

## Taxonomic review of the genus *Mithuna* Moore (Lepidoptera: Erebidae: Arctiinae: Lithosiini), with descriptions of two new genera and seventeen new species

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### ABSTRACT

The Oriental footman-moth genus *Mithuna* Moore, 1878 is reviewed. Two new genera and 17 new species are described: *Eilemithuna* gen. n. (type species: *Ilema transducta* de Joannis, 1930); *Mithunoconosia* gen. n. (type species: *Mithuna clivusa* Bucsek, 2012); *Mithuna armata* sp. n. (NE India), *Mithuna atkinsoni* sp. n. (NE India), *Mithuna bolovena* sp. n. (Laos), *Mithuna bucseki* sp. n. (Thailand, Laos and Vietnam), *Mithuna flabellata* sp. n. (Thailand), *Mithuna fletcheri* sp. n. (NE India), *Mithuna lamdonga* sp. n. (Vietnam), *Mithuna meghalaya* sp. n. (NE India), *Mithuna ochrocephala* sp. n. (Thailand), *Mithuna phahompoka* sp. n. (Thailand), *Mithuna pianma* sp. n. (China, Yunnan), *Mithuna robusta* sp. n. (Thailand), *Mithuna securis* sp. n. (Vietnam), *Mithuna suthepia* sp. n. (Thailand), *Mithuna swanni* sp. n. (Myanmar), *Mithuna thaica* sp. n. (Thailand), and *Mithuna wilemani* sp. n. (Taiwan). Seven new combinations are introduced: *Pseudopelosia fuscivena* (Hampson, 1896), comb. n., *Mithuna bilineata* (Bucsek, 2020), comb. n., *Eilemithuna dimidilinea* (Černý, 2009), comb. n., *Eilemithuna transducta* (de Joannis, 1930), comb. n., *Mithunoconosia clivusa* (Bucsek, 2012), comb. n., *Mithunoconosia pulverea* (Bucsek, 2012), comb. n. and *Mithunoconosia strigifera* (Hampson, 1900), comb. n. Lectotype is designated for *Mithuna arizana* Wileman, 1911. Adults and male and female genitalia of all species considered are illustrated.

KEYWORDS: Biodiversity, *Eilemithuna*, footman moth, lectotype, Lithosiina, *Mithunoconosia*, Oriental Region, new combination, *Pseudopelosia*, South Asia, taxonomy.

### INTRODUCTION

The Oriental footman-moth genus *Mithuna* Moore, 1878 belongs to the subtribe Lithosiina and was erected to solely include *Mithuna quadriplaga* Moore, 1878 from Indian Himalaya. Subsequently, another three species were described in the genus: *M. fuscivena* Hampson, 1896 from Sri Lanka, *M. strigifera* Hampson, 1900 from Northeast India and *M. arizana* Wileman, 1911 from Taiwan Island. About a century later, seven more species were included in the genus: *M. quadriplagoides* Holloway, 2001 from Borneo Island; *M. dimidilinea* Černý, 2009 from Thailand; *M. clivusa* Bucsek, 2012, *M. flavia* Bucsek, 2012, *M. jendeki* Bucsek, 2012 and *M. pulverea* Bucsek, 2012 from Western Malaysia and *M. tranthiedui* Dubatolov

& Bucsek, 2016 from Vietnam (Holloway 2001; Černý & Pinratana 2009; Bucsek 2012; Dubatolov & Bucsek 2016), of which *M. jendeki* was transferred to the genus *Euconosia* Watson, 1980, two years after the description was published (Bucsek 2014). Additionally, five *Mithuna*-looking species were described in the genus *Teulisna* Walker, 1862 (Černý & Pinratana 2009; Dubatolov & Bucsek 2016; Kirti & Singh 2016; Bucsek 2020) and were recently assigned to *Mithuna* by Volynkin *et al.* (2025). Further studies of the unidentified *Mithuna* materials deposited in various collections led the authors of the present paper to the discovery of additional 17 unknown species, which are described in the present paper as species new to science.

The known and newly discovered species of *Mithuna* can be subdivided into nine groups. After the detailed examination of their genitalia structures and external morphology, it became clear that two of those groups display fundamental morphological differences from others in *Mithuna* and represent distinct lineages, for which two new genera are erected in the present paper. In addition, '*Mithuna*' *fuscivena* Hampson, 1896 was found to be non-congeneric with the type species of *Mithuna* and the newly described genera and is therefore transferred to the genus *Pseudopelosia* Krüger, 2015 in the present paper.

#### MATERIALS AND METHODS

Acronyms of the depositories used:

- BMNH – see NHMUK;
- CAV – research collection of Anton Volynkin (Leominster, UK);
- CKC – research collection of Karel Černý (Innsbruck, Austria);
- MfN – Museum für Naturkunde, Berlin, Germany;
- MNHN – Muséum national d'Histoire naturelle, Paris, France;
- MWM/ZSM – Museum Witt München / Zoologische Staatssammlung München, Munich, Germany;
- NHMUK – Natural History Museum, London, UK;
- OUMNH – Oxford University Museum of Natural History, Oxford, UK;
- SNM – Slovak National Museum, Bratislava, Slovakia;
- SZMN – Siberian Zoological Museum of the Institute of Systematics and Ecology of Animals, Novosibirsk, Russia.

Abbreviations used: AV – genitalia slide prepared by A. Volynkin, HT – holotype, LT – lectotype, PT – paratype.

The genitalia were dissected applying standard methods of preparation (Lafontaine & Mikkola 1987; Kononenko 2010), then stained with Eosin Y or Chlorazol Black and embedded in Euparal on microscope slides, or preserved in glycerol in microvials pinned under the specimens. The photos of adults were taken using a Nikon D3100/AF-S or Nikon D7500 camera equipped with a Nikkor 18–55 mm or Sigma 105 mm F2.8 EX DG Macro OS lens while the photos of genitalia were taken using the aforementioned cameras attached to a microscope with an LM-

scope adapter. All pictures were processed using the Adobe Photoshop CC 2018 software. The male and female genitalia terminology follows Volynkin (2024).

For the holotype label citations, information provided in quotation marks is transcribed verbatim. Different labels are separated by a slash ('/') while the different lines of the same label are separated by a vertical bar ('|'). Any additional data are provided in square brackets. The content of the labels of additional specimens examined including paratypes is edited or translated in accordance with English grammar and standardised. In the species and genus accounts, the abbreviations 'sp. n.' and 'gen. n.' are omitted to make the text easier for reading.

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#### TAXONOMY

Order Lepidoptera Linnaeus, 1758

Family Erebidae Leach, 1815

Subfamily Arctiinae Leach, 1815

Tribe Lithosiini Billberg, 1820

Subtribe Lithosiina Billberg, 1820

Genus *Mithuna* Moore, 1878

*Mithuna* Moore, 1878: 21. (Type species: *Mithuna quadriplaga* Moore, 1878, by monotypy.)

**Diagnosis:** Species of the genus are quite uniform externally and characterised by the brown colouration and fuscous and diffuse forewing pattern consisting of a medial line, a small discal spot and a subterminal line interrupted into irregular patches. The male genitalia, although diverse in the valva shape, are characterised by the combination of the following features: (1) The juxta is plate-like with apico-lateral plates wrapping phallus laterally and (in certain groups) dorsally; the juxta structure is considered herein as characteristic of the genus; (2) The costa bears a small processus momenti; (3) The valval section of the transtilla is fold-shaped and membranous (in certain species weakly sclerotised); the editum and tendon are absent; and (4) The dorsal section of the valvula is well-sclerotised and in certain species extended into an apical process. In the female genitalia, the genus is characterised by the short ductus bursae, which is sclerotised in most species, the long utricular or saccate corpus bursae and the short conical or semiglobular appendix bursae situated postero-laterally or postero-ventrally.

**Redescription:** Sexual dimorphism limited. Antenna setose ciliate in both sexes with shorter cilia in females. Body and forewing ground colour from ochreous brown to deep brown or reddish brown. Costal margin of forewing convex post-medially; anal margin convex antemedially; outer margin slightly convex; apex triangular or rounded; tornus rounded. Forewing markings fuscous, diffuse; pattern

consisting of medial transverse line, discal spot (reduced in many species) and subterminal line. Latter interrupted into irregular patches. Cilia fuscous. Hindwing pale ochreous, in many species suffused with greyish brown.

*Male genitalia.* Uncus proximally swollen and distally tapered; in certain species with tiny claw-shaped tip. Scaphium from setose to plate- or string-like. Subscaphium setose. Arms of tegumen moderately broad and sclerotised. Vinculum as long as scaphium or longer, with narrow but well-sclerotised arms, ventrally rectangular or U-shaped, with short saccate intravincular corema sparsely covered with short hairs. Valva diverse in shape, from narrow and strongly elongate with almost parallel margins to trapezoidal or almost elliptical. Basis valvae narrow, in certain groups with jugum distalis originating from proximal dorsal corner of valva and directed ventro-distad. Costa narrow, moderately sclerotised, stretching along the dorsal margin of valva or short and occupying only its basal section; bearing short process in certain species; short processus momenti present. Valval section of transtilla elongate fold-like, stretching along ventral margin of costa, membranous or weakly sclerotised; tendon absent. Valvula lobular or distally tapered, with secondary sclerotisation, densely setose or bearing sclerotised apical process in certain species. Lamella centralis reduced but in certain species present as weakly sclerotised transverse area. Sacculus diverse in length with distal process of various shapes, or without it in certain groups. Juxta broad, moderately sclerotised with membranous medio-ventral section; dorsal section with apico-lateral processes wrapping phallus laterally and (in certain groups) dorsally and bearing cluster of denticles, or claw- or bird wing-shaped process in certain species. Phallus cylindrical, distally dilated in certain species; in most species with string-like longitudinal lateral sclerotised fold. Vesica diverse in shape, with semiglobular, conical or utricular diverticula; in certain groups bearing cornuti, serrulate plates or clusters of denticles or areas of graniculi. Vesica ejaculatorius without elasma.

*Female genitalia.* Ovipositor short, broad conical. Papilla analis trapezoidal with rounded corners, setose. Pseudopapilla present, short, triangular and setose. Glandula present. Apophyses rod-like, well-sclerotised. 8<sup>th</sup> sternite with postvaginal plate; in certain species additional sclerotisations present lateral and posterior to the postvaginal plate. Ductus bursae diverse in structure: tubular or vase-shaped, sclerotised or membranous, rugose or smooth; in certain species with antero-ventral sclerotised pocket. Corpus bursae elongate or saccate, membranous or with sclerotised and rugose posterior section; in certain species with scobination. Appendix bursae short, semiglobular or conical, membranous, gelatinous or weakly sclerotised, situated postero-laterally or postero-ventrally. 7<sup>th</sup> sternite moderately sclerotised, in certain species bearing subostial rugose sclerotisation or small lateral gelatinous pockets.

**Distribution:** The genus is widespread in the Oriental Realm from Himalaya to the Pacific coast, reaching Malay Peninsula and Borneo Island in the south.

**Notes:** Besides the taxa placed in *Mithuna* and the new genera *Eilemithuna* gen. n. and *Mithunoconosia* gen. n. in the present paper, *Mithuna fuscivena* Hampson, 1896 was originally described in *Mithuna* and has been kept in the genus since (Holloway 2001; Bucsek 2012). However, Holloway (2001) discussed the substantial morphological differences of *fuscivena* from the typical *Mithuna* and noted that “they are probably not congeneric”. The examination of the genitalia structures of *fuscivena* (illustrated by Holloway 2001: fig. 39) led the authors of the present paper to the conclusion that it is morphologically close to the genus *Pseudopelosia* Krüger, 2015 (illustrated by Krüger 2015: figs 91, 92, 248, 345), to which the species is transferred herein: *Pseudopelosia fuscivena* (Hampson, 1896), comb. n.

**Species content of *Mithuna*:** The genus *Mithuna* in its current concept comprises more than two dozens of externally similar species with diverse male and female genitalia structures, which are herein subdivided into seven species-groups:

The *M. tongdzuythanhi* species-group

*M. flava* (Dubatolov & Bucsek, 2016)

*M. securis* sp. n.

*M. thaica* sp. n.

*M. tongdzuythanhi* (Dubatolov & Bucsek, 2016)

The *M. arizana* species-group

*M. arizana* Wileman, 1911

*M. bilineata* (Bucsek, 2020), comb. n.

*M. bolovena* sp. n.

*M. ochrocephala* sp. n.

*M. tenebrosa* (N. Singh & Kirti, 2016)

*M. wilemani* sp. n.

The *M. quadriplaga* species-group

*M. armata* sp. n.

*M. atkinsoni* sp. n.

*M. fletcheri* sp. n.

*M. meghalaya* sp. n.

*M. phahompoka* sp. n.

*M. pianma* sp. n.

*M. quadriplaga* Moore, 1878

*M. robusta* sp. n.

*M. swanni* sp. n.

The *M. tranthiedui* species-group

*M. flabellata* sp. n.

*M. lamdonga* sp. n.

*M. tranthiedui* Dubatolov & Bucsek, 2016

The *M. quadriplagoides* species-group

*M. quadriplagoides* Holloway, 2001

The *M. mithunoides* species-group

*M. bucseki* sp. n.

*M. mithunoides* (Černý, 2009)

The *M. varia* species-group

*M. suthepia* sp. n.

*M. varia* (Bucsek, 2020)

Incertae sedis

'*Mithuna*' *flavia* Bucsek, 2012

*Mithuna tongdzuythanhi* species-group

**Diagnosis:** The male genitalia of the species-group are characterised by the heavily sclerotised and upcurved distal saccular process, the distally dilated phallus with a protruding lateral crest, and the vesica armed with a thorn-shaped subapical cornutus. In the female genitalia, the appendix bursae is well-sclerotised.

*Mithuna tongdzuythanhi* (Dubatolov & Bucsek, 2016)

Figs 1–4, 69, 105

*Teulisna tongdzuythanhi* Dubatolov & Bucsek, 2016: 229, figs 2, 3, 21. (Type locality: “Central Vietnam, Vinh Phuc Prov., Tam Dao, 21°27'N 105°38.37'E, 900 m”.)

**Diagnosis:** The forewing length is 10.0–11.0 mm in males and 11.0–12.0 mm in females. *Mithuna tongdzuythanhi* is externally reminiscent of *M. thaica* and *M. bilineata*, but distinguished by the somewhat larger size and paler hindwing. Reliable identification requires the examination of the genitalia structures, which are clearly different in all three species. The genitalia structures of *M. tongdzuythanhi* are similar to *M. flava*, from which the former differs externally in the somewhat larger size, the more elongate forewing, the darker, brown forewing ground colour (it is brownish ochreous in *M. flava*) and the medial line more strongly curved in the cell. Unlike in *M. flava*, the male genital capsule of *M. tongdzuythanhi* has a thinner uncus, a longer juxta, longer and narrower valvae with shorter and less upcurved distal saccular processes. The phallus of *M. tongdzuythanhi* is longer and narrower than in *M. flava*. The vesica of *M. tongdzuythanhi* can be readily distinguished from *M. flava* by the narrower and shorter main chamber, the longer, narrower and more heavily granulose largest diverticulum and the shorter and thinner subapical cornutus. The female genitalia of *M. tongdzuythanhi* differ from *M. flava* in the longer and narrower ductus bursae, the shorter and ovoid corpus bursae (it is tubular posteriorly and globular anteriorly in *M. flava*) and the longer, utricular appendix bursae, which is conical in *M. flava*.

