*; 18. *Chrysocraspeda rubricata*; 19. *Chrysocraspeda rubraspersa*; 20. *Sauris quassa*.

Notes on some moths

GEOMETRIDAE

1. *Thalassodes opalina* Butler, 1880 (Genitalia: Fig. 9. 1)

Material examined: 1 male, Malaysia, Kedah, Kedah Peak, 3200', 6 July 1977, leg. Y.P. Two.

Note: This is the only specimen recorded from Peninsular Malaysia, in the northern region of Peninsular Malaysia (Kedah Peak or Mount Jerai) at an elevation of 975m. Although the specimen is now faded and has lost its wings diagnostic features, the male genitalia match with the description by Han & Xue (2011). However, the genitalia of the Peninsular Malaysian specimen show some variations in two structures: (1) the valve basal process is slightly broader; (2) the gnathos is slenderer and longer.

2. *Pseudomiza obliquaria* Leech, 1897

Material examined: 1 female, Malaysia, Pahang, Fraser's Hill, High Pine Bungalow, 22 July 2023, leg. Sofwan Badr.

Note: Only a single specimen was collected in the upper montane region of Fraser's Hill, Pahang.

3. *"Metallaxis" semipurpurascens* Hampson, 1896 (Genitalia: Fig. 9. 2 & 3)

Material examined: 1 male, 1 female, Malaysia, W. Pahang, Genting Tea Estate, 670m, 3 May 2010, 3 August 1979, leg. H.S. Barlow (Coll. GTE), GTE slides, GTE 380, GTE382; 1 female, Malaysia, W. Pahang, Genting Tea Estate, 670m, June 2009, leg. H.S. Barlow (Coll. GTE).

Notes: Holloway (1997) indicated that the tribe placement of this species should be in Scopulini instead of Rhodostrophiini (now treated as junior synonym of Cyllopodini (see Sihvonen *et al.* 2020)) based on the male genitalia characteristic. He did not elaborate any further. Both male and female genitalia dissections were examined, illustrated and described in detail to further elucidate "*M*." *semipurpurascens* relationship with Scopulini in this study.

Male 8th abdominal segment: The 8th sternite is narrow, squarish, tongue-like (mappa), with symmetrical lateral rod-like processes that curve inward (cerata). **Male genitalia:** capsule-like and ovate, with a broad saccus. Uncus and gnathos absent. Socii well developed, divided into two long, slender, and bent projections that are moderately setose and taper to a hooked apex; these flank the anal tube. Transtilla U-shaped and weakly sclerotised. Valva soft, antler-like, and divided into two projections: the first is lateral, bifurcate, and curved inward; the second is shorter, straight, and arises between the bifurcation. The sacculus distally expanded and partially fused basally with the valva. Aedeagus hairpin-shaped, with a spur-like apical projection (carina). **Female abdomen:** The fifth abdominal sternite bears a lateral streak of cteniophore (indicated in the illustration). **Female genitalia:** Apophyses slender, with the posterior pair longer than the anterior. Ostium bursae cup-shaped and sclerotised, constricted anteriorly. Ductus bursae slightly expanded posteriorly and gradually narrowing anteriorly. Corpus bursae pyriform, bearing two elongate patches of separate spinose signa.

Based on the presence of two rounded lobes on the tergite, the mappa and cerata on the sternites of the male 8th abdominal segment, together with the well-developed socii and the absence of both uncus and gnathos in the male genitalia, and two patches of signa in the female genitalia, this species is undoubtedly misplaced and should be transferred to the tribe Scopulini and possibly under the genus *Scopula* (Sihvonen pers. comm.).

4. *Sauris quassa* Prout, 1932 (Fig. 3. 20; Genitalia: Fig. 9. 4)

Material examined: 1 male, Malaysia, W. Pahang, Genting Tea Estate, 670m, 23 November 1981, leg. H.S. Barlow (Coll. GTE), GTE slides, GTE124.

Note: This species is exclusively documented through the male holotype, collected at an elevation of approximately 1,600m on Gunung Kinabalu (Holloway 1997). Consequently, the GTE specimen represents the second known individual with lower elevation at approximately 650m and marks the first documented occurrence in Peninsular Malaysia confirmed by genitalia dissection. In the male genitalia, the uncus is straight and flanked by triangular-shape socii bearing setae. The socii are slightly shorter but broader than the uncus giving the sociuncus appearance of a crown. The ventral part of the valve is expanded with transverse pleats occurring at its distal half and stop just before the distal membranous section.

NOTODONTIDAE

5. *Liparopsis dierli* R. & E. Bender, 1984 (Fig. 4. 22; Genitalia: Fig. 9. 5)

Material examined: 2 males, Malaysia, W. Pahang, Genting Tea Estate, 670m, 3 December 2016, 1 August 2018, leg. H.S. Barlow (Coll. GTE), GTE slides, GTE65, GTE66.

Note: Externally, this species resembles *L. sundana* Holloway, 1983, but *dierli* is larger, with stronger contrast between the white and reddish-brown areas of the forewing and distinct reddish-brown costal spots in the antemedial and postmedial regions. The male eighth sternite bears a large central lobe, while the tergite has a bifurcate projection at the middle of the posterior margin. The valve is shaped like a swan's head, with the "beak" region heavily sclerotised and the "eye" region membranous and setose. The vinculum is distinctly W-shaped. The aedeagus is curved, bearing a pair of sclerotised spurs at the apex.

EREBIDAE

6. *Lymantria strigatoides* Schintlmeister, 1994 (Fig. 4. 23; Genitalia: Fig. 9. 6)

Material examined: 1 female, Malaysia, Pahang, Fraser's Hill, 1,400m, 30 October 2024, leg. Khalid Fadil (Coll. GTE), GTE slides, GTE383.

Note: This is the only specimen recorded from Peninsular Malaysia. Schintlmeister (2004) noted the species as common in Sumatra, but our findings suggest it is rare locally. The female of *L. strigatoides* closely resembles *L. strigata* Aurivillius, 1894 (Sundaland, ?Thailand), but differs by its pinkish abdomen, whereas *strigata* is yellowish. In the female genitalia, the posterior apophysis is long and slender, the anterior apophysis clubbed. The ostium bursae is strongly sclerotised and dorsally folded. The ductus bursae is extremely short, and the corpus bursae is pyriform, bearing a rhomboidal signum.

7. *Euproctis canescens* Rothschild, 1920 (Fig. 4. 29; Genitalia: Fig. 9. 7)

Material examined: 1 male, 1 female, Malaysia, W. Pahang, Genting Tea Estate, 670m, 2 July 2010, 5 August 1977, leg. H.S. Barlow (Coll. GTE), GTE slides, GTE370, GTE371.