**Holotype** (examined from photographs): **Vietnam:** ♂ “26–28.iii.2012 | Central Vietnam, | Vinh Phuc Prov., | Tam Dao, 21° 27' N | 105° 38.37'E, 900 m, | V.Zolotuhin leg.”, gen. prep. by V. Dubatolov (preserved in sugar on a piece of paper pinned under the specimen) (SZMN).

**Additional material examined:** **Vietnam:** 4♂ 8♀, Tam Dao, 60 km NW Hanoi, 21°34'N 105°20'E, 950 m, 17.x.1994, V. Sinyayev, gen. slide No. ZSM Arct. 2019-1105♂ (MWM/ZSM); 1♂ 1♀, same



locality as previous but 1200 m, 1–15.xi.1992, Sinyayev & Simonov (MWM/ZSM); 1♂ 1♀, Tam Dao, 950 m, 11.x.1984, K. Spitzer, gen. slide Nos: AV7838♂, AV7839♀ (CKC); 1♂ 1♀, same data as previous but 16.x.1984, gen. slide Nos: AV7840♂, AV7841♀ (CKC); 1♂ 1♀, Tam Dao, 50 km N Hanoi, 900 m, 23.iii.1995, W. Mey, gen. slide Nos: NKMB-AV-010♂, NKMB-AV-011♀ (MfN); 1♂, Mt Fan-si-pan (North), Cha-pa, primary forest, 22°17'N 103°44'E, 1600 m, 25–30.iii.1995, V. Sinyayev & A. Schintlmeister (MWM/ZSM). **Thailand:** *Chiang Mai Prov.:* 1♂, Mt Doi Phahompok, 10 km W of Mae Ai, 1500 m, 26.ii.1998, M. Hreblay & Cs. Szabóky, gen. slide No. ZSM Arct. 2019-1104♂ (MWM/ZSM); 1♂, Chae Son NP, 18°51'33"N 91°22'03"E, 1496 m, 9.vi.2005, K. Černý, gen. slide No. AV7827♂ (CKC); 1♂, Doi Pha Hom Pok, 20°02'54"N 99°09'49"E, 1400 m, 28–29.xi.2005, K. Černý, gen. slide No. AV7828♂ (CKC); 1♀, Fang, Doi Pha Hom Pok, 20°06'16"N 99°07'46"E, 2110 m, 23–24.v.2011, K. Černý, gen. slide No. AV7833♀ (CKC); 1♂ 1♀, Doi Inthanon NP, 18°30'59"N 98°28'13"E, 1416 m, 6–7.vi.2005, K. Černý, gen. slide Nos. AV7829♂, AV7830♀ (CKC); 1♀, Fang Distr., Doi Ang Khang, 29°54'11"N 99°02'32"E, 1425 m, 23–27.vii.2005, T. Ihle, gen. slide Nos. AV7834♀ (CKC); 1♂ 1♀, 4 km SE of Pang Faen, 1100 m, 14.xi.1999, M. Hreblay (MWM/ZSM); 1♂ 1♀, 4 km SE of Pang Faen, 1100 m, 14.xi.1999, M. Hreblay (MWM/ZSM); 1♂ same locality as previous, 18.i.2004, P. Hentschel & A. Szabó (MWM/ZSM). *Nan Prov.:* 1♂, 30 km E Pua, 1700 m, 10.xi.1999, M. Hreblay (MWM/ZSM). *Mae Hong Son Prov.:* 1♂, 21 km NW of Pai, 1360 m, 7.ii.1998, M. Hreblay & Cs. Szabóky (MWM/ZSM). **India:** 1♂, Khasis. Nat. Coll. / Doncaster Private coll., Purch. 1927, gen. slide No. AV8780♂ (OUMNH).

**Distribution:** The species is currently known from Northern Vietnam (Lao Cai and Tuyen Quang Provinces) (Dubatolov & Bucsek 2016), Northern Thailand (Mae Hong Son, Chiang Mai and Nan Provinces) and Northeast India (Meghalaya) (present study).

### *Mithuna flava* (Dubatolov & Bucsek, 2016)

Figs 5, 6, 70, 106

*Teulisna flava* Dubatolov & Bucsek, 2016: 230, figs 4, 22 (Type locality: “North Vietnam, Thanh Hoa Prov., Thuong Xuan Distr., Xuan Lien NR [National Reserve], 19°52'N 105°14.28'E, 130 m”).

**Diagnosis.** The forewing length is 9.0–9.5 mm in males and 11.0 mm in females. *Mithuna flava* is morphologically similar to *M. tongdzuythanhi* and the detailed comparison is provided above in the diagnosis of the latter species.

**Holotype** (examined from photographs): **Vietnam:** ♂ “29–30.xi.2012 | North Vietnam, Thanh Hoa | Prov., Thuong Xuan Distr., | Xuan Lien NR, anthropog. | 19°52'N 105°14.28'E, 130 m | V.Zolotuhin leg.”, gen. prep. by V. Dubatolov (preserved in sugar on a piece of paper pinned under the specimen) (SZMN).

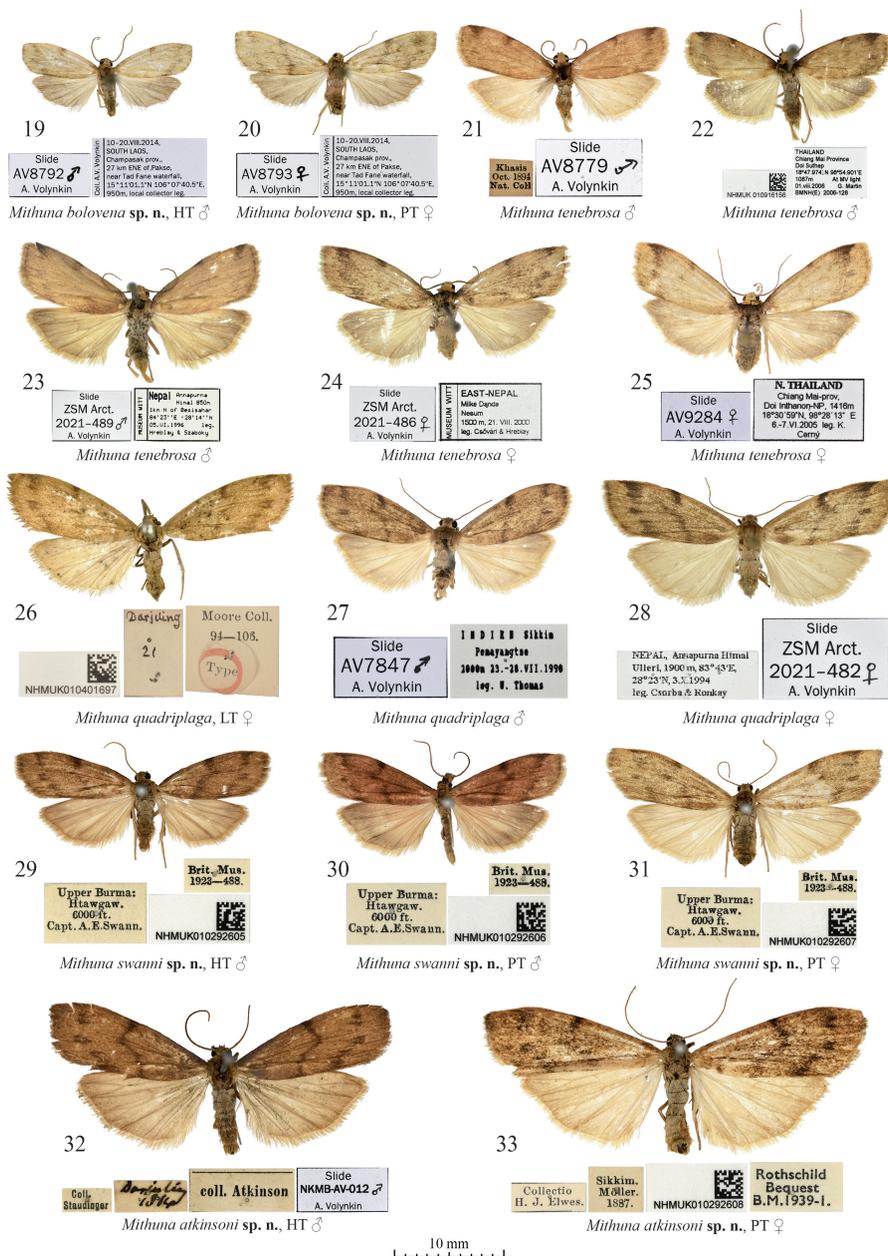
**Additional material examined:** **Vietnam:** 1♂, Tam Dao, 50 km N Hanoi, 23.iii.1995, 900 m, W. Mey (MfN); 2♂ 1♀, Mt Fan-si-pan (North), Cha-pa, primary forest, 22°17'N 103°44'E, 1600 m, 25–30.iii.1995, V. Sinyayev & A. Schintlmeister, gen. slide Nos ZSM Arct. 2021-494♂, 2021-495♀, 2021-660♂ (AV) (MWM/ZSM); 2♂ 1♀, Bach-Ma Nat. Park, 16°10'N 107°54'E, 1200 m, 26.vii–6.viii.1996, V. Sinyayev & E. Afonin, gen. slide Nos ZSM Arct. 2021-499♂, 2021-500♂, 2021-501♀ (AV) (MWM/ZSM).

**Distribution.** The species is currently known from Vietnam (Thanh Hoa, Lao Cai and Tuyen Quang Provinces) (Dubatolov & Bucsek 2016).

### *Mithuna thaica* sp. n.

Figs 7, 8, 71, 72, 107

**LSID:** [urn:lsid:zoobank.org:act:C96958EB-25D9-4391-B494-442EAC06ECBF](https://zoobank.org/act:C96958EB-25D9-4391-B494-442EAC06ECBF).



Figs 19–33. Adults of *Mithuna* spp. Depositories of the specimens: 19 and 20 in CAV; 21 in OUMNH; 22, 26, 29–31 and 33 in NHMUK; 23, 24 and 28 in MWM/ZSM; 25 and 28 in CKC; 32 in MfN.

**Etymology:** The species name is a Latin adjective derived from the country of Thailand, where the new species has been found.

**Diagnosis:** The forewing length is 7.5–8.0 mm in males and 10.0 mm in the female. *Mithuna thaica* is externally reminiscent of *M. tongdzyathanhi* but differs in the smaller size and the darker hindwing suffused with greyish brown. The male genital capsule of *M. thaica* can be easily distinguished from *M. tongdzyathanhi* in the thicker uncus, the narrower and V-shaped vinculum (it is U-shaped in the similar congener), the shorter and narrower juxta, the nearly symmetrical valvae (with a slightly broader right one), which are shorter and proximally broader and less upcurved than in *M. tongdzyathanhi* and the more symmetrical and upcurved distal saccular processes, with tiny thorn-shaped tips directed inwards. Additionally, unlike in *M. tongdzyathanhi*, the apex of the valva of *M. thaica* has a weaker sclerotised dorsal margin, and is covered with weak hair-like setae whereas in *M. tongdzyathanhi*, its dorsal margin is densely covered with short but heavily sclerotised setae. The phallus of *M. thaica* is markedly shorter than in *M. tongdzyathanhi* and is distally dilated. In the vesica, *M. thaica* is distinguished from *M. tongdzyathanhi* by the longer and broader main chamber, the markedly shorter and membranous largest diverticulum (it is heavily granulose in the congener) and the broader subapical cornutus. The female terminalia of *M. thaica* differ from *M. tongdzyathanhi* in the more heavily sclerotised 8<sup>th</sup> abdominal segment, the shorter apophyses anteriores, the shorter ductus bursae having a ventral crest (it is dorso-ventrally flattened in *M. tongdzyathanhi*), the longer, narrower and pyriform corpus bursae (it is ovoid in the similar congener) and the markedly shorter and weaker sclerotised, semiglobular appendix bursae, which is utricular in *M. tongdzyathanhi*. The detailed comparison with *M. securis* is provided below in the diagnosis of the latter species.

**Holotype:** Thailand: ♂ “Thailand | Changwat [Province] Nan | 5 km N of Bo Luang | 1000 m, 12.xi.1999 | leg. Márton Hreblay | Museum Witt” / “Slide | ZSM Arct. | 2021-497♂ | A. Volynkin” (MWM/ZSM) (Figs 7, 71).

**Paratypes:** Thailand: 1♀, same data as in holotype, gen. slide No. ZSM Arct. 2021-498♀ (AV) (MWM/ZSM); 1♂, Chiang Mai Prov., Doi Suthep, 18°47.974'N 98°54.901'E, 1087 m, at MV light, 1.viii.2006, G. Martin, BMNH(E) 2006-128, NHMUK010916154 (NHMUK); 1♂, Tak Prov., Doi Mussoe, 16°45.317'N 98°55.438'E, 821 m, 11.v.2008, K. Černý, gen. slide No. AV8071♂ (CKC).

**Distribution:** The new species is known from West and North Thailand (Tak, Chiang Mai and Nan Provinces).

### *Mithuna securis* sp. n.

Figs 9, 10, 73, 108

**LSID:** [urn:lsid:zoobank.org:act:28B2CE97-6553-4F25-93FA-096557381038](https://zoobank.org/act:28B2CE97-6553-4F25-93FA-096557381038).

**Etymology:** The species name is derived from the Latin *securis* (‘axe’) and refers to the axe-shaped tip of the distal saccular process of the new species. The name is a noun in apposition.

**Diagnosis:** The forewing length is 9.0 mm in the male holotype and 9.5 mm in the female paratype. *Mithuna securis* is similar to *M. thaica* and can be distinguished only by the genitalia structures, while another similar species, *M. tongdzuythanhi* differs from it in the larger size and paler hindwing. The male genital capsule of *M. securis* is most similar to *M. thaica* but distinct in the rectangular distal apical process having two triangular lateral thorns in its distal corners whereas the distal saccular process of *M. thaica* is distally tapered and bears only one apical thorn directed inwards. The phallus of *M. securis* is somewhat distally narrower than in *M. thaica*. In the vesica, *M. securis* differs from *M. thaica* in the broader main chamber, the markedly shorter largest diverticulum, the narrower subapical diverticulum and the longer and more distally tapered subapical cornutus. The female terminalia of *M. securis* are distinguished from *M. thaica* by the weaker sclerotised 8<sup>th</sup> abdominal segment, the 7<sup>th</sup> abdominal sternite bearing postero-lateral gelatinous pockets, the markedly shorter and weaker sclerotised ductus bursae, the medially constricted corpus bursae and the broader but weaker sclerotised appendix bursae.