Note: This species is distinctive in having dark brownish-grey forewings, speckled with black dots and bearing an ochreous yellow semicircular patch along the mid-termen between veins M3 and CuA1. The hindwing colouration is the same with the forewing but paler, without any speckled spots and the mid-termen marking is inconspicuous. In the male genitalia, the valve is distinctively square-shaped, distally membranous, and densely setose. Saccus elongate and tongue-shaped. The aedeagus is rectangular and the base of aedeagus vesica bears a field of fine cornuti. In the female genitalia, the papillae analis squarish. Posterior apophyses slender, tapered apically, and slightly longer than the anterior apophyses, which are rounded at the tips. Ostium bursae rounded, flanked by a pair of sclerotised folds bearing setae. Ductus bursae short, leading to an unusually short, oval corpus bursae, lacking any signum.

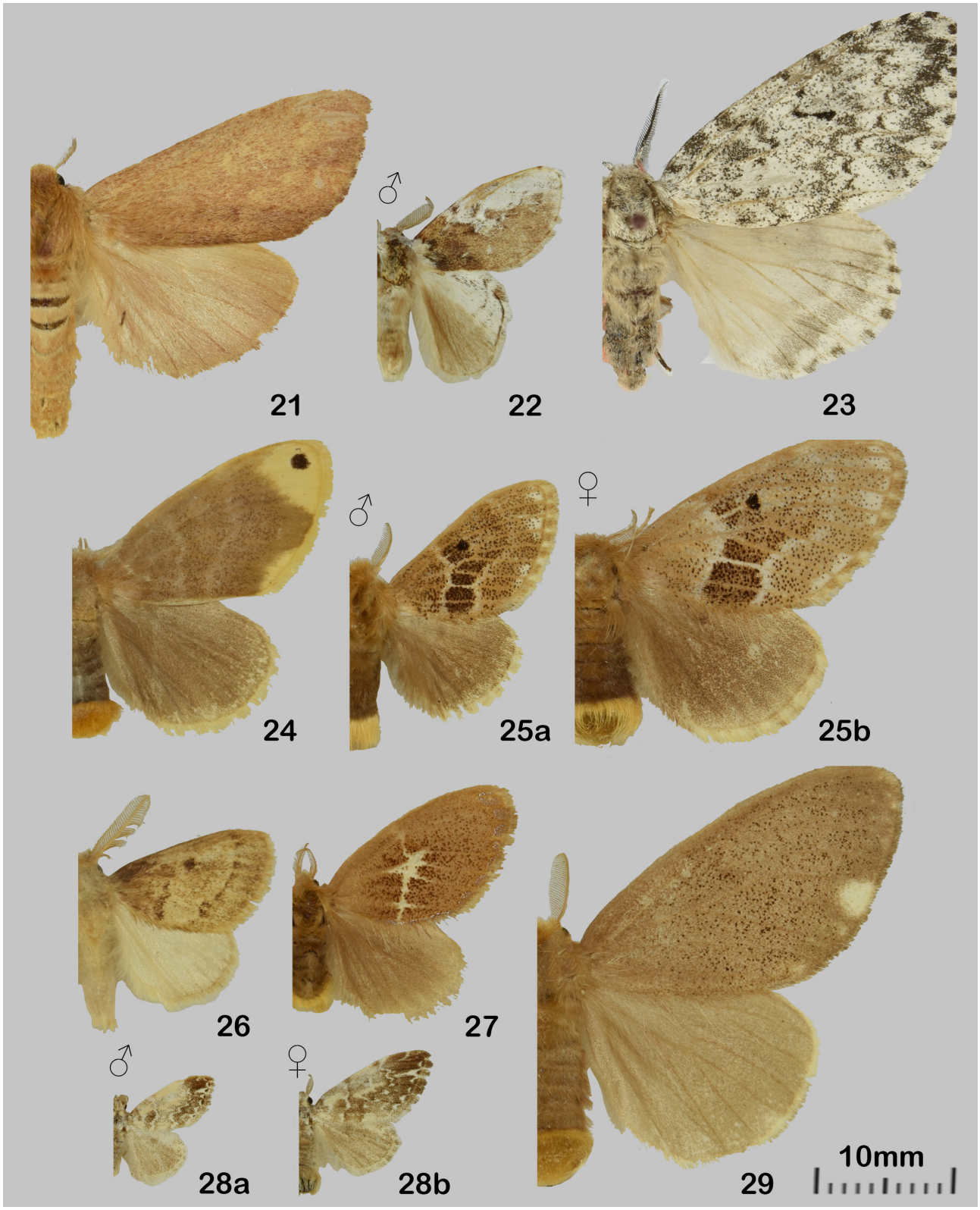

FIGURE 4. Notodontidae. 21. *Changea siamensis*; 22. Male, *Liparopsis dierli*; **Erebidae: Lymantriinae.** 23. Lymantria strigatoides; 24. *Toxoproctis celidota*; 25a. Male, *Nygmia punctatofasciata*; 25b. Female, ditto; 26. *Choerotricha indistincta*; 27. *Euproctis asteroides*; 28a. Male, *Medama spatulidorsum*; 28b. Female, ditto; 29. *Euproctis canescens*.

8. *Arctornis bilobuncus* Holloway, 1999 (Fig. 5. 30; Genitalia: Fig. 9. 8)

Material examined: 1 male, Malaysia, W. Pahang, Genting Tea Estate, 670m, Bred *Lithocarpus*, 24 February 2004, leg. H.S. Barlow (Coll. GTE). GTE slides, GTE365.

Note: This is the only specimen collected from Peninsular Malaysia. The external and genitalia features match with the descriptions given by Holloway (1999). In addition, the margins of the forewings and hindwings are slightly greyish, but do not extend to the apex or dorsum.

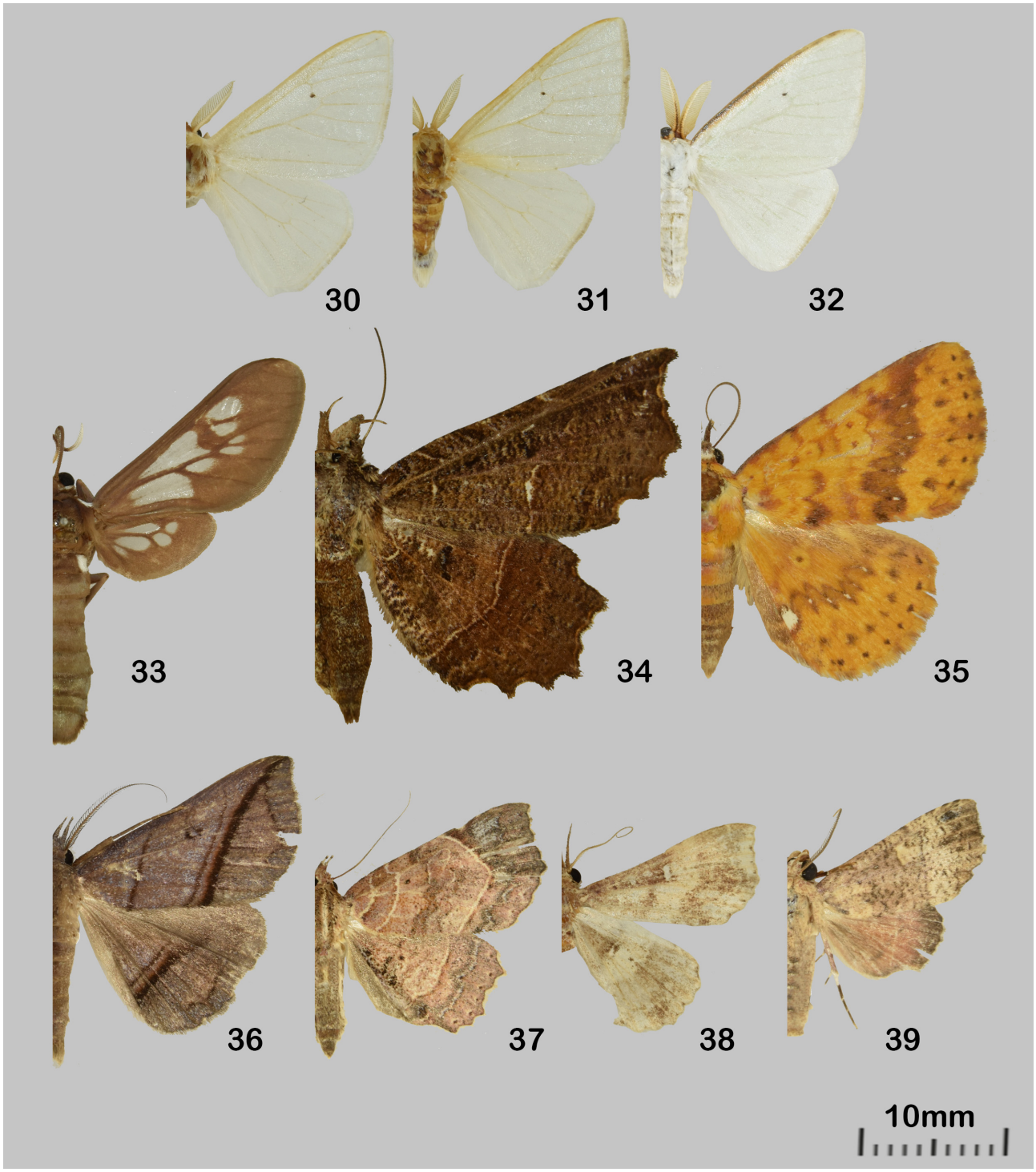

FIGURE 5. Erebidae: Lymantriinae. 30. *Arctornis bilobuncus*; 31. *Arctornis rhopica*; 32. *Arctornis ferruginicosta*; **Erebidae: Arctiinae**. 33. *Caeneressa ericssoni*; **Erebidae**. 34. *Acharya franconia*; 35. *Thermosara diapyra*; 36. *Heterospila duplexa*; 37. *Tamba cf. kaingaran*; 38. *Adrapsa scopigera*; 39. *Falana bilineata.*

9. *Arctornis rhopica* Toxopeus,1948 (Fig. 5. 31)

Material examined: 1 male, Malaysia, W. Pahang, Genting Tea Estate, 670m, 2 January 2005, leg. H.S. Barlow (Coll. GTE). GTE slides, GTE366; 2 males Malaysia, W. Pahang, Genting Tea Estate, 670m, 16 August 2011, 13 February 2006, leg. H.S. Barlow (Coll. GTE).

Note: The external morphology and genitalia features match with the descriptions given by Holloway (1999). In addition, the margins of the forewings and hindwings are uniformly greyish. The forewing grey margin extends to the apex but not the dorsum, while the hindwing margin reaches neither. The legs are not spotted.

10. *Arctornis ferruginicosta* Holloway, 1999 (Fig. 5. 32; Genitalia: Fig. 10. 9)

Material examined: 1 male, 1 female, Malaysia, W. Pahang, Genting Tea Estate, 670m, 9 July 2024, 22 September 2025, leg. Khalid Fadil (Coll. GTE). GTE slides, GTE368, GTE369.

Notes: The external morphology and genitalia features match with the descriptions given by Holloway (1999). As mentioned by Holloway (1999), this species is readily distinguishable by the rusty brown costa of the forewing and lack of any marking on the dorsal part of the white abdomen. In addition, the antennal base is dark rusty brown, with the colour gradually diffusing to about halfway along the shaft.

11. *Adrapsa scopigera* Moore, 1885 (Fig. 5. 38; Genitalia: Fig. 10. 10)

Material examined: 1 male, Malaysia, W. Pahang, Genting Tea Estate, 670m, May 2018, Banana Bait, leg. H.S. Barlow (Coll. GTE), GTE slides, GTE135.

Note: A single specimen was collected in Peninsular Malaysia using banana bait. Holloway (2008) noted the genitalia features of *A. scopigera* in comparison to *A. pseudoscopigera* Holloway, 2008, stating that "compared with *scopigera*, the saccus is more acute, and the valve lacks a strong harpe at its centre. The aedeagus vesica in *scopigera* has a large bundle of needle-like spines that are not seen in *pseudoscopigera*." This description appears under *A. pseudoscopigera* but without an accompanying illustration. Here, we illustrated the male genitalia of *scopigera*.

12. *Chusaris retatalis* Walker, 1859 (Fig. 6. 44; Genitalia: Fig. 10. 11)

Material examined: 2 males, Malaysia, W. Pahang, Genting Tea Estate, 670m, 25 March 2016, 26 December 2019, leg. H.S. Barlow (Coll. GTE), GTE slides, GTE140, GTE142; 1 male, Malaysia, W. Pahang, Genting Tea Estate, 670m, July 2011, leg. H.S. Barlow (Coll. GTE).

Note: Holloway (2008) noted several external differences distinguishing *C. retataloides* Holloway, 2008, from *C. retatalis*. However, based on our examination, this species can be reliably identified only through genitalia dissection. The male genitalia were described by Holloway (2008) under the account of *retataloides*, though not illustrated: "The male genitalia have the valves narrow, entire, lacking the extended spine of the sacculus in *retatalis*. The aedeagus vesica lacks the bundle of cornuti seen in *retatalis*." In addition, *retatalis* possesses a more developed uncus, moderately setose throughout, and the aforementioned sacculus spine is situated at mid-valve. The male genitalia is illustrated here.

13. *Catada belaria* Lödl & Paumkirchner, 2001

Material examined: 1 female, Malaysia, Kedah, Pulau Langkawi, The Datai, May 2022, leg. H.S. Barlow (Coll. GTE).