**Holotype:** Vietnam: ♂ “S Vietnam | Da Lat, Datan La 1380 m, | 11°54'10,6"N 108°26'59"E, 29.ix.2013 leg. K. Černý” / “Slide | AV7842♂ | A. Volynkin” (MWM/ZSM, ex CKC) (Figs 9, 73).

**Paratype:** Vietnam: ♀, same data as in holotype, gen. slide No. AV7843♀ (CKC).

**Distribution:** The new species is currently known only from its type locality in South Vietnam (Lam Dong Province).

#### *Mithuna arizana* species-group

**Diagnosis:** The male genitalia of the species-group differ from the *M. tongdzuythanhi* species-group in the shorter, weaker sclerotised and less upcurved distal saccular process, the narrower phallus with a string-shaped lateral crest and the vesica lacking an apical cornutus. The female genitalia are distinguished by the membranous appendix bursae.

#### *Mithuna arizana* Wileman, 1911

Figs 13–15, 76, 109

*Mithuna arizana* Wileman, 1911: 109. (Type locality: [Taiwan] “Arizan (7500 ft.)”.)

**Diagnosis:** The forewing length is 10.5–11.5 mm in males and 13.0–13.5 mm in females. *Mithuna arizana* is externally reminiscent of the Himalayan *M. quadriplaga* but differs in the broader forewing with a more convex anal margin, paler ground colour (it is suffused with fuscous in *M. quadriplaga*) and thinner medial line. The genitalia structures of *M. arizana* are most similar to the allopatric *M. bilineata*, which can be distinguished externally from the former species by the smaller size, the narrower forewing with a less convex anal margin, the considerably darker ground colour of both wings and the more diffuse forewing markings. Unlike in *M. bilineata*, the male genitalia of *M. arizana* have a broader and more

downcurved uncus, a somewhat shorter valva with a larger distal saccular process, a proximally broader phallus and a markedly broader vesica with a longer largest diverticulum having three short subdiverticula. The female genitalia of *M. arizana* are distinguished from *M. bilineata* by the shorter anterior apophysis, the broader ostium bursae, the markedly broader corpus bursae and the larger appendix bursae.

**Lectotype** (herein designated): **Taiwan:** “♂ Arizan, | Formoza, | 7500 ft. 3 | 17.xi.1906. | A.E. Wileman.” / “*Mithuna arizana* | Type♂ sp. n.” / “694T+” / “Wileman Coll. | B.M.1929-261.” / red ring “Type” label / QR-code label “NHMUK010401698” (NHMUK) (Fig. 13).

**Paralectotype:** ♀ without abdomen, “♀ Arizan, | Formoza, | 7300 ft. 3 | 23.viii.1908. | A.E. Wileman.” / “*Mithuna arizana* | Type♀ sp. n.” / “Wileman Coll. | B.M.1929-261.” / red ring “Type” label / QR-code label “NHMUK010401699” (NHMUK).

**Additional material examined:** **Taiwan:** *Hualien Co.:* 1♂, Taroko National Park, at Road 8, 1400 m, 22.iv.1997, Csorba & Ronkay, gen. slide No. ZSM Arct. 2019-1103♂ (AV) (MWM/ZSM). *Ilan Co.:* 2♂ 1♀, Ming Chyr Forest Recreation Area, 1200 m, 8–9.vii.1997, B. Herczig & S. Kovács, gen. slide No. ZSM Arct. 2021-506♀ (AV) (MWM/ZSM). *Taoyuan Co.:* 1♂, Ming Chyr Forest Recreation Area, 1160 m, 17–18.iv.1997, Gy. Fábán & S.T. Kovács (MWM/ZSM); 1♂, Suyuan, near Pinan, at Road 7/1, 1550 m, 6.vi.1997, B. Herczig & L. Ronkay (MWM/ZSM). *Nantou Co.:* 1♂ 1♀, Meifeng, ca. 2100 NN, 24°05'55"N 121°10'48"E, 9.ix.2002, U. Buchsbaum, gen. slide Nos AV7826♂, AV7826♀ (CKC). *Taitung Co.:* 1♂ 1♀, Mutien, 1500 m, 21.v.1997, Gy.M. László & G. László (MWM/ZSM); 1♂, Hsiangyang, upper forest zone, 2200 m, 13–14.iv.1997, B. Herczig & L. Ronkay (MWM/ZSM).

**Distribution:** The species is endemic to Taiwan Island (Wileman 1911).

**Note:** The species was described from one male and one female (Wileman 1911), which are syntypes. In order to stabilise the nomenclature, the male syntype is hereby designated as the lectotype.

### *Mithuna bilineata* (Bucsek, 2020), **comb. n.**

Figs 11, 12, 74, 75, 110

*Poliosia bilineata* Bucsek, 2020: 60, figs 54, 124. (Type locality: “Laos, Khammouane prov., Nakai env., 500 m, 17°34'N 105°10'E”.)

**Diagnosis:** The forewing length is 9.5 mm in the male and 10.0 mm in the female examined. *Mithuna bilineata* is morphologically similar to the Taiwanese *M. arizana* and the detailed comparison is provided above in the diagnosis of the latter.

**Holotype** (not examined): Illustrated by Bucsek (2020: figs 54, 124), deposited in SNM.

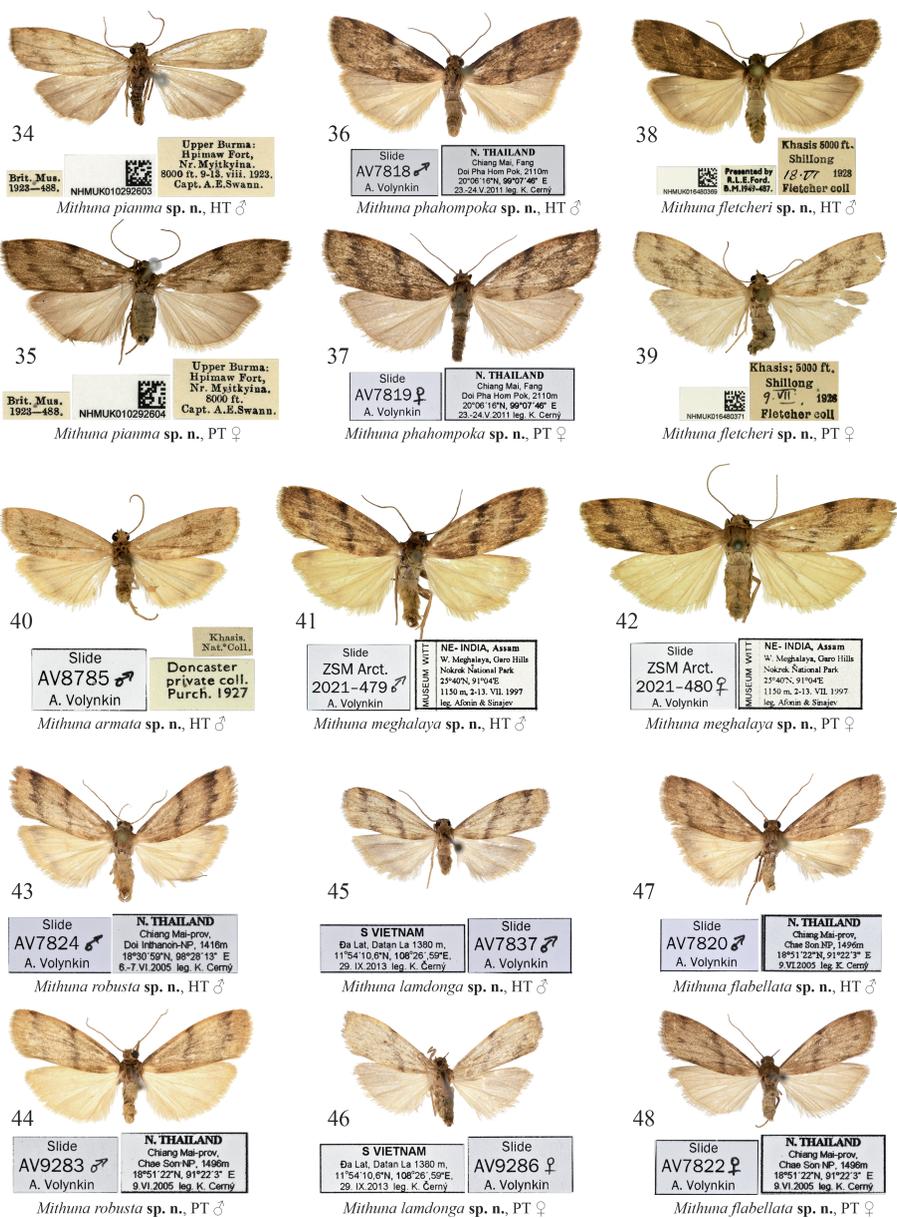
**Material examined:** **Vietnam:** 1♂ 1♀, Mai-chau, 25 km S Moc-chau, 20°50'N 104°40'E, 1400 m, 14–18.xi.1994, V. Sinyaev, gen. slides Nos. ZSM Arct. 2021-658♂, 2021-659♀ (AV) (MWM/ZSM).

**Distribution:** The species is currently known from Central Laos (Khammouane Province) (Bucsek 2020) and Northern Vietnam (Hoa Binh Province) (present study).

### *Mithuna ochrocephala* sp. n.

Figs 16, 17, 77, 78, 111

**LSID:** [urn:lsid:zoobank.org:act:C93ABB93-83FA-4715-B089-252DBD4F6685](https://zoobank.org/act:C93ABB93-83FA-4715-B089-252DBD4F6685).



Figs 34–48. Adults of *Mithuna* spp. Depositories of the specimens: 34, 35, 38 and 39 in NHMUK; 36, 41, 42, 43, 45 and 47 in MWM/ZSM (36, 43, 45 and 47: ex CKC); 40 in OUMNH; 37, 44, 46 and 48 in CKC.

**Etymology:** The species name is a Latin adjective meaning ‘ochre-headed’ and refers to the ochreous-yellow head of the new species.

**Diagnosis:** The forewing length is 7.0 mm in males and 7.5 mm in the female. *Mithuna ochrocephala* is similar to the Taiwanese *M. wilemani*, but can be easily distinguished by the narrower forewing with darker ground colour and the markedly darker hindwing intensely suffused with brownish grey, whereas the hindwing of *M. wilemani* is pale ochreous and slightly suffused with brown only in its distal half. The male genital capsules of the two species are similar, but in *M. ochrocephala* the uncus is narrower, the valva is medially narrower with a shorter collis displaced more distally and the distal saccular process is narrower, than the corresponding structures in *M. wilemani*. The phallus of *M. ochrocephala* is broader than in *M. wilemani*. In the vesica, *M. ochrocephala* is distinct from *M. wilemani* in the broader main chamber, the presence of the utricular lateral diverticulum, the proximally broader distal diverticulum and the broader and more heavily scobinate apical section with a smaller subapical diverticulum. As the female of *M. wilemani* is unknown, the female genitalia of *M. ochrocephala* were compared with *M. arizana* and *M. bilineata* instead, and *M. ochrocephala* differs clearly from the aforementioned congeners in the broader, sclerotised and dorsoventrally flattened ductus bursae (it is tubular and membranous in *M. arizana* and *M. bilineata*), and the shorter but markedly broader, saccate corpus bursae (it is rather tubular in the similar congeners). Additionally, unlike in *M. arizana*, the appendix bursae of *M. ochrocephala* is longer, broader and semiglobular whereas it is conical in the former species.

**Holotype:** Thailand: ♂, “C. Thailand | Nakhon Ratchasima, 600 m, | Wang, Nam Kiew. | 14°27,55'N 101°59,55'E, | 28.x.2010 leg. K. Černý” / “Slide | AV8069♂ | A. Volynkin” (MWM/ZSM, ex CKC) (Figs 16, 77).

**Paratypes:** Thailand: 2♂, Khao Yai NP, Park HQ, 720 m, 2–4.xi.1988, J.D. Bradley, Angoon Lewvanich & D.S. Fletcher, NHMUK010292612, NHMUK010292613 (NHMUK); 1♂ 1♀, Nakhon Nayok Prov., Khao Yai NP, Khao Khieo [foot of Khao Khiao Mt.], 14°24'20"N 101°22'14"E, 752 m, l.vi.2005, K. Černý, gen. slide Nos: AV8066♂, AV8067♀ (CKC); 1♂, Buri Ran [Buriram] Prov., 14°09.02'N 102°39.38'E, 300 m, 31.x.2010, K. Černý, gen. slide No. AV8068♂ (CKC).

**Distribution:** The new species is currently known from Northeastern and Central Thailand (Nakhon Ratchasima, Buriram and Nakhon Nayok Provinces).

### *Mithuna wilemani* sp. n.

Figs 18, 79

**LSID:** [urn:lsid:zoobank.org:act:D8790AD5-22DE-4913-A978-7B369E808599](https://zoobank.org/act:D8790AD5-22DE-4913-A978-7B369E808599).

**Etymology:** The new species is named after Alfred Ernest Wileman (1860–1929), British diplomat and lepidopterist and author of numerous taxa including *M. arizana* and *M. arizana* ab. *parva*.

**Diagnosis:** The forewing length is 7.5–9.0 mm in males. *Mithuna wilemani* is morphologically similar to the Thai *M. ochrocephala* and the detailed comparison is



provided above in the diagnosis of the latter species. Compared with the sympatric *M. arizana*, *M. wilemani* is markedly smaller and has a shorter forewing with a less convex anal margin and more diffuse medial line. The male genital capsule of *M. wilemani* can be easily distinguished from *M. arizana* in the distally narrower and straighter uncus, the shorter vinculum, the proximally narrower valva with a medially convex dorsal margin forming a collis, the densely setose apical section of the valva and the less upcurved distal saccular process. The phallus of *M. wilemani* is considerably narrower and shorter than in *M. arizana*. In the vesica, the main chamber of *M. wilemani* is shorter and narrower, the largest (distal) diverticulum is markedly shorter and narrower and the distal section is shorter and narrower than the corresponding structures of *M. arizana*.

*Female.* Unknown.

**Holotype:** Taiwan: ♂, “Taiwan, Taoyuan Co. | Tungyenshan Recr[eation] Ar[ea] | ca. 24°50′N / 121°24′E, | 900 m, 21.–24.ix.2002 | leg. W. Schacht et al.” / “Slide | AV7846♂ | A. Volynkin” (MWM/ZSM, ex CKC) (Figs 18, 79).

**Paratypes:** Taiwan: 1♂, Kuantaochi, Nantou [County], Formosa, 9.viii.1972, S. Yamane / Inoue Coll. B.M.1 992–71, NHMUK010292626 (NHMUK); 1♂, Wushe, Nantou [County], Formosa, 27.vii.1973, Y. Shibata / Inoue Coll. B.M.1 992–71, NHMUK010292627 (NHMUK).

**Distribution:** The new species is endemic to Taiwan Island.

**Note:** It is likely that this species was first described as *Mithuna arizana* ab. *parva* Wileman, 1911, which is an unavailable name (ICZN 1999: Art. 10.2, 45.5 and 45.6.2). However, as the primary types of ab. *parva* remain undissected, it is impossible to check this assumption.