Note: The only Peninsular Malaysian specimen of this species was collected on Pulau Langkawi by HSB. This species appears to be rare but shows a broad habitat distribution, ranging from wet heath forest at 150m and coastal areas (this study) to the highlands of Bukit Retak, Brunei, at 1618m (Holloway 2008).

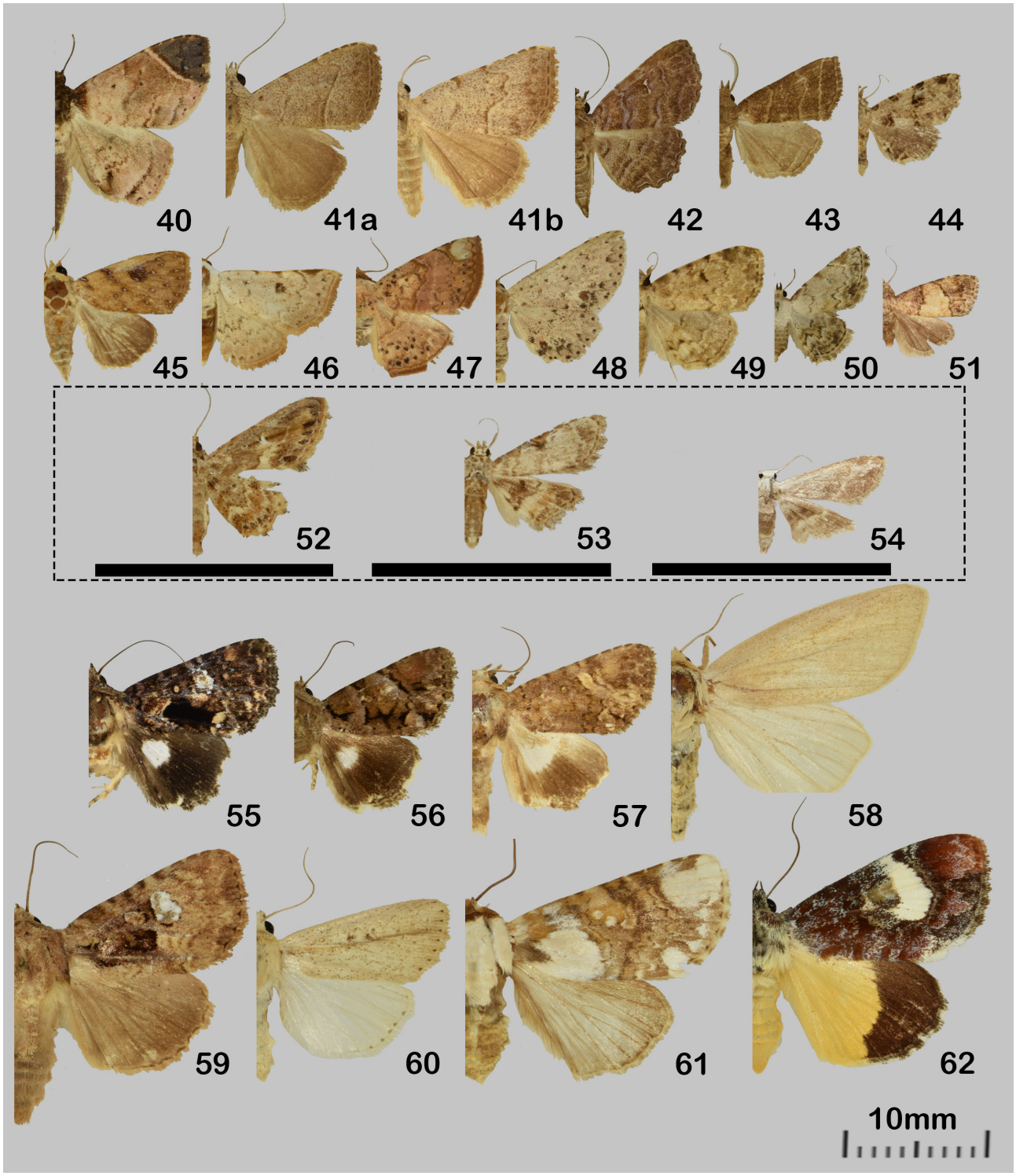

FIGURE 6. Erebidae. 40. *Dunira subapicalis*; 41a. "*Oglasa*" *pachycnemis*; 41b. Ditto; 42. *Tadaxa lintona*; 43. *Polypogon annulata*; 44. *Chusaris retatalis*; 45. *Rivula mageei*; 46. *Eublemma bacchusi*; 47. *Eublemma undilinea*; 48. *Obana vagipennata*; 49. *Anatatha maculifera*; 50. "*Mataeomera*" *oxoniorum***;** 51. *Alienia cambodiaa*; 52. *Mesocopsis posticata*; 53. *Araeopteron goniophora*; 54. *Araeopteron flaccida*; **Noctuidae**. 55. *Ecpatia lingulata*; 56. *Ecpatia triangulata*; 57. *Ecpatia sciachroa*; 58. *Simyra conspersa*; 59. *Feliniopsis leucostigma*; 60. *Mythimna griseofasciata*; 61. *Mudaria rudolfi*; 62. *Sarbanissa kiriakoffi*. The three species illustrated in the dotted-line box are magnified five times from its actual size with the scale bar adjusted for 10mm.

14. *Falana bilineata* Holloway, 2005 (Fig. 5. 39)

Material examined: 1 male, Malaysia, W. Pahang, Genting Tea Estate, 670m, 8 May 2024, leg. Khalid Fadil (Coll. GTE).

Note: This is the only specimen collected from Peninsular Malaysia. Holloway (2005) noted that the two paratypes from Barito Ulu, Kalimantan have obscure fascia lacking the diagnostic double postmedial fascia without providing figure. We speculated that the absence of this fascia is similar to the specimen collected from GTE, but we are unsure if this species exhibits any polymorphism. Additionally, the forewing from GTE is more speckled with irregular small black dots and lines compare to the holotype. The male genitalia match exactly with Holloway (2005).

15. *Anatatha maculifera* Butler, 1889 (Fig. 6. 49; Genitalia: Fig. 10. 12)

Material examined: 1 male, Malaysia, W. Pahang, Genting Tea Estate, 670m, BB3, N248, 30 September 2018, leg. H.S. Barlow (Coll. GTE), GTE slides, GTE179.

Note: A single specimen was collected in Peninsular Malaysia using banana bait. Interestingly, the holotype was also collected "at sugar" which suggest the same method of using fruits as bait to attract this species. The specimen habitus match with the illustration of the holotype. The valve is split into costal and ventral arms. The costal arm is broader, resembles an upside-down boot while the ventral arm is narrower with the saccular process blade-like and bears papillate harpe. Aedeagus bears a spur-like projection (carina) apically.

16. *Araeopteron flaccida* Inoue, 1958 (Fig. 6. 54; Genitalia: Fig. 10. 13)

Material examined: 1 male, Malaysia, W. Pahang, Genting Tea Estate, 670m, 3 December 2024, leg. Khalid Fadil (Coll. GTE), GTE slides, GTE379; 1 female, Malaysia, W. Pahang, Genting Tea Estate, 670m, 30 December 2016, leg. H.S. Barlow (Coll. GTE).

Note: This species was previously known only from Japan and South Korea, here it is recorded for the first time from Peninsular Malaysia, representing a significant southward extension of its known range. The habitus match with the descriptions provided by Inoue (1958), Sohn *et al.* (2005), and Fibiger & Kononenko (2008), in which the most diagnostic characters are consistent across both wings: (1) a darker brown ground colour, (2) a postmedial fascia with a narrow oblique white band, and (3) the absence of distinct black discal spots. The male genitalia also match well with the description by Fibiger & Kononenko (2008). However, there is some discrepancy concerning the presence of cornuti in the aedeagus vesica among the three references. Inoue (1958) and Sohn *et al.* (2005) both described the vesica as lacking cornuti, whereas Fibiger & Kononenko (2008) reported the presence of tiny cornuti. Our examination confirms that cornuti are indeed present (indicated in illustration), although they are extremely inconspicuous. The differences likely result from preparation quality: Inoue's (1958) figure was hand-drawn and simplified, and Sohn *et al.* (2005) examined a blurred image of the aedeagus.

17. *Laspeyria cf. poecilota* Turner, 1908 (Genitalia: Fig. 10. 14)

Material examined: 1 male, Malaysia, Pahang, Genting Highlands, 9 November 1980, leg. H.S. Barlow (Coll. GTE), GTE slides, GTE372.

Note: This is the only recorded specimen for Peninsular Malaysia. This record points to an unusual distribution (Queensland, Thailand, Peninsular Malaysia), which may be due to confusion with the similar looking and to date overlooked *L. ruficeps* Walker, 1864 (India, ?Taiwan, Borneo, Peninsular Malaysia). In *poecilota*, the forewing bears distinct double antemedial and postmedial fasciae, with the inner line darker than the outer, a feature most evident in the antemedial fascia. The reniform consists of four dots. Black dots are present between the double postmedial fascia and the submarginal spot in *poecilota*, whereas in *ruficeps* this area is represented by a paler dentate line across the pale veins. Holloway (2009) described the male genitalia of *ruficeps* as having a tongue-like

valve apex with a distinct central angle to the costal margin. In *poecilota*, the valve apex is slightly broader and the angle to the costal margin less pronounced. The vinculum in *poecilota* is diagnostically shorter than in *ruficeps*. Examination of the holotype is necessary to confirm these diagnoses.

18. *Tamba cf. kaingaran* Holloway, 2011 (Fig. 5. 37; Genitalia: Fig. 10. 15)

Material examined: 1 male, Malaysia, W. Pahang, Genting Tea Estate, 670m, 26 April 1981, leg. H.S. Barlow (Coll. GTE), GTE slides, GTE375; 1 female, Malaysia, W. Pahang, Genting Tea Estate, 670m, 5 June 2024, leg. Khalid Fadil (Coll. GTE), GTE slides, GTE381.

Note: The species illustrated here match with Holloway's (2011) description of *Tamba kaingaran*. However, no genitalia diagnosis was provided in his account. Based on our observations, this species appears to have been previously overlooked in Peninsular Malaysia, and we suspect it to be conspecific with the Bornean *kaingaran*. In the male genitalia, the uncus is apically expanded and setose, tapering to a narrow tip. The valve is membranous with a cleft centrally, and the sacculus bears two soft, digitiform distal processes. In the female genitalia, the antrum is sclerotised, the ductus bursae is convoluted, and the corpus bursae is pyriform, bearing a single row of signa near the posterior end. Further examination of the female holotype and male specimens from the type locality are needed to confirm this identification.

19. *"Oglasa" pachycnemis* Hampson, 1926 (Fig. 6. 41a & 41b; Genitalia: Fig. 10. 16)

Material examined: 2 males, 1 female, Malaysia, W. Pahang, Genting Tea Estate, 670m, 2 October 1977, 25 July 1979, 11 July 2000, leg. H.S. Barlow (Coll. GTE). GTE slides, GTE208, GTE209, GTE235; 5 males, Malaysia, W. Pahang, Genting Tea Estate, 670m, 28 July 2007, 24 December 1979, 18 November 1977, 10 January 1981, 30 January 1981, leg. H.S. Barlow (Coll. GTE); 5 females, Malaysia, W. Pahang, Genting Tea Estate, 670m, 23 June 2007, 20 November 1977, 14 July 1980, 7 May 1979, July 2008, leg. H.S. Barlow (Coll. GTE).

Note: Holloway (2005) documented this species as being known only from four specimens collected in Sarawak: two by A. R. Wallace and two obtained during a recent survey. In his description, Holloway noted "a dark/pale zig-zag at the dorsum representing the posterior half of the postmedial" on the forewing; however, this feature is absent in the specimens examined in this study. It was subsequently determined that this species exhibits polymorphism restricted to the postmedial fascia. Two additional forms are described and illustrated: the first one matches the previously described form, while the second features a postmedial fascia that is bidentate distally to the bipunctate reniform. We dissected the male genitalia, which match the description provided by Holloway (2005). However, Holloway (2005) did not illustrate the female genitalia. In this study, we examined and provide the first illustration of the female genitalia (Fig. 2a). The papillae analis is mitre-shaped. The posterior apophysis is slightly longer than the anterior. The ductus bursae is short and narrow, with a constricted belt at the distal region just before the corpus bursae. The corpus bursae is ovate and uniformly covered with fine scobination, with denser scobination concentrated in the distal region.

EUTELIIDAE

20. *Chlumetia tombaga* Kobes, 2008 (Fig. 7. 67)

Note: Kononenko & Pinratana (2013) misspelt the species name *tombaga* as *tombago*. Kobes (2008) named this species after the Toba Batak word *tombaga*, meaning 'copper,' in reference to the coloration of the hindwing upperside.