### *Mithuna bolovena* sp. n.

Figs 19, 20, 80, 112

**LSID:**urn:lsid:zoobank.org:act:8C0849C9-DFCD-495E-83AC-9D96F017CB37.

**Etymology:** The species name is derived from the Boloven Plateau, at the western end of which the new species has been found. The name is a noun in apposition.

**Diagnosis:** The forewing length is 7.5 mm in the male holotype and 9.0 mm in the female paratype. *Mithuna bolovena* is externally reminiscent of *M. bilineata* but differs in the smaller size, the paler, more ochreous forewing ground colour and the somewhat more elongate forewing apex. The male genital capsule of *M. bolovena* is similar to *M. wilemani* but distinguished by the proximally broader uncus, the broader and more sparsely setose valvula bearing a tiny sclerotised thorn apically (it is apically rounded in *M. wilemani*) and the broader, more upcurved and apically pointed distal saccular process, which is apically rounded in *M. wilemani*. The phalli of the two species are very similar. In the vesica, *M. bolovena* differs from *M. wilemani* in the narrower main chamber, the unilobate and curved distal diverticulum (it is straight and bilobate in the congener) and the somewhat narrower apical diverticulum. As the female of *M. wilemani* is unknown, the female genitalia of *M. bolovena* were compared with *M. tenebrosa*, from which

the new species can be distinguished by the more heavily sclerotised apophyses, the shorter and more heavily sclerotised 8<sup>th</sup> abdominal segment, the markedly shorter intersegmental membrane between the 7<sup>th</sup> and 8<sup>th</sup> abdominal segments and the narrower corpus bursae with a smaller appendix bursae.

**Holotype:** Laos: ♂ “10–20.viii.2014, | South Laos, | Champasak prov., | 27 km ENE of Pakse, | near Tad Fane waterfall, | 15°11'01.1"N 106°07'40.5"E, | 950 m, local collector leg. | Coll. A. V. Volynkin" / “Slide | AV8792♂ | A. Volynkin” (MWM/ZSM, ex CAV) (Figs 19, 80).

**Paratypes:** Laos: 2♀, same data as in holotype, gen. slide No. AV8793♀ (CAV).

**Distribution:** The new species is currently known only from its type locality in southern Laos (Champasak Province).

### *Mithuna tenebrosa* (N. Singh & Kirti, 2016)

Figs 21–25, 81–84, 113

*Teulisna tenebrosus* N. Singh & Kirti in Kirti & Singh, 2016: 163. (Type locality: “Assam, Jatinga” [NE India].)

**Diagnosis:** The forewing length is 9.0–11.0 mm in males and 11.0–11.5 mm in females. *Mithuna tenebrosa* is externally reminiscent of *M. tongdzyuthanhi* but differs in the forewing having a less elongate apex and an indistinct medial line. The male genitalia of *M. tenebrosa* are most similar to the Taiwanese *M. wilemani* but differ clearly in the strongly asymmetrical valvae, of which the left one is extremely elongate (ca. twice as long as the right one) and nearly straight while the right valva is medially somewhat upcurved. Additionally, the uncus of *M. tenebrosa* is proximally broader than in *M. wilemani*, the apical section of the valva is narrower and weaker setose and the distal saccular process is thinner and stick-shaped whereas it is thumb-shaped in *M. wilemani*. The phallus of *M. tenebrosa* is slightly broader than in *M. wilemani*. The vesica configurations of the two species are similar but unlike in *M. wilemani*, the largest (distal) diverticulum of *M. tenebrosa* has larger lobes and the apical section has an additional lateral diverticulum. As the female of *M. wilemani* is unknown, the female genitalia of *M. tenebrosa* were compared with the most similar *M. arizana* instead, and *M. tenebrosa* differs from the latter in the longer anterior apophysis, the shorter ductus bursae with a heavily sclerotised cup-shaped posterior section and the narrower corpus bursae. The intersegmental membrane between the 7<sup>th</sup> and 8<sup>th</sup> abdominal segments of *M. tenebrosa* is the longest in the genus.

**Material examined:** **Bhutan:** 1♂, Bhutan, Dudgeon, 95–203, 2500', 17.viii.[18]95 (NHMUK). **India:** 1♂, W[est] B[engal], Darjeeling, 5 km oberh. [above] Rambh, 800 m, 30.vii.1990, W. Thomas, gen. slide No. ZSM Arct. 2021-491♂ (AV) (MWM/ZSM); 1♂, [Meghalaya] Khasis, x.1894, Nat. Coll., gen. slide No. AV8779♂ (OUMNH); 2♂ 1♀, [Meghalaya] Khasis, Nat. Coll. / Doncaster private coll., Purch. 1927, gen. slide No. AV8782♀ (OUMNH). **Nepal:** 1♂ 1♀, Milke Danda, Nesum, 1500 m, 2.viii.2000, Csóvari & Hreblay, gen. slide Nos: ZSM Arct. 2021-485♂, 2021-486♀ (AV) (MWM/ZSM); 2♂ 2♀, Annapurna Himal, 1 km N of Besisahar, 28°14'N 84°23'E, 850 m, 5.vi.1996, Hreblay & Szaboky, gen. slide Nos: ZSM Arct. 2021-487♂, 2021-488♀, 2021-489♂, 2021-490♀ (AV) (MWM/ZSM). **Thailand:** *Chiang Mai Prov.:* 1♂, Fang Distr., Doi Pha Hom Pok, 20°02'54"N 99°09'49"E, 1400 m, 28–29.xi.2005, K. Černý, gen. slide No. AV7844♂ (CKC); 1♀, Doi Inthanon NP, 18°30'59"N

98°28'13"E, 1416 m, 6–7.vi.2005, K. Černý, gen. slide No. AV9284♀ (CKC); 1♂ Mt Doi Inthanon NP, 2300 m, 28.i.2000, M. Hreblay & A. Szabó (MWM/ZSM); 1♂ 4 km SE of Pang Faen, 1100 m, 14.xi.1999, M. Hreblay (MWM/ZSM); 1♂ 1♀, Doi Suthep, 18°47.974'N 98°54.901'E, 1087 m, at MV light, 1.viii.2006, G. Martin, BMNH(E) 2006-128, NHMUK010916156, NHMUK010916157 (NHMUK).

**Distribution:** The species is currently known from Northeast India (north of West Bengal, Meghalaya) (Kirti & Singh 2016), Nepal (Kishida 1995, as *M. quadriplaga*), Bhutan and Northern Thailand (Chiang Mai Province) (present study).

**Notes:** (1) Both generic names, *Teulisna* (the original combination of the species) and *Mithuna* are feminine. The species name is a Latin adjective and its original spelling 'tenebrosus' has a masculine ending, which is against Article 31.2 of ICZN (1999). Although provisions of this article seem to be widely ignored by the lepidopterological community (e.g., Sommerer 2002; Welter-Schultes 2012; Nieuwerkerken *et al.* 2019), the ending of the species name is herein corrected to the feminine gender with the authorship of the taxon being preserved, to comply with Articles 33.2 and 34.2 of ICZN (1999).

(2) The species was described with the male genitalia having a left valva broken off (although the illustrated specimen had it), which made the main diagnostic character of the male genitalia being not mentioned the original description (Kirti & Singh 2016).

(3) The species varies in its size and the shade of the forewing ground colour but the genitalia structures are rather invariable throughout its distributional range, only the length of the left valva somewhat varies in the Thai populations (Figs 83, 84).

#### *Mithuna quadriplaga* species-group

**Diagnosis:** The male genitalia of the species-group are characterised by the well-developed distal saccular process and the flattened juxta with a weakly sclerotised medio-ventral section and well-sclerotised apico-lateral lobes bearing sclerotised plates in most species. The female genitalia have a heavily sclerotised and rugose ductus bursae with sclerotised margins of the ostium, a strongly elongate, narrow and membranous corpus bursae and a membranous appendix bursae.

#### *Mithuna quadriplaga* Moore, 1878

Figs 26–28, 85, 114

*Mithuna quadriplaga* Moore, 1878: 21, pl. s: fig. 9. (Type locality: "Darjiling" [NE India, West Bengal, Darjeeling].)

**Diagnosis:** The forewing length is 10.5–11.0 mm in males and 12.5–13.0 mm in females. *Mithuna quadriplaga* is morphologically similar to the allopatric *M. swanni* and the detailed comparison is provided below in the diagnosis of the latter species.

**Lectotype** (designated by Hampson (1900) as "Type"): **India:** (Fig. 26): ♀, "Darjiling | 21" / "Moore Coll. | 94–106." / red ring "Type" label / QR-code label with unique ID "NHMUK010401697" (NHMUK).



69

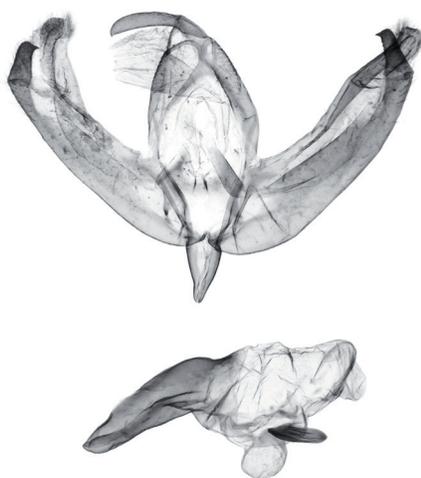
*Mithuna tongdzuythanhi*

N Thailand, Chiang Mai Prov., Doi Pha Hom Pok, slide AV7828

70

*Mithuna flava*

N Vietnam, Fansipan Mt., slide ZSM Arct. 2021-494



71

*Mithuna thaica* sp. n., HT

N Thailand, Nan Prov., slide ZSM Arct. 2021-497

72

*Mithuna thaica* sp. n., PT

W Thailand, Tak Prov., slide AV8071

**Figs 69–72.** Male genitalia of *Mithuna* spp. Depositories of the dissected specimens: 69 and 72 in CKC; 70 and 71 in MWM/ZSM.

**Additional material examined: India:** 1♂, W[est] B[engal], Darjeeling, Manjitar, 700 m, 20.vii.1990, W. Thomas, gen. slide No. ZSM Arct. 2019-1102♂ (AV) (MWM/ZSM); 1♂ 1♀, Sikkim, Pemayangtse, 2000 m, 23–28.vii.1990, W. Thomas, gen. slide Nos: AV7847♂, AV7848♀ (CKC); 1♀, [Meghalaya] Khasis, Nat. Coll. / Doncaster private coll., Purch. 1927, gen. slide No. AV8781♀ (OUMNH). **Nepal:** 1♂ 1♀, Annapurna Himal, Ulleri, 1900 m, 28°23'N 83°43'E, 3.x.1994, Csorba & Ronkay, gen. slide Nos: ZSM Arct. 2021-481♂ 2021-482♀ (AV) (MWM/ZSM); 1♂, Langtang, 9 km S Dhunche, 28°04'N 85°14'E, 2110 m, 23.ix.1994, Csorba & Ronkay, gen. slide No. ZSM Arct. 2021-483♂ (AV) (MWM/ZSM); 1♂ 1♀, Langtang, 1.5 km NE Dhunche, 28°06'N 85°18'E, 1950 m, 24.ix.1994, Csorba & Ronkay, gen. slide No. ZSM Arct. 2021-484♀ (AV) (MWM/ZSM).

**Distribution:** The species is known from Nepal and Northeast India (Sikkim, north of West Bengal and Meghalaya) (Moore 1878).

**Notes:** (1) Moore (1878) described the species from an unspecified number of specimens preserved in his and O. Staudinger's collections (currently housed in NHMUK and MfN respectively). Subsequently, Hampson (1900) cited only one female from Moore's collection as "Type", which, according to the Article 74.5 of ICZN (1999), should be considered as lectotype designation.

(2) Unfortunately, only a single female from Khasi Hills was available for this study. This specimen has female genitalia very similar to the Himalayan populations and is therefore considered herein as belonging to *M. quadriplaga*.

### *Mithuna swanni* sp. n.

Figs 29–31, 86, 115

**LSID:** urn:lsid:zoobank.org:act:CB4F786E-3093-44E3-91E8-D54661D350CC.

**Etymology:** The species is named after Captain Arthur E. Swann, who collected not only the type series of the new species but numerous other Heterocera in northern Myanmar in 1921–1923.

**Diagnosis:** The forewing length is 10.5–11.0 mm in males and 12.0 mm in the female. *Mithuna swanni* is externally very similar to *M. quadriplaga* and *M. pianma* and identification requires the examination of the genitalia structures. The male genitalia of *M. swanni* are similar to *M. quadriplaga*, but distinguished by the broader uncus, the more heavily setose scaphium, the smaller claw-shaped processes of the apico-lateral plates of the juxta and the longer and unilobate diverticulum of the vesica, which is bilobate in *M. quadriplaga*. In the female genitalia, *M. swanni* differs from *M. quadriplaga* in the broader ostium bursae, the shorter ductus bursae and the longer corpus and appendix bursae.

**Holotype: Myanmar:** ♂, [North Myanmar, Kachin State, Myitkyina District] "Upper Burma: | Htaungaw. | 6000 ft. | Capt. A.E. Swann" / "Brit. Mus. | 1923–488." / QR-code label "NHMUK010292605" (NHMUK) (Figs 29, 86).

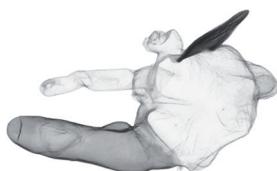
**Paratypes: Myanmar:** 2♂ 1♀, same data as in holotype, NHMUK010292606, NHMUK010292607, NHMUK010292610 (NHMUK).

**Distribution:** The new species is currently known only from its type locality in Northern Myanmar (eastern Kachin State).



73

*Mithuna securis* sp. n., HT  
S Vietnam, Lam Dong Prov., slide AV7842



74

*Mithuna bilineata*, HT  
C Laos, Khammouane Prov. prep. Bucsek



75

*Mithuna bilineata*  
N Vietnam, Hoa Binh Prov., Mai Chau, slide ZSM Arct. 2021-658



76

*Mithuna arizana*  
Taiwan, Nantou Co., slide AV7825

**Figs 73–76.** Male genitalia of *Mithuna* spp. Depositories of the dissected specimens: 73 and 75 in MWM/ZSM (73: ex CKC); 74 in SNM (after Bucsek 2020); 76 in CKC.

*Mithuna atkinsoni* sp. n.

Figs 32, 33, 87, 116

**LSID:** [urn:lsid:zoobank.org:act:0B0710A9-0A8A-455B-8890-FFEB731C96DD](https://zoobank.org/act:0B0710A9-0A8A-455B-8890-FFEB731C96DD).**Etymology:** The new species is named after William Stephen Atkinson (1820–1876), the British lepidopterist, whose collection of Indian Lepidoptera served as the basis for the description of numerous new taxa including the current one.**Diagnosis:** The forewing length is 14.5–15.0 mm in males and 16.5 mm in the female. *Mithuna atkinsoni* is the largest species in the genus. It is most externally similar to *M. meghalaya*, from which *M. atkinsoni* differs in the more elongate forewing and the medial line angled in the cell whereas it is nearly straight in *M. meghalaya*. The male genital capsule of *M. atkinsoni* is most reminiscent of *M. pianma* with its setose apex of the valva but can be easily distinguished by the narrower uncus, broader U-shaped sacculus (it is rectangular in *M. pianma*), the more strongly upcurved valva with a more densely setose apex and the broader juxta with larger sclerotised apico-lateral plates. Unlike in *M. pianma*, the vesica of *M. atkinsoni* has a shorter but broader basal section with a dorsal cluster consisting of larger denticle-like cornuti, a markedly broader ventral diverticulum covered with graniculi and bearing a cluster of denticle-like cornuti laterally (it is situated apically in *M. pianma*), the presence of a utricular distal diverticulum and the apical section having a short bilobate diverticulum. The female genitalia of *M. atkinsoni* differ from *M. pianma* in the trapezoidal postvaginal plate (it is elliptical and connected to additional areas of sclerotisation laterally and posteriorly), the more rugose ductus bursae lacking the anterior ventral pocket and the narrower corpus bursae.**Holotype:** India: ♂, [Northeast India] “Darjeeling | 1864” / “coll. Atkinson” / “Coll. | Staudinger” / “Slide | NKMB-AV-012♂ | A. Volynkin” (MfN) (Figs 32, 87).**Paratypes:** India: 1♂ 1♀, Sikkim, Möller, 1887 / Collectio H.J. Elwes / Rothschild Bequest B.M. 1939-1, NHMUK010292452, NHMUK010292608 (NHMUK).**Distribution:** The new species is known from Northeast India (north of West Bengal and Sikkim).*Mithuna pianma* sp. n.

Figs 34, 35, 88, 117

**LSID:** [urn:lsid:zoobank.org:act:E3EAF528-42A6-4B80-82BA-C50C5264B520](https://zoobank.org/act:E3EAF528-42A6-4B80-82BA-C50C5264B520).**Etymology:** The species name is derived from the town of Pianma, the type locality of the new species. The name is a noun in apposition.**Diagnosis:** The forewing length is 11.0 mm in the male holotype and 12.5 mm in females. *Mithuna pianma* is externally very similar to *M. quadriplaga* and *M. swanni* and identification requires the examination of the genitalia structures. In the male genital capsule, *M. pianma* differs from the aforementioned congeners in the



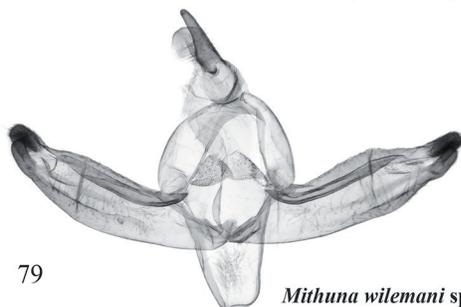
77

*Mithuna ochrocephala* sp. n., HT  
NE Thailand, Nakhon Ratchasima Prov., slide AV8069



78

*Mithuna ochrocephala* sp. n., PT  
SE Thailand, Buriram Prov., slide AV8068



79

*Mithuna wilemani* sp. n., HT  
Taiwan, Taoyuan Co., slide AV7846



80

*Mithuna bolovena* sp. n., HT  
S Laos, Champasak Prov., slide AV8792



**Figs 77–80.** Male genitalia of *Mithuna* spp. Depositories of the dissected specimens: 77 and 79 in MWM/ZSM, ex CKC; 78 in CKC; 80 in CAV.

more heavily sclerotised scaphium, the narrower vinculum, the medially narrower valva with a broader, apically rounded and densely setose apex (it is apically pointed and weakly setose in *M. quadriplaga* and *M. swanni*), the more upcurved distal saccular process and the smaller apico-lateral plates of the juxta lacking processes. The phallus of *M. pianma* is somewhat shorter than in *M. quadriplaga* and *M. swanni*. In the vesica of *M. pianma*, the diverticulum bears an apical cluster of denticle-like cornuti, which is absent in both congeners. Additionally, the diverticulum of *M. pianma* is unilobate whereas it is bilobate in *M. quadriplaga*. The female genitalia of *M. pianma* differ from *M. quadriplaga* and *M. swanni* in the less rugose and markedly narrower ductus bursae bearing an anterior ventral pocket and the posteriorly broader corpus bursae. The detailed comparison with *M. atkinsoni* is provided above in the diagnosis of the latter species.

**Holotype:** **China:** ♂, [China, Yunnan Prov., Nujiang Lisu Autonomous Prefecture, Lushui City, Pianma Town] “Upper Burma: | Hpimaw Fort, | Nr. Myitkyina. | 8000 ft. 13.viii.1923. | Capt. A.E. Swann.” / “Brit. Mus. | 1923-488.” / QR-code label “NHMUK010292603” (NHMUK) (Figs 34, 88).

**Paratypes:** **China:** 2♀, same data as in holotype, NHMUK010292604, NHMUK010292609 (NHMUK).

**Distribution:** The new species is currently known only from its type locality in Yunnan Province of China, near the border with Kachin State of Myanmar.

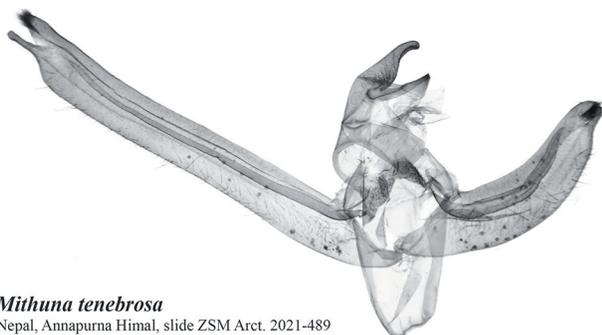
### *Mithuna phahompoka* sp. n.

Figs 36, 37, 89, 118

**LSID:** [urn:lsid:zoobank.org:act:E2284EDB-2F86-4EED-8EAA-040F726921EA](https://zoobank.org/act:E2284EDB-2F86-4EED-8EAA-040F726921EA).

**Etymology:** The species name is derived from the Mount (Doi) Phahompok, where the new species is found. The name is a noun in apposition.

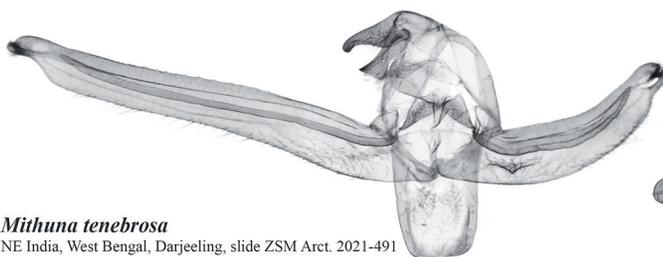
**Diagnosis:** The forewing length is 11.5 mm in the male holotype and 12.5 mm in females. *Mithuna phahompoka* is externally similar to *M. quadriplaga*, *M. swanni*, *M. pianma* and *M. fletcheri*, but can be distinguished by the nearly straight medial line of the forewing, which is angled in the cell in the similar congeners. The male and female genitalia of *M. phahompoka* are most similar to *M. fletcheri* and the detailed comparison is provided below in the diagnosis of the latter species. The vesica configuration of *M. phahompoka* is also very similar to *M. pianma* having, however, a largely different male genital capsule, from which that of *M. phahompoka* differs in the broader uncus, the longer and broader juxta, the shorter vinculum, the markedly shorter and broader valva with a proximally broader dorsal section having an upcurved, more tapered and smooth distal part (it is rather trapezoidal and densely setose in *M. pianma*) and the broader sacculus with a considerably longer, hook-shaped distal process, which is blade-shaped and smoothly upcurved in *M. pianma*. The phallus of *M. phahompoka* is longer and somewhat broader than in *M. pianma*. In the vesica of *M. phahompoka*, the proximal cluster of cornuti is shorter than in *M. pianma*, the largest diverticulum is somewhat broader and the apical section has a small semiglobular diverticulum,

***Mithuna tenebrosa***

Nepal, Annapurna Himal, slide ZSM Arct. 2021-489



81

***Mithuna tenebrosa***

NE India, West Bengal, Darjeeling, slide ZSM Arct. 2021-491



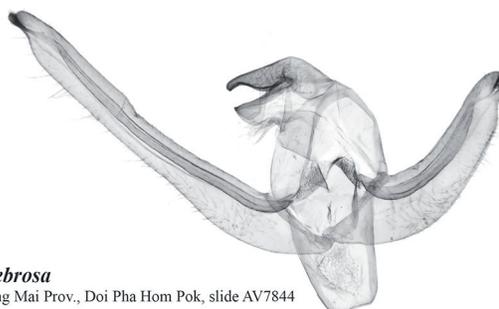
82

***Mithuna tenebrosa***

N Thailand, Chiang Mai Prov., Doi Suthep, NHMUK010916156



83

***Mithuna tenebrosa***

N Thailand, Chiang Mai Prov., Doi Pha Hom Pok, slide AV7844



84

**Figs 81–84.** Male genitalia of *Mithuna tenebrosa*. Depositories of the dissected specimens: 81 and 82 in MWM/ZSM; 83 in NHMUK; 84 in CKC.

which is absent in *M. pianma*. The female genitalia of *M. phahompoka* differ from *M. pianma* in the broader postvaginal plate, the narrower ductus bursae and the posteriorly tapered corpus bursae, which is medially slightly constricted and posteriorly dilated in *M. pianma*.

**Holotype: Thailand:** ♂, “N. Thailand | Chiang Mai, Fang | Doi Pha Hom Pok, 2110 m | 20°06'16"N 99°07'46" E | 23.–24.v.2011 leg. K. Cerný [*recte*: Černý]” / “Slide | AV7818♂ | A. Volynkin” (MWM/ZSM, ex CKC) (Figs 36, 89).

**Paratypes: Thailand:** 1♂ 2♀, same data as in holotype, gen. slide Nos: AV7819♀, AV9281♀ (CKC).

**Distribution:** The new species is currently known only from its type locality in Northern Thailand (Chiang Mai Province).

### *Mithuna fletcheri* sp. n.

Figs 38, 39, 90, 119

**LSID:** [urn:lsid:zoobank.org:act:D0B42341-D805-4C42-98C7-AF9F52001D24](https://zoobank.org/urn:lsid:zoobank.org:act:D0B42341-D805-4C42-98C7-AF9F52001D24).

**Etymology:** The new species is named after Thomas Bainbrigge Fletcher (1878–1950), the British entomologist, expert in Microlepidoptera and collector of a part of the type series.

**Diagnosis:** The forewing length is 10.5–11.5 mm in males and 11.5 mm in the female. *Mithuna fletcheri* is externally reminiscent of *M. quadriplaga*, *M. swanni* and *M. pianma* and identification requires the examination of the genitalia structures. The male genitalia of *M. fletcheri* are similar to *M. phahompoka*, but differ in the proximally broader uncus, the shorter and distally broader dorsal section of the valva with a short claw-shaped tip, the markedly shorter distal saccular process and the vesica with a longer basal section bearing a larger proximal cluster of cornuti, a narrower largest diverticulum and a smaller subapical diverticulum. The female genitalia of *M. fletcheri* are distinguished from *M. phahompoka* by the somewhat shorter anterior apophysis, the broader postvaginal plate, the markedly broader ductus bursae, and the posteriorly broader and medially constricted ductus bursae, which is gradually dilated anteriorly in *M. phahompoka*.

**Holotype: India:** ♂, “[NE India, Meghalaya] Khasis 5000 ft. | Shillong | 18.VI 1928 | Fletcher coll.” / “Presented by | R.L.E. Ford | B.M.1949-487.” / QR-code label “NHMUK016480369” (NHMUK) (Figs 38, 90).

**Paratypes: India:** 1♂ 1♀, same data as in holotype, but 27.vi.1928, NHMUK0106480370 (♂), and 9.vii.1928, NHMUK0106480370 (♀) (NHMUK); 1♂, Khasis, Oct. 1894, Nat. Coll. / 67. 20. Ex Coll. Ed. Brabant. 1920, NHMUK010292625 (NHMUK); Assam, Khasia Hills. Coll. abt. 1904 by Nissary. Pres. 1907 by Herbert Druce / 1907, 2377, gen. slide No. AV8783♂ (OUMNH).

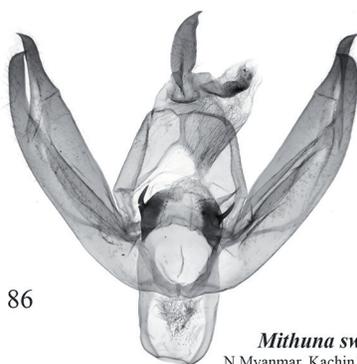
**Distribution:** The new species is currently known only from Khasi Hills (Northeast India, Meghalaya).



85

*Mithuna quadriplaga*

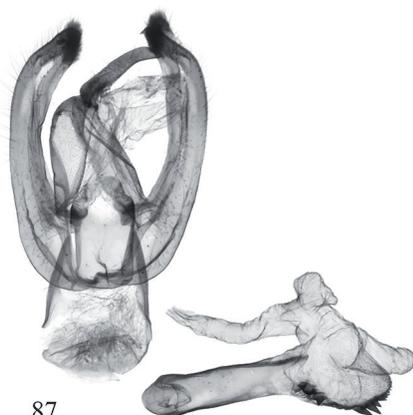
Nepal, Langtang, slide ZSM Arct. 2021-483



86

*Mithuna swanni* sp. n., HT

N Myanmar, Kachin State, NHMUK010292605



87

*Mithuna atkinsoni* sp. n., HT

NE India, Darjeeling, slide NKMB-AV-012



88

*Mithuna pianma* sp. n., HT

SW China, Yunnan Prov., NHMUK010292603



**Figs 85–88.** Male genitalia of *Mithuna* spp. Depositories of the dissected specimens: 85 in MWM/ZSM; 86 and 88 in NHMUK; 87 in MfN.

*Mithuna armata* sp. n.

Figs 40, 91

**LSID:** [urn:lsid:zoobank.org:act:28B6C493-4905-4D3A-9EE1-D7D20269E8FC](https://zoobank.org/act:28B6C493-4905-4D3A-9EE1-D7D20269E8FC).**Etymology:** The species name is a Latin adjective meaning ‘armed’ and refers to the apico-lateral plates of the juxta of the new species bearing robust thorns.**Diagnosis:** The forewing length is 10.5 mm in the male holotype. *Mithuna armata* is externally reminiscent of *M. fletcheri* but can be distinguished by the somewhat smaller size, the less subapically downcurved costal margin of the forewing, the paler, ochreous-brown forewing ground colour (it is deep brown with fuscous suffusion in *M. fletcheri*) and the indistinct medial line. In the male genitalia, *M. armata* differs clearly from its congeners in the robust hook-shaped uncus, the short and distally swollen dorsal section of the valva bearing a cluster of robust denticles, the broad triangular distal saccular process and the large apico-lateral plates of the juxta bearing three massive upcurved thorns of different lengths. The phallus of *M. armata* is markedly broader than in the similar congeners and has a distal ventral protrusion. The vesica of *M. armata* is distinguished from similar congeners in the broad, globular main chamber with two semiglobular diverticula distally and ventrally and a blade-shaped cornutus laterally and the very short apical section.*Female.* Unknown.**Holotype:** India: ♂, “[NE India, Meghalaya] Khasis. | Nat. Coll.” / “Doncaster | private coll. | Purch. 1927” / “Slide | AV8785♂ | A. Volynkin” (OUMNH) (Figs 40, 91).**Distribution:** The new species is currently known only from Khasi Hills (Northeast India, Meghalaya).*Mithuna meghalaya* sp. n.