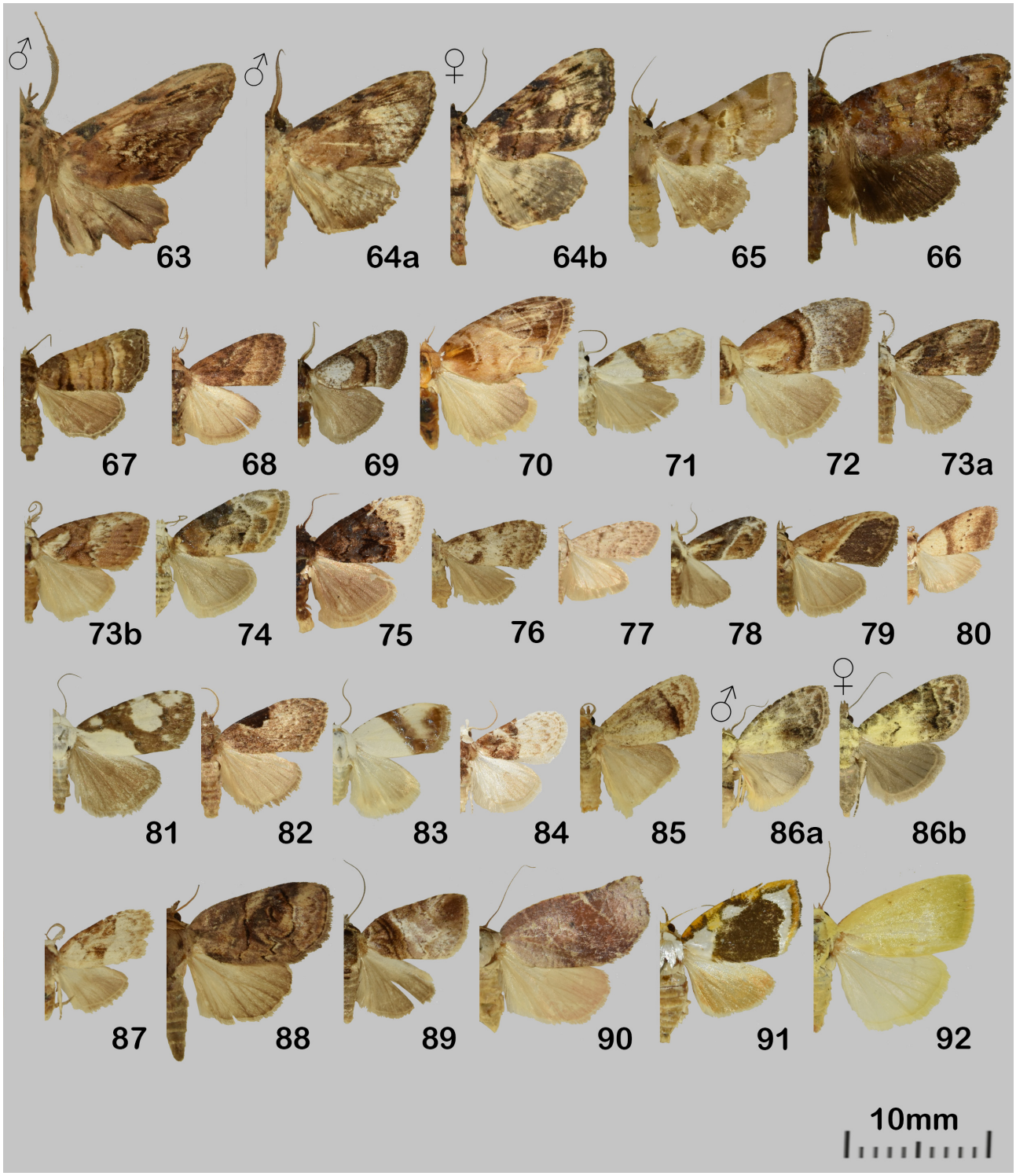

FIGURE 7. Euteliidae; 63. *Marathyssa incisa*; 64a. Male, *Marathyssa harmonica*; 64b. Female, ditto; 65. *Atacira waterstradti*; 66. *Chlumetia brunnea*; 67. *Chlumetia tombaga*; **Nolidae**. 68. *Meganola tenebrosa*; 69. *Meganola pseudobasalactifera*; 70. *Evonima ronkaygabori*; 71. *Manoba obfuscata*; 72. *Nanola subbasalactifera*; 73a. *Nanola rothschildi*; 73b. Ditto; 74. *Hampsonola tarkabarka*; 75. *Hampsonola diehli*; 76. *Njalkanola bimaculata*; 77. *Inouenola grisalis*; 78. *Fragilonola igorkostjuki*; 79. *Spininola maliatthoides*; 80. *Wittonola latifasciata*; 81. *Calonola orbiculata*; 82. *Sumatranola costamacula*; 83. *Membranola lampang*; 84. *Furanola karsholti*; 85. "*Nola*" *nigrolineata*; 86a. Male, "*Nola*" *transwallacea*; 86b. Female, ditto; 87. *Selca latifascialis*; 88. *Garella docilis*; 89. *Garella curiosa*; 90. *Tortriciforma razowskii*; 91. *Titulcia javensis*; 92. *Earias brevipennis*.