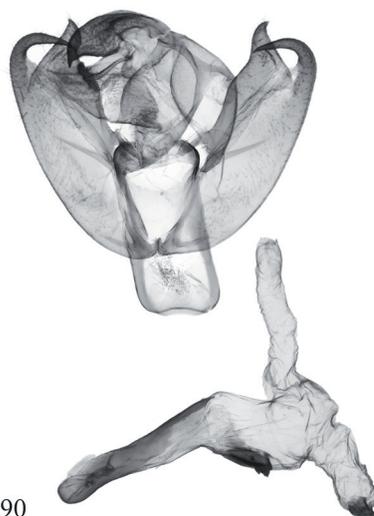
Figs 41, 42, 92, 120

**LSID:** [urn:lsid:zoobank.org:act:F5345F64-A097-4143-BD55-0888179F1EBB](https://zoobank.org/act:F5345F64-A097-4143-BD55-0888179F1EBB).**Etymology:** The species name is derived from the Indian state of Meghalaya, where the new species has been found. The name is a noun in apposition.**Diagnosis:** The forewing length is 12.0 mm in males and 12.5–13.0 mm in females. *Mithuna meghalaya* is externally reminiscent of *M. atkinsoni* but differs in the smaller size and the nearly straight medial line, which is angled in the cell in *M. atkinsoni*. The male genital capsule of *M. meghalaya* is very characteristic and differs from other members of the *M. quadriplaga* species-group in the short valva with a massive bilobate distal saccular process and reduced dorsal section bearing a thorn-shaped costal processes; the latter are asymmetric: the right one is longer than the left one. The phallus of *M. meghalaya* is the broadest in the genus. In the vesica, the main chamber is broad and bears a massive horn-shaped subbasal cornutus laterally, while the apical section has two short utricular diverticula (reminiscent of



89

***Mithuna phahompoka* sp. n., HT**  
N Thailand, Chiang Mai, Doi Pha Hom Pok, slide AV7818



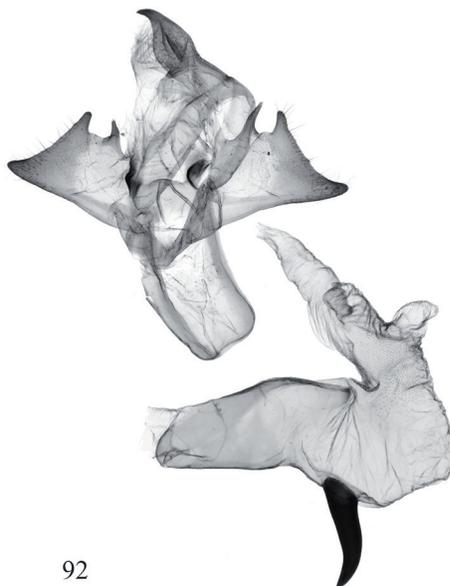
90

***Mithuna fletcheri* sp. n., HT**  
NE India, Meghalaya, Khasi Hills, NHMUK016480369



91

***Mithuna armata* sp. n., HT**  
NE India, Khasi Hills, slide AV8785



92

***Mithuna megalaya* sp. n., HT**  
NE India, Meghalaya, Garo Hills, slide ZSM Arct. 2021-479

**Figs 89–92.** Male genitalia of *Mithuna* spp. Depositories of the dissected specimens: 89 and 92 in MWM/ZSM (89: ex CKC); 90 in NHMUK; 91 in OUMNH.

*M. robusta*). The female genitalia of *M. meghalaya* are distinguished from similar congeners in the strongly posteriorly dilated, vase-shaped ductus bursae and the dilated posterior section of the corpus bursae. Additionally, the substernal area of the 7<sup>th</sup> abdominal sternite of *M. phahompoka* is sclerotised and rugose whereas it is weakly sclerotised and smooth in other members of the *M. quadriplaga* species-group.

**Holotype:** India: ♂, “NE-India, Assam | W. Meghalaya, Garo Hills | Nokrek National Park | 25°40'N 91°04'E, | 1150 m, 2–13.vii.1997 | leg. Afonin & Sinajev [*recte*: Sinyaev] | Museum Witt” / “Slide | ZSM Arct. | 2021-479♂ | A. Volynkin” (MWM/ZSM) (Figs 41, 92).

**Paratypes:** India: 2♂ 7♀, same data as in holotype, gen. slide No. ZSM Arct. 2021-480♀ (AV) (MWM/ZSM); 1♀, Assam, Khasia Hills, Coll. abt. 1904 by Nissary, Pres. 1907 by Herbert Druce / 1907, 2379, gen. slide No. AV8784♀ (OUMNH).

**Distribution:** The new species is known from Northeast India (Meghalaya).

*Mithuna robusta* sp. n.

Figs 43, 44, 93, 94

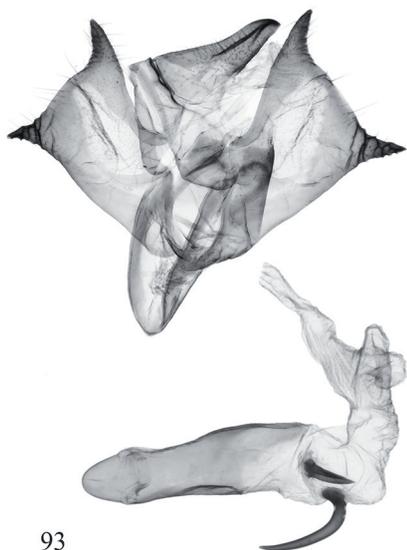
**LSID:** [urn:lsid:zoobank.org:act:BB8B8C70-3FC7-4908-832A-2879F2A52377](https://zoobank.org/act:BB8B8C70-3FC7-4908-832A-2879F2A52377).

**Etymology:** The species name is a Latin adjective meaning ‘robust’ and refers to the heavily sclerotised sacculus and large phallus of the new species armed with robust thorns.

**Diagnosis:** The forewing length is 11.0 mm in males. *Mithuna robusta* is externally reminiscent of the sympatric *M. flabellata* but can be distinguished by the somewhat larger size and paler, more ochreous forewing ground colour; however, reliable identification may require the examination of the genitalia structures. The male genital capsule of *M. robusta* is most similar to *M. meghalaya* but differs clearly in the longer and broader uncus, the markedly shorter vinculum, the more asymmetrical valvae (the right one is broader whereas in *M. meghalaya* the asymmetry is expressed only in the length of the costal process), the considerably longer dorsal section of the valva with a robust thorn-shaped tip and the unilobate and apically pointed distal saccular process, whereas in *M. meghalaya* its distal lobe is apically rounded. Additionally, the juxta of *M. robusta* is broader than in *M. meghalaya* and has weakly sclerotised apico-lateral plates. The phallus of *M. robusta* is markedly narrower than in *M. meghalaya*. Unlike in *M. meghalaya*, the main chamber of the vesica of *M. robusta* is considerably narrower and bears two subbasal cornuti: the lateral one, which is thinner than in *M. meghalaya* and rather claw-shaped (it is horn-shaped in *M. meghalaya*) and the second shorter, blade-shaped dorsal one. The apical section of the vesica of *M. robusta* is narrower than in *M. meghalaya* and has shorter diverticula.

*Female.* Unknown.

**Holotype:** Thailand: ♂, “N. Thailand | Chiang Mai-prov, | Doi Inthanon-NP, 1416m | 18°30'59"N 98°28'13" E | 6–7.vi.2005 leg. K. Cerný [*recte*: Černý]” / “Slide | AV7824♂ | A. Volynkin” (MWM/ZSM, ex CKC) (Figs 43, 93).



93

*Mithuna robusta* sp. n., HT  
N Thailand, Chiang Mai, Doi Inthanon, slide AV7824



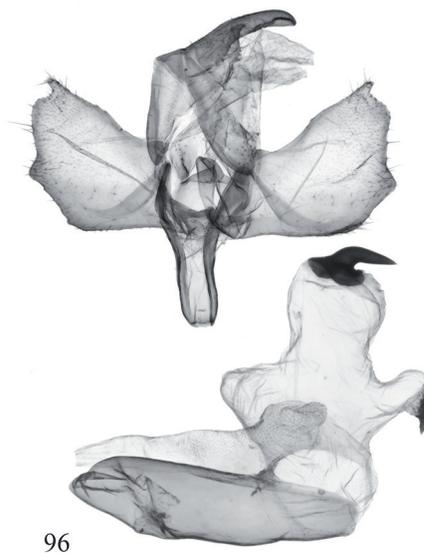
94

*Mithuna robusta* sp. n., PT  
N Thailand, Chiang Mai, Doi Inthanon NP, slide AV9280



95

*Mithuna lamdonga* sp. n., HT  
S Vietnam, Lam Dong Prov., slide AV7837



96

*Mithuna flabellata* sp. n., HT  
N Thailand, Chiang Mai Prov., Chae Son NP, slide AV7820

**Figs 93–96.** Male genitalia of *Mithuna* spp. Depositories of the dissected specimens: 93, 95 and 96 in MWM/ZSM, ex CKC; 94 in CKC.

**Paratypes: Thailand:** 1♂, same data as in holotype, gen. slide No. AV9280♂ (CKC); 3♂, Chiang Mai Prov., Chae Son NP, 18°51'33"N 91°22'03"E, 1496 m, 9.vi.2005, K. Černý, gen. slide Nos: AV7821♂ AV9282♂, AV9283♂ (CKC).

**Distribution:** The new species is known from Northern Thailand (Chiang Mai Province).

*Mithuna tranthiedui* species-group

**Diagnosis:** The male genitalia of the group are characterised by the pyramidal juxta (similar to the *M. quadriplagoides* species-group, whereas in other congeners it is flattened), the distally dilated valva with very short apical and distal saccular processes and the broad vesica bearing robust cornuti. The female genitalia of the *M. tranthiedui* species-group are similar to the *M. tongdzuythanhi* species-group with its sclerotised posterior end of the corpus bursae. However, in the *M. tranthiedui* species-group the corpus bursae is more saccate than in the *M. tongdzuythanhi* species-group and its posterior area of sclerotisation is longer and broader.

*Mithuna lamdonga* sp. n.

Figs 45, 46, 95, 121

**LSID:** [urn:lsid:zoobank.org:act:A267D24D-E3E6-4F6D-966D-05C8963AE2E8](https://zoobank.org/urn:lsid:zoobank.org:act:A267D24D-E3E6-4F6D-966D-05C8963AE2E8).

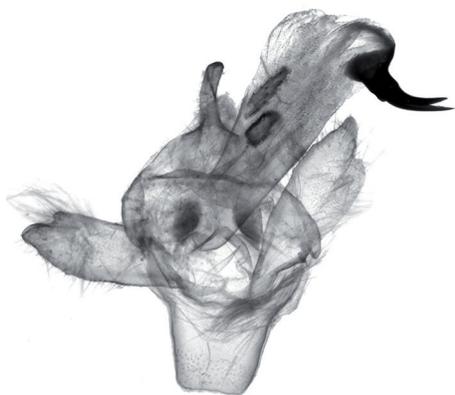
**Etymology:** The species name is derived from Lam Dong Province of Vietnam, where the new species is found. The name is a noun in apposition.

**Diagnosis:** The forewing length is 9.5 mm in both sexes. *Mithuna lamdonga* is externally similar to *M. robusta* and *M. flabellata* but can be easily distinguished by the smaller size, the narrower forewing and the paler, greyish ochreous ground colour of the forewing, which is ochreous brown in *M. robusta* and brown in *M. flabellata*. The male genital capsule of *M. lamdonga* is reminiscent of *M. tranthiedui* but is distinct in the longer uncus and the markedly longer and broader valva with broader and triangular apices of the dorsal and saccular sections (they both are apically rounded in *M. tranthiedui*). The vesica configuration of *M. tranthiedui* remains unstudied but it was possible to compare the cornuti of the two species: *M. lamdonga* has two robust thorn-shaped cornuti and one serrulate plate whereas in *M. tranthiedui*, there are two serrulate plates and two large claw-shaped cornuti originating from the same heavily sclerotised base. As the female of *M. tranthiedui* remains unknown, the female genitalia of *M. lamdonga* were compared with *M. flabellata* (see below under the diagnosis of the latter species).

**Holotype: Vietnam:** ♂, “S Vietnam | Đa Lat, Datan La 1380 m, | 11°54'10,6"N 108°26'59"E, | 29.ix.2013 leg. K. Černý” / “Slide | AV7837♂ | A. Volynkin” (MWM/ZSM, ex CKC) (Figs 45, 95).

**Paratype: Vietnam:** ♀, same data as in holotype, gen. slide No. AV9286♀ (CKC).

**Distribution:** The new species is currently known only from its type locality in Southern Vietnam.



97

*Mithuna tranthiedui*, HT

C Vietnam, Gia Lai Prov., Kon Ka Kinh NP, prep. Dubatolov



98

*Mithuna quadriplagoides*

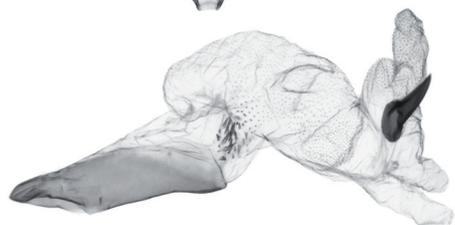
E Malaysia, Borneo Isl., slide NKMB-AV-009



99

*Mithuna mithunoides*

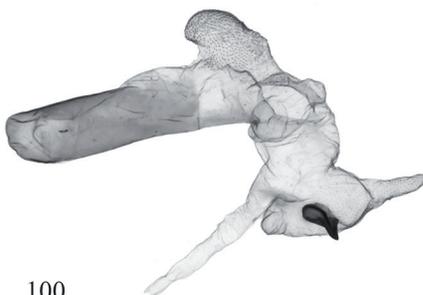
S Thailand, Ranong Prov., slide AV8070



100

*Mithuna bucseki* sp. n., HT

N Thailand, Chiang Mai Prov., slide ZSM Arct. 2021-502



**Figs 97–100.** Male genitalia of *Mithuna* spp. Depositories of the dissected specimens: 97 in SZMN (photo by V. Dubatolov); 98 in MfN; 99 in CKC; 100 in MWM/ZSM.

*Mithuna flabellata* sp. n.

Figs 47, 48, 96, 122

**LSID:** urn:lsid:zoobank.org:act:0920AE08-FBBF-4A38-8457-2C71A9C2417C.**Etymology:** The species name is a Latin adjective meaning ‘fan-shaped’ and refers to the fan-shaped valva of the new species.**Diagnosis:** The forewing length is 10.0–10.5 mm in males and 10.0 mm in the female. *Mithuna flabellata* is externally reminiscent of *M. robusta* but can be distinguished by the somewhat smaller size and darker, brown forewing ground colour, which is ochreous brown in the congener. Reliable identification often requires the examination of the genitalia structures, which are substantially different in the two species in their uncus, valva and vesica configurations. The male genital capsule of *M. flabellata* is most reminiscent of *M. lamdonga* but differs clearly in the markedly broader and longer valva with a sacculus having a medial ventral protrusion and bearing a broader distal protrusion-like process. The phallus of *M. flabellata* is proximally broader than in *M. lamdonga*. Unlike in *M. lamdonga*, the vesica of *M. flabellata* has a lateral subbasal (proximal) diverticulum displaced more distally and bearing a cornutus (vs. a serrulate plate in the congener), a broader and bilobate distal (largest) diverticulum bearing a shorter and more curved cornutus and a shorter apical section lacking the cornutus. In the female genitalia, *M. flabellata* is distinct from *M. lamdonga* in the longer postvaginal plate, the broader and more heavily sclerotised ductus bursae lacking the anterior ventro-lateral pocket, which is present in *M. lamdonga*, the anteriorly broader corpus bursae with a sclerotised postero-lateral area having a lateral protrusion and the more heavily sclerotised and conical appendix bursae, which is semiglobular in the similar congener. Additionally, the anterior section of the corpus bursae of *M. flabellata* bears weak graniculi whereas that of *M. lamdonga* is membranous.**Holotype: Thailand:** ♂, “N. Thailand | Chiang Mai-prov. | Chae Son NP, 1496 m | 18°51'22"N 91°22'3"E | 9.vi.2005 leg. K. Černý [recte: Černý]” / “Slide | AV7820♂ | A. Volynkin” (MWM/ZSM, ex CKC) (Figs 47, 96).**Paratypes: Thailand:** 1♀, same data as in holotype, gen. slide No. AV7822♀ (CKC); 1♂, Chiang Mai Prov., Doi Inthanon NP, 18°30'59"N 98°28'13"E, 1416 m, 6–7.vi.2005, K. Černý, gen. slide No. AV7823♂ (CKC).**Distribution:** The new species is known from Northern Thailand (Chiang Mai Province).*Mithuna tranthiedui* Dubatolov & Bucsek, 2016

Figs 49, 97

*Mithuna tranthiedui* Dubatolov & Bucsek, 2016: 230, figs 6, 24. (Type locality: “Central Vietnam, Gia Lai Prov., K’Bang Distr., Dak Roong Comm., vill[age]. Kon Loc, Kon Ka Kinh NP [National Park], 1050 m, 14°42.602' N 108°39.062' E”.)



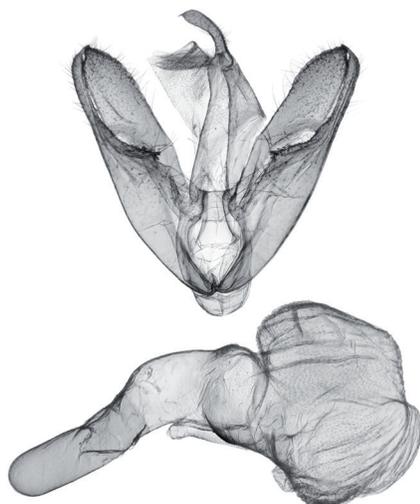
101

*Mithuna varia*, HT  
NE Laos, Houaphanh Prov., prep. Bucsek



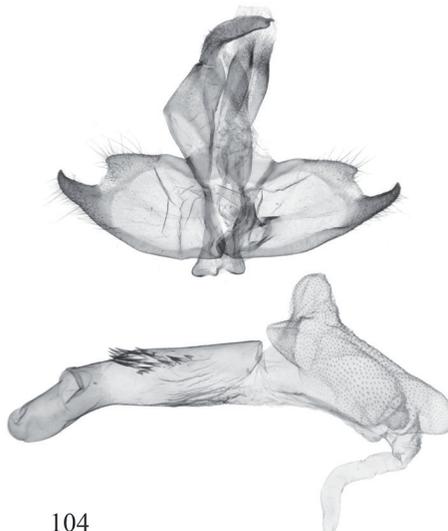
102

*Mithuna suthepia* sp. n., HT  
N Thailand, Chiang Mai Prov., NHMUK010292623



103

*Eilemithuna transducta*  
N Vietnam, Lao Cai Prov., Fansipan Mt., slide ZSM Arct. 2019-1106



104

*Eilemithuna dimidilinea*, PT  
N Thailand, Chiang Mai Prov., Doi Pha Hom Pok, slide AV7835

**Figs 101–104.** Male genitalia of *Mithuna* and *Eilemithuna* gen. n. spp. Depositories of the dissected specimens: 101 in SNM (after Bucsek (2020)); 102 in NHMUK; 103 in MWM/ZSM; 104 in CKC.

**Diagnosis:** The forewing length is 10.5 mm in the male holotype. The species was described from a single worn specimen reminiscent of *M. flabellata*, from which *M. tranthiedui* differs in the darker hindwing. The male genitalia of *M. tranthiedui* are similar to *M. lamdonga* and the detailed comparison is provided above in the diagnosis of the latter species.

*Female.* Unknown.

**Holotype** (examined only on photographs): **Vietnam:** ♂, “14–19.III.2012 | Central Vietnam, Gia Lai Prov | K’Bang Distr., Dak Roong | Comm., vill. Kon Loc, Kon Ka | Kinh NP, 14°42.602’ N 108° | 39.062’ E, 1050 m | V.Zolotuhin leg.”, gen. prep. by V. Dubatolov (preserved in sugar on a piece of paper pinned under the specimen) (SZMN) (Figs 49, 97).

**Distribution:** The species is currently known only from its type locality in Central Vietnam (Gia Lai Province) (Dubatolov & Bucsek 2016).

#### *Mithuna quadriplagoides* species-group

**Diagnosis:** See below under the only species included in the group, *M. quadriplagoides*.

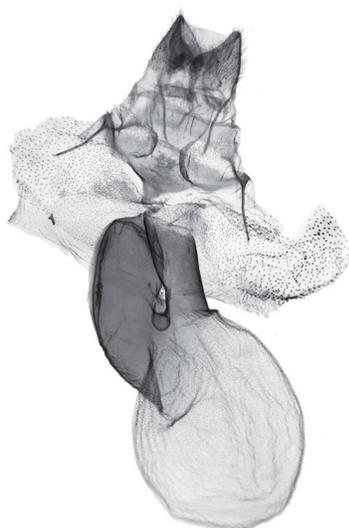
#### *Mithuna quadriplagoides* Holloway, 2001

Figs 50, 51, 98, 123

*Mithuna quadriplagoides* Holloway, 2001: 304, pl. 2: fig. 7 (moth), fig. 74 (♂ genitalia). (Type locality: [Malaysia, Borneo Island] “Sarawak: Gunong Mulu Nat. Park ... Mulu, 1790 m”.)

**Diagnosis:** The forewing length is 11.0–11.5 mm in males and 11.5 mm in females. *Mithuna quadriplagoides* is externally reminiscent of *M. meghalaya* but is somewhat smaller and has a more rounded forewing apex and a darker hindwing suffused with greyish brown. The male genital capsule of *M. quadriplagoides* is distinct from other congeners in the solid, nearly elliptical valva lacking processes but with a shallow subapical depression ventrally and the apico-lateral plates of the juxta modified into long bird wing-shaped processes bearing clusters of robust spines distally. The structure of the valva is similar to the *M. mithunoides* species-group with its medial transverse area of sclerotisation ventrally connected with sacculus, which is possibly a weakly sclerotised lamella centralis. The phallus of the species is S-like curved medially and has a heavily sclerotised lateral string-like fold, which is similar to the *M. quadriplaga* species-group. The vesica is broad, almost globular with a broad area of graniculi, which is unique within the genus. In the female genitalia, *M. quadriplagoides* differs from its congeners in the sclerotised, dorso-ventrally flattened and smooth ductus bursae (it is rugose in the *M. quadriplaga* species-group) and the strongly elongate and narrow corpus bursae, which is reminiscent of the *M. quadriplaga* species-group but has a weakly sclerotised posterior and a weakly granulose anterior sections, whereas the corpus bursae is membranous in the *M. quadriplaga* species-group.

**Holotype:** **Malaysia:** ♂, [Borneo Island] “Sarawak: Gunong | Mulu Nat. Park | R.G.S. Exped. 1977–8 | J.D. Holloway *et al.* | B.M. 1978–206” / “Site 1. January | Camp 4, Mulu | 1790 m. 452463 | Lower



105

*Mithuna tongdzuythanhi*

N Vietnam, Tam Dao Range, slide NKMB-AV-011



106

*Mithuna flava*

N Vietnam, Tam Dao Range, slide ZSN Arct. 2021-501



107

*Mithuna thaica* sp. n., PT

N Thailand, Nan Prov., slide ZSN Arct. 2021-498



108

*Mithuna securis* sp. n., PT

S Vietnam, Lam Dong Prov., slide AV7843

**Figs 105–108.** Female genitalia of *Mithuna* spp. Depositories of the dissected specimens: 105 in MfN; 106 and 107 in MWM/ZSM; 108 in CKC.

montane (moss) | forest. MV – canopy.” / “Holotype | *Mithuna* | *quadriplagoides* | Holloway” / round label with red ring “Holo- | type” / blue label “Arctiidae | genitalia slide | No. 4708♂” / QR-code label “NHMUK 010916196” (NHMUK) (Fig. 50).

**Paratype: Malaysia:** ♀, [Borneo Island] Sarawak: Gunong Mulu Nat. Park, R.G.S. Exped. 1977–8, J.D. Holloway *et al.*, B.M. 1978–206 / Site 2, January, Camp 4, Mulu, 1790 m, 452463, lower montane (moss) forest. Act[inic light]–understorey / Paratype *Mithuna quadriplagoides* Holloway / Paratype [round label with yellow ring], NHMUK010292611 (NHMUK).

**Additional material examined: Malaysia:** 1♂, Borneo, Mt Kinabalu, Mesilau, 2000 m, 14–17.xi.2006, LF [light trap], W. Mey & K. Ebert leg. / West Mesilau River, Suspension Bridge (MfN); 1♂, Borneo, Sabah, Kinabalu NP, HQ, 4–6.xi.2003, LF [light trap], W. Mey, gen. slide No. NKMB-AV-009♂ (MfN).

**Distribution:** The species is endemic to Borneo Island (Holloway 2001).

### *Mithuna mithunoides* species-group

**Diagnosis:** The male genitalia of the species-group are characterised by the combination of the following features: (1) The juxta is broad, flattened and has small apico-lateral plates bearing spurs; (2) The costa is short, S-shaped and lacks a jugum distalis; (3) The distal section of the valva is formed by the secondary sclerotised valvula; (4) The sacculus is short and lacks processes, distally fused with a weak transverse sclerotisation presumably representing a lamella centralis; and (5) The vesica lacks the distal (largest) diverticulum and has an enlarged apical section having a large bilobate diverticulum bearing a single robust cornutus.

In the female genitalia, the following features are characteristic of the species-group: (1) The ductus bursae is broad, dorso-ventrally flattened, well-sclerotised with postero-lateral heavily sclerotised plates; (2) The posterior section of the corpus bursae has one or two broad areas of sclerotisation and a longitudinal membranous fold ventrally; and (3) The anterior section of the corpus bursae is densely scobinate.

### *Mithuna mithunoides* (Černý, 2009)

Figs 52, 53, 99, 124

*Teulisna mithunoides* Černý in Černý & Pinratana, 2009: 135, pl. 27, fig. 271. (Type locality: “SW Thailand, Chumphon, Pa Toh, Ban Lang Tang, 162 m, 9°46'5"N 98°46'59"E”.)

**Diagnosis:** The forewing length is 7.5–8.0 mm in males and 8.5 mm in females. *Mithuna mithunoides* is morphologically similar to *M. bucseki* and the detailed comparison is provided below in the diagnosis of the latter species.

**Holotype: Thailand:** ♀, “SW Thailand | Chumphon-prov., Pa Toh distr., | Ban Lang Tang, 162 m | 9°46'5"N 98°46'59" E | 19., 21.xi.2006 leg. K. Černý [recte: Černý]” / red label “Holotype | *Teulisna* | *mithunoides* | Karel Černý, 2009” / “Slide | AV8073♀ | A. Volynkin” (MWM/ZSM, ex CKC) (Figs 53, 124).

**Paratypes:** 1♂ 1♀, SW Thailand, Ranong Prov., Ranong, 10°01'32"N 98°40'13"E, 380 m, 3–4.xii.2005, K. Černý, gen. slide Nos AV8070♂, AV8071♀ (CKC).

**Additional material examined: Cambodia:** 1♂, Mondolkiri Prov., Seima Biodiversity Conservation Area, between Seima and O'Rang, 12°15'44"N 107°03'49"E, 360 m, 27–29.i.2006, G. Csorba & G. Ronkay, gen. slide No. ZSM Arct. 2021-505♂ (MWM/ZSM). **Thailand:** 1♀, Saraburi [Nakhon Nayok Prov.], Khao Yai NP, Mt Khao Kaew [Khao Khiao], 1244 m, 14°21'56"N 101°24'[00"]E, 31.v.2005, K. Černý, gen. slide No. AV7831♀ (CKC).



109

*Mithuna arizana*

Taiwan, Nantou Co., slide AV7826



110

*Mithuna bilineata*

N Vietnam, Hoa Binh Prov., slide ZSM Arct. 2021-659



111

*Mithuna ochrocephala* sp. n., PTC Thailand, Nakhon Nayok Prov.,  
slide AV8067

112

*Mithuna bolovena* sp. n., PTS Laos, Champasak Prov.,  
slide AV8793

113

*Mithuna tenebrosa*Nepal, Annapurna Himal,  
slide ZSM Arct. 2021-490

**Figs 109–113.** Female genitalia of *Mithuna* spp. Depositories of the dissected specimens: 109 and 111 in CKC; 110 and 113 in MWM/ZSM; 112 in CAV.

**Distribution:** The species is known from Southern and Central Thailand (Chumphon, Ranong and Nakhon Nayok Provinces) (Černý & Pinratana 2009), Western Malaysia (Perak) (Bucsek 2016) and Cambodia (Bae *et al.* 2016). The record from Central Laos (Bucsek 2020) belongs to *M. bucseki* (see below).

*Mithuna bucseki* sp. n.

Figs 54, 55, 100, 125

**LSID:** [urn:lsid:zoobank.org:act:1423CF26-EE57-4A83-A198-BD666C5314D5](https://zoobank.org/act:1423CF26-EE57-4A83-A198-BD666C5314D5).