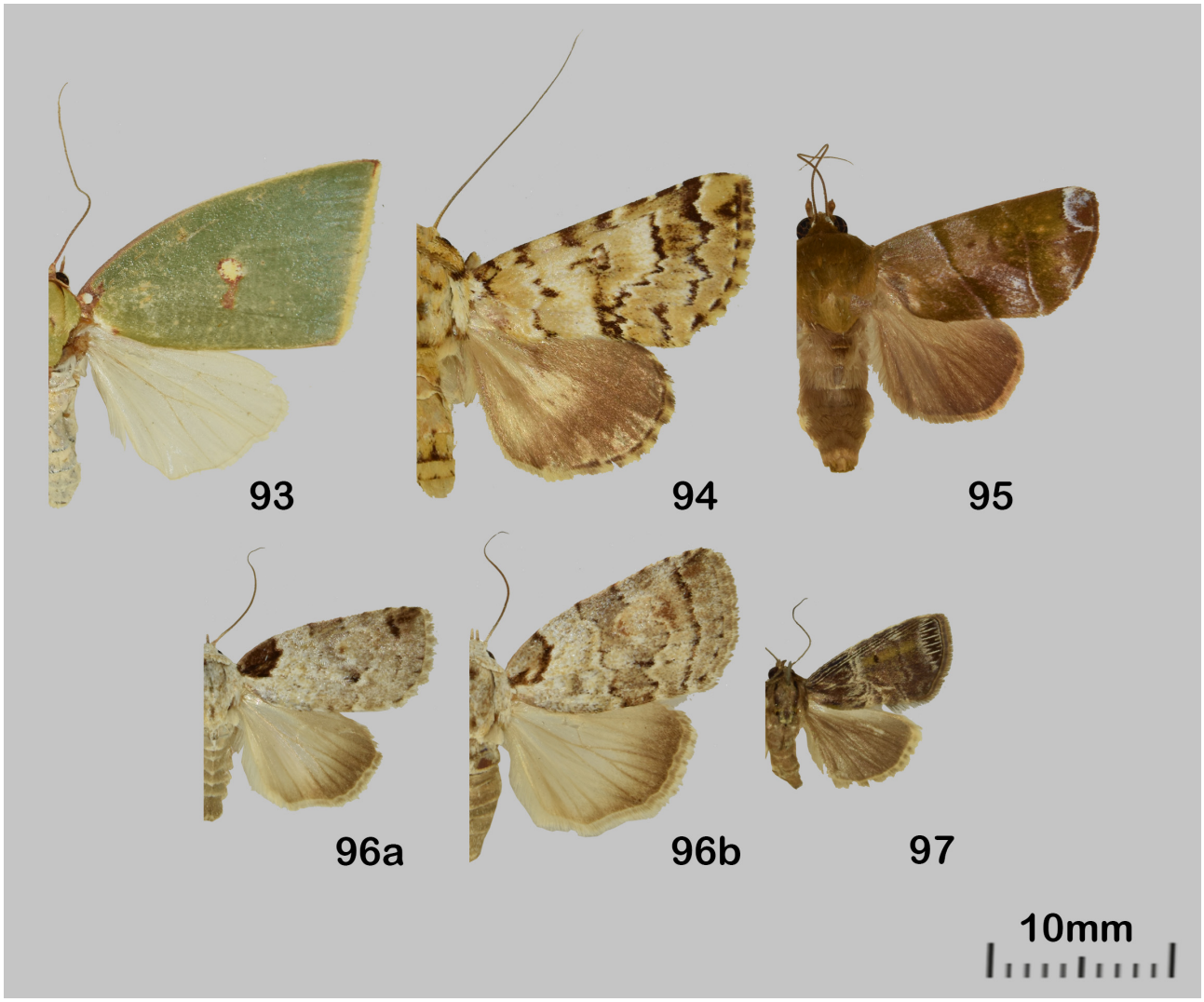

FIGURE 8. Nolidae. 93. *Tyana flavitegulae*; 94. *Risoba sumatrana*; 95. *Xenochroa sindarrayensis*; 96a. *Giaura nigrilineata*; 96b. Ditto; 97. *Labanda carinata*.

NOLIDAE

21. *"Nola" nigrolineata* van Eecke, 1926 (Fig. 7. 85; Genitalia: Fig. 10. 17)

Material examined: 1 female, Malaysia, W. Pahang, Genting Tea Estate, 670m, 11 February 1979, leg. H.S. Barlow (Coll. GTE).

Note: Gyula László (pers. comm.) noted that this species is treated as *Nola nigrolineata* van Eecke by Poole (1989). László further commented that *nigrolineata* does not belong to the genus *Nola* and a new genus is to be described for this species and its sister species, *"Nola" transwallacea* Holloway, 2003 which is also illustrated in this paper (Fig. 8. 86a & 86b). The male genitalia also support László's suggestion of a close relationship between *nigrolineata* and *transwallacea*. The ventral arm of the valve is considerably narrower than the dorsal arm and tapers to an apical spur, consistent with Holloway's (2003) description of *transwallacea*. However, the harpe in *nigrolineata* is digitiform rather than spine-like.

22. *Tortriciforma razowskii* Kobes, 1992 (Fig. 7. 90; Genitalia: Fig. 10. 18)

Material examined: 2 females, Malaysia, W. Pahang, Genting Tea Estate, 670m, 3 June 1984, 14 December 1982, leg. H.S. Barlow (Coll. GTE).

Note: Holloway (2003) placed this species in the tribe Chloephorini based on its tympanal organ structure. However, further DNA analysis by Zahiri *et al.* (2013) revealed that this species belongs to the tribe Careini but speculated that their result was probably erroneous. Genitalia study of this species might elucidate the tribe placement more accurately since Kobes (1992 & 1997) described this and its sister species without any genitalia description. However, he suggested this species should be placed in a new separate genus supported by Sugi based on the modified hindleg structure. Here we described the female genitalia as we lack a male specimen. The papillae analis resemble a mitre, being slightly broad at the base and tapering posteriorly. The posterior apophysis is twice the length of the anterior apophysis, with both having rounded tips. The ostium bursae opening is wide and the lamella antevaginalis is highly sclerotised, in contrast to lamella postvaginalis. The ductus bursae is short, broad and sclerotised leading to a globular accessory bursae located dorsally and partially concealed by a robust pyriform corpus bursae. Within the bursae, there is a thorn-like signum with a streak of sclerotised patches distally. It is worth noting that the bursae is not convoluted and possesses signum, contrary to the description given by Holloway (2003) in the genus diagnosis of *Tortriciforma*. This distinction further strengthens the case for placing this species in its own distinct group.

23. *Labanda carinata* Holloway, 2003 (Fig. 8. 97)

Material examined: 2 females, Malaysia, W. Pahang, Genting Tea Estate, 670m, 11 December 2009, 6 April 2006, leg. H.S. Barlow (Coll. GTE).

Note: Previously, Holloway (2003) collected only two specimens from the lower montane forest on limestone. This study marks a new habitat extension for the species at secondary dipterocarp forest.

Additionally, we have provided colour plates for selected species (figs. 3–8) and illustration of genitalia and other structures (figs. 9 & 10) of moths that are not readily accessible in literature and/or internet.

New hostplant records for reared species

The GTE checklist also provides hostplants to the newly recorded moths reared by HSB throughout the years, as shown in Table 2. Most of the hostplants are from the Dipterocarpaceae family, with two from Fagaceae and one from Fabaceae. In this checklist and an unpublished GTE checklist, the genus *Arctornis* consists mostly of white moths with an indistinguishable marking for most of the species. They mainly feed on Dipterocarpaceae. Five dipterocarp genera had been recorded locally as the hostplants: *Dipterocarpus*, *Vatica, Hopea*, *Parashorea*, and *Shorea*. Holloway (1999) has also recorded *Arctornis* foodplants from the following families: Anacardiaceae, Bombacaceae, Combretaceae, and Elaeocarpaceae. All of the hostplants listed in Table 2 are the first time recorded for the species.

TABLE 2. Select list of newly recorded moths of Peninsular Malaysia and their hostplants.

Family: Subfamily	Species	Hostplant
Erebidae: Lymantriinae	*Nygmia xanthura* Swinhoe, 1907	*Shorea lamellata* Foxw. (Dipterocarpaceae)
	Arctornis magnaclava Holloway, 1999	*Shorea macrantha* Brandis (Dipterocarpaceae)
	Arctornis bilobuncus Holloway, 1999	*Lithocarpus* sp. (Fagaceae)
	Arctornis rhopica Toxopeus, 1948	*Lithocarpus rassa* (Miq.) Rehder (Fagaceae)
Erebidae: Boletobiinae	*Eublemma quadrapex* Hampson, 1891	flowers of *Bauhinia integrifolia* Roxb. (Fabaceae)
Euteliidae: Stictopterinae	*Lophoptera belli* Holloway, 1985	*Hopea sangal* Korth. (Dipterocarpaceae)

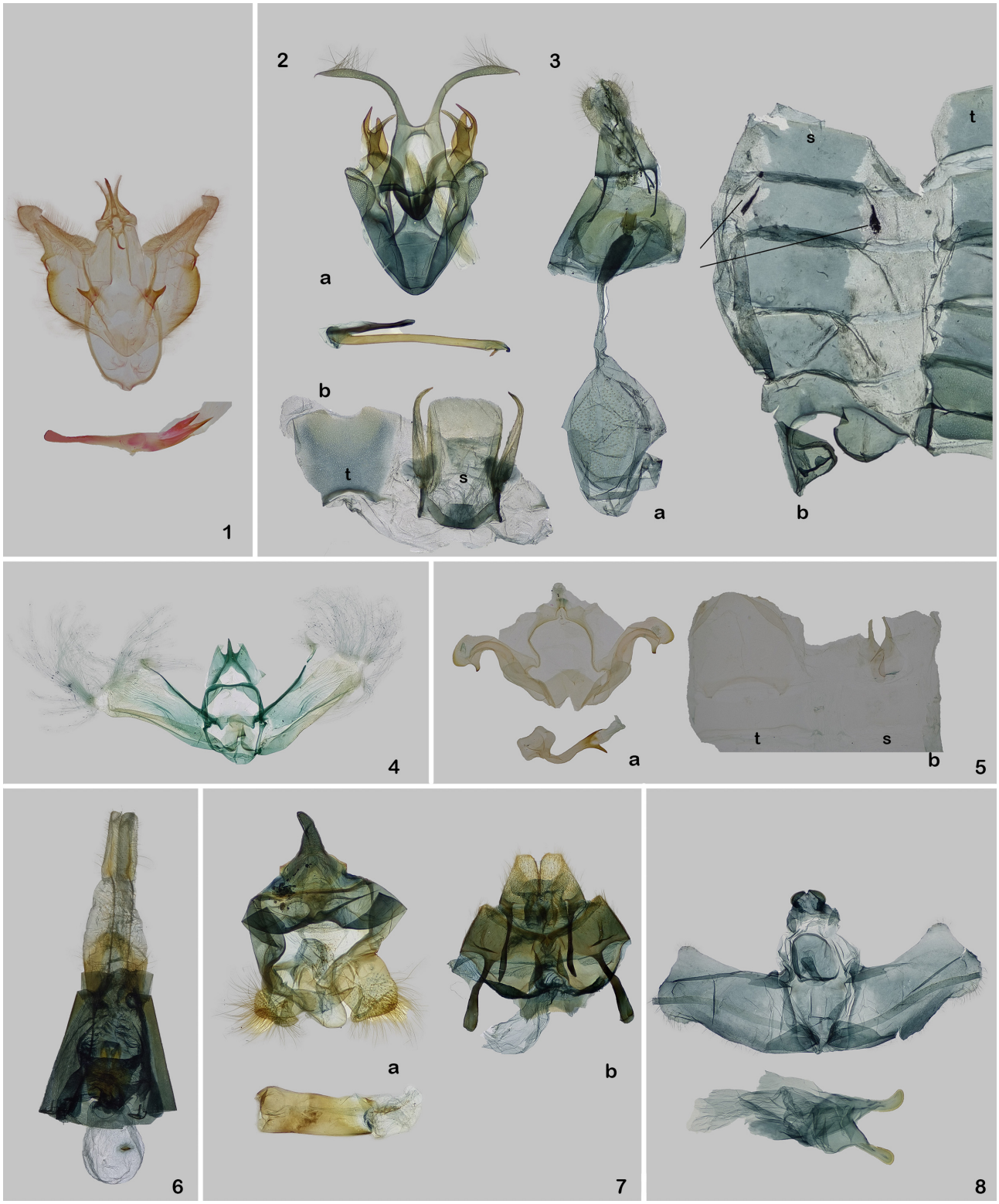

FIGURE 9. Geometridae: 1. *Thalassodes opalina* male, aedeagus below; **2.** "*Metallaxis" semipurpurascens* **a.** male, aedeagus below, **b.** male, 8th abdominal segment; **3.** Ditto **a.** female, **b.** abdominal pelt; **4.** *Sauris quassa* male; **Notodontidae: 5.** *Liparopsis dierli* **a.** male, aedeagus below, **b.** 8th abdominal segment; **Erebidae: 6.** *Lymantria strigatoides* female; **7.** *Euproctis canescens* **a.** male, aedeagus below, **b.** female; **8.** *Arctornis bilobuncus* male, aedeagus below. Abbreviation: *t* tergite; *s* sternite.

FIGURE 10. Erebidae: 9. *Arctornis ferruginicosta* **a.** male, aedeagus below, **b.** female; **10.** *Adrapsa scopigera* male, aedeagus below; **11.** *Chusaris retatalis* male, aedeagus below; **12.** *Anatatha maculifera* male, aedeagus below; **13.** *Araeopteron flaccida* male, aedeagus below, vesica enlarge showcasing inconspicuous cornuti; **14.** *Laspeyria cf. poecilota* male, aedeagus below; **15.** *Tamba cf. kaingaran* **a.** male, aedeagus below, **b.** female; **16.** *"Oglasa" pachycnemis* female; **Nolidae: 17.** *"Nola" nigrolineata* male, aedeagus below; **18.** *Tortriciforma razowskii* female.

Conclusion

Despite the 309 new species records, there is a high possibility of species missed out, with the possibility of a few endemic species in the collection. Even after 53 years of collecting, there are more species that are still undiscovered, as indicated by the species accumulation curve. However, it is alarming to note, in common with other reports worldwide, that the number of moths attracted to our light trap has dropped dramatically by around 23% over the period 1980–2020 (unpublished Rothamsted trapping data). This study underlines the drastically understudied diversity of the moth fauna in Peninsular Malaysia and rainforest ecosystems generally, and how much fundamental faunistic research is still yet to be and acts as a stepping stone to fill the large gap in the richness and diversity of macromoths in Peninsular Malaysia. This study is part of a larger project to database and digitise all of the GTE collection that will be available for public viewing on the internet (in prep.).

Acknowledgements

Our utmost gratitude especially to Dr. Jeremy D. Holloway (Dorking, England, United Kingdom) for providing us with valuable feedback, constructive comments and identifying species in general upon preparing this paper.

We also grateful to Dr. Gyula M. László (Leominster, England, United Kingdom) for giving his expert comments on checking and correcting the Nolinae in GTE collection with up-to-date revision.

We also thank Matthew T. Hamer (University of Hong Kong) and Dr. Thary Gazi Goh (Shah Alam, Malaysia) for their assistance in proofreading the paper and helping out with the statistics.

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