**Etymology:** The new species is named after Karol Bucsek, renowned expert in the Asian Arctiinae, who greatly contributed to the knowledge of the Lithosiini of Southeast Asia.

**Diagnosis:** The forewing length is 8.5–9.0 mm in males and 9.0 mm in females. *Mithuna bucseki* is externally indistinguishable from *M. mithunoides* and identification requires the examination of the genitalia structures. The male genital capsule of the new species differs clearly from *M. mithunoides* in the shorter uncus, the dorsally narrower juxta bearing smaller spurs, the broader valva having a longer distal dorsal section with a falcate tip and the ventral process directed ventrad (it is directed ventro-distad in *M. mithunoides*) and the ventrally protruding distal section of the sacculus. The phallus of *M. bucseki* is distally narrower than in *M. mithunoides*. In the vesica, *M. bucseki* is distinguished from *M. mithunoides* by the smaller but more heavily granulose subbasal diverticulum, the narrower main chamber (medial section) having two short diverticula (absent in *M. mithunoides*) and the somewhat narrower apical diverticulum bearing a smaller cornutus. The female genitalia of *M. bucseki* differ from those of *M. mithunoides* in the anteriorly narrower ductus bursae with markedly larger postero-lateral sclerotised plates and the posterior section of the corpus bursae having two broad sclerotised areas separated ventrally by the longitudinal membranous fold, whereas *M. mithunoides* has one sclerotised area on the left side with a broader longitudinal membranous fold edging it on the right side. Additionally, the anterior section of the corpus bursae of *M. bucseki* is less posteriorly constricted than in *M. mithunoides* and bears markedly finer scobination.

**Holotype:** Thailand: ♂, “Thailand | Changwat [Province] Chiang Mai | 4 km SE of Pang Faen | 1100 m, 14.xi.1999 | leg. Márton Hreblyay” / “Slide | ZSM Arct. | 2021-502♂ | A. Volynkin” (MWM/ZSM) (Figs 54, 100).

**Paratypes:** Laos: 72♂ 79♀, 10–20.viii.2014, Champasak Prov., 27 km ENE of Pakse, near Tad Fane waterfall, 15°11'01.1"N 106°07'40.5"E, 950 m, local collector, gen. slide Nos: AV7343♂, AV8787♀ (CAV). Thailand: 1♀, same data as in holotype, gen. slide No. ZSM Arct. 2021-503♀ (AV) (MWM/ZSM); 1♂, Chiang Mai Prov., Doi Suthep, 18°47.974'N 98°54.901'E, 1087 m, 1.viii.2006, G. Martin [leg.], at MV light, BMNH(E) 2006-128, NHMUK010916155 (NHMUK). Vietnam: 1♂, Bao Loc (sec. forest), Rung Cat Tien, 11°32'N 107°48'E, 1500 m, 10–20.xii.1992, Sinyaev & Simonov, gen. slide No. ZSM Arct. 2021-504♂ (AV) (MWM/ZSM).

**Distribution:** The new species is currently known from Northern Thailand (Chiang Mai Province), Central and Southern Laos (Khammouane and Champasak Pro-



114

*Mithuna quadriplaga*  
Nepal, Annapurna Himal,  
slide ZSM Arct. 2021-482



115

*Mithuna swanni* sp. n., PT  
N Myanmar, Kachin State,  
NHMUK010292607



116

*Mithuna atkinsoni* sp. n., PT  
NE India, Sikkim,  
NHMUK010292608



117

*Mithuna pianna* sp. n., PT  
SW China, Yunnan Prov.,  
NHMUK010292604



118

*Mithuna phahompoka* sp. n., PT  
N Thailand, Chiang Mai Prov.,  
slide AV7819



119

*Mithuna fletcheri* sp. n., PT  
NE India, Meghalaya, Khasi Hills,  
NHMUK016480371

**Figs 114–119.** Female genitalia of *Mithuna* spp. Depositories of the dissected specimens: 114 in MWM/ZSM; 115–117 and 119 in NHMUK; 118 in CKC.

vinces) (Bucsek 2020, as *Teulisna mithunoides*) and Southern Vietnam (Lam Dong Province).

*Mithuna varia* species-group

**Diagnosis:** In the male genitalia of the species-group, the genital capsule structure is similar to that in the *M. quadriplaga* species-group, but differs in the presence of a well-sclerotised proximal lobe of the sacculus folded dorsad. In the vesica, the robust plank-shaped and apically serrulate cornutus is diagnostic. The female genitalia of the *M. varia* species-group are very characteristic and differ clearly from other congeners in the heavily sclerotised tongue-shaped postvaginal plate, the short and very broad, sclerotised ductus bursae and the gelatinous corpus bursae densely covered with robust spines, which is similar to the genus *Eilemithuna* gen. n. and certain members of the subtribes Cisthenina and Nudariina.

*Mithuna varia* (Bucsek, 2020)

Figs 56, 57, 101, 126

*Teulisna varia* Bucsek, 2020: 51, figs 16–18, 97, 98 (Type locality: “Laos, Huaphanne prov., Mt Phu Pane, 1200–1900 m, Ban Saluei v. env., 20°12'N 103°59'E”).

**Diagnosis:** The forewing length is 9.0 mm in males and 10.5 mm in females (Bucsek 2020). *Mithuna varia* is morphologically similar to *M. suthepia* sp. n. and the detailed comparison is provided below in the diagnosis of the latter species.

**Holotype** (not examined): **Laos:** illustrated by Bucsek (2020): figs 16, 97, deposited in SNM.

**Distribution:** The species is currently known from Northern Laos (Houaphanh Province) (Bucsek 2020) and Northern Thailand (Chiang Mai Province) (present study).

*Mithuna suthepia* sp. n.

Figs 58, 59, 102, 127

**LSID:** [urn:lsid:zoobank.org:act:F83AE252-392A-4D28-B9F6-958EEFC94513](https://zoobank.org/act:F83AE252-392A-4D28-B9F6-958EEFC94513).

**Etymology:** The specific epithet is derived from Mount (Doi) Suthep, the type locality of the new species. The name is a noun in apposition.

**Diagnosis:** The forewing length is 9.5 mm in the male holotype and 11.0 mm in the female paratype. *Mithuna suthepia* is externally very similar to *M. varia*, from which the new species differs only in somewhat more distinct forewing pattern elements. Reliable identification requires the examination of the genitalia structures. The male genital capsule of *M. suthepia* differs from *M. varia* in the juxta lacking the apico-lateral spurs, the rectangular vinculum (it is U-shaped in *M. varia*), the distally narrower valva with a markedly narrower apical serrulate sclerotised area, and the shorter and triangular proximal lobe of the sacculus, which is trapezoidal in *M. varia*. The phallus of *M. suthepia* is more distally dilated than in *M. varia*.



120

***Mithuna meghalaya* sp. n., PT**  
NE India, Meghalaya, Garo Hills,  
slide ZSM Arct. 2021-480



121

***Mithuna lamdonga* sp. n., PT**  
S Vietnam, Lam Dong Prov.,  
slide AV9286



122

***Mithuna flabellata* sp. n., PT**  
N Thailand, Chiang Mai Prov.,  
slide AV7822



123

***Mithuna quadriplagoides*, PT**  
E Malaysia, Borneo Isl.,  
NHMUK010292611



124

***Mithuna mithunoides*, HT**  
S Thailand, Chumphon Prov.,  
slide AV8073



125

***Mithuna bucseki* sp. n., PT**  
N Thailand, Chiang Mai Prov.,  
slide ZSM Arct. 2021-503

**Figs 120–125.** Female genitalia of *Mithuna* spp. Depositories of the dissected specimens: 120, 124 and 125 in MWM/ZSM; 121 and 122 in CKC; 123 in NHMUK.

Unfortunately, the vesica of the holotype of *M. varia* is not fully everted; therefore, the vesica configurations of the two species could not be compared. However, unlike in *M. varia*, the cornutus of *M. suthepia* is remarkably longer and broader (in proportion to the phallus size), and the distal diverticulum bears graniculi (vs. a small serrulate plate in *M. varia*). The female genitalia of the two species are very similar, but *M. suthepia* can be distinguished from *M. varia* in having a longer anterior apophysis, and the posteriorly dilated postvaginal plate, which has parallel margins in the latter species.

**Holotype: Thailand:** ♂, “Thailand 1540 m | Chiang Mai [Prov.] | Doi Suthep-Pui NP | San Kuu | 22.iv.–6.v.1994 | I.J. Kitching *et al.* | BMNH(E) 1994-97” / QR-code label “NHMUK010292623” (NHMUK) (Figs 58, 102).

**Paratype: Thailand:** ♀, *Chiang Mai Prov.*: Doi Inthanon NP, 18°31'05"N 98°31'50"E, 1500 m, 28–29.iv.2006, K. Černý, gen. slide No. AV7832♀ (CKC).

**Distribution:** The new species is currently known from Northern Thailand (Chiang Mai Province).

#### *Lithosiina incertae sedis*

The following species was described from a single female and placed in the genus *Mithuna*. Although vaguely reminiscent of *Mithuna* externally, the species has female genitalia dissimilar to true *Mithuna* and its generic placement remains unclear.

#### ‘*Mithuna*’ *flavia* Bucsek, 2012

Figs 66, 128

*Mithuna flavia* Bucsek, 2012: 117; gen. fig. Mal218; pl. 20: fig. 292 (adult) (Type locality: “Malaysia, Pahang distr., Endau Rompin State Park, Camping by the Kincin River, 50 m, 2°37'10.4"N 103°20'10.9"E”).

**Diagnosis:** The forewing length is 8.5 mm in the female holotype. ‘*Mithuna*’ *flavia* is externally reminiscent *M. tenebrosa* but differs in the smaller size, the narrower forewing with a more tapered apex, the lack of the subapical costal spot in the forewing and the paler hindwing. The female genitalia of ‘*M.*’ *flavia* differ from other species in the genus *Mithuna* in the narrow tubular and gelatinous posterior section of the corpus bursae, from which a heavily sclerotised and irregular appendix bursae originates, and the saccate but medially constricted anterior section of the corpus bursae.

**Holotype: Malaysia:** illustrated by Bucsek (2012): pl. 20: fig. 292; gen. fig.: Mal218. The holotype is deposited in MWM/ZSM, but was not located in the collection during this study, and therefore was not examined.

**Distribution:** The species is currently known only from its type locality in Western Malaysia (Bucsek 2012).



126

*Mithuna varia*, PT  
NE Laos, Houaphanh Prov.,  
prep. Bucsek



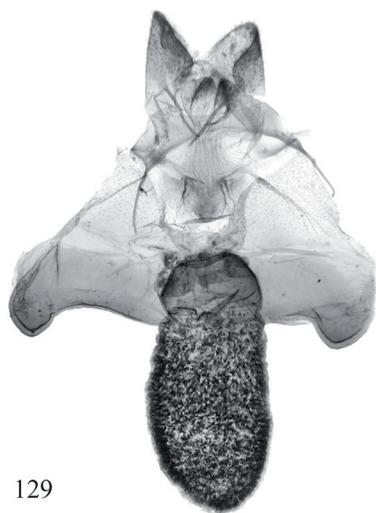
127

*Mithuna suthepia* sp. n., PT  
N Thailand, Chiang Mai Prov.,  
slide AV7832



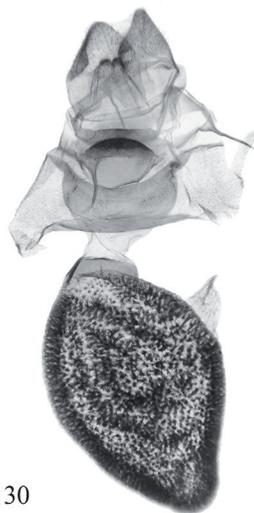
128

*"Mithuna" flavia*, HT  
W Malaysia, Pahang,  
slide Mal218 (Bucsek)



129

*Eilemithuna transducta*  
N Vietnam, Lao Cai Prov., slide ZSM Arct. 2021-496



130

*Eilemithuna dimidilinea*  
N Thailand, Chiang Mai Prov., slide AV7836

**Figs 126–130.** Female genitalia of *Mithuna* and *Eilemithuna* gen. n. spp. Depositories of the dissected specimens: 126 in SNM (after Bucsek 2020); 127 and 130 in CKC; 128 and 129 in MWM/ZSM (128 after Bucsek 2012).

Genus *Eilemithuna* gen. n.

**LSID:** urn:lsid:zoobank.org:act:124B581D-F23F-4ABB-9410-09796E2C2C75.

**Type species:** *Ilema transducta* de Joannis, 1930, by present designation.

**Etymology:** The generic name is a combination of the genus-group names *Eilema* Hübner, [1819] and *Mithuna*. The gender is feminine.

**Diagnosis:** Species of the genus are externally very similar to *Mithuna*, but have more contrasting forewing pattern. The male genitalia of *Eilemithuna* differ from *Mithuna* in the eilemoid structure of the genital capsule: the juxta of *Eilemithuna* consists of two weakly sclerotised stripe-shaped plates connected by the medial membrane and the dorsal end of the juxta is connected with the sacculus by the membrane of the annelifer. This complex structure does not let the valvae open widely and makes the proximal sections of the sacculi folded when the valvae are open. Unlike in *Eilemithuna*, the juxta of *Mithuna* is broad, plate-like and is not connected to the middle of the sacculi by the annelifer, which makes the valvae opening wide. Another character differing *Eilemithuna* from *Mithuna* is the structure of the valvula, which is membranous and only slightly sclerotised dorsally in the new genus, whereas in *Mithuna*, the valvula is well-sclerotised and often has a sclerotised apical process. Additionally, the vinculum of *Eilemithuna* is shorter than in *Mithuna* and lacks the corema. In the female genitalia, *Eilemithuna* is distinct from *Mithuna* in the lack of the glandula, the posteriorly antrum-like dilated and gelatinous ductus bursae and the heavily sclerotised posterior end of the corpus bursae at the junction with the membranous anterior section of the ductus bursae. Additionally, the appendix bursae of *Eilemithuna* is situated medially whereas it is situated posteriorly in *Mithuna*. The robust spine scobination of the corpus bursae of the new genus is also characteristic but not unique: *Mithuna varia* has similarly scobinate corpus bursae but differs from *Eilemithuna* in the presence of the glandula, the evenly sclerotised ductus bursae and the broad and weakly sclerotised appendix bursae situated postero-laterally.

**Description:** *Adults* (Figs 60–65). Sexual dimorphism limited. Antenna serrulate setose ciliate in males and ciliate in females. Body greyish brown. Forewing ground colour pale greyish brown. Costal margin of forewing convex postmedially; anal margin convex antemedially; outer margin slightly convex; apex triangular or rounded; tornus oblique. Forewing markings contrast fuscous with diffuse margins; pattern consisting of medial transverse line and subterminal line. Latter consisting of irregular patches. Cilia as ground colour. Hindwing pale ochreous, slightly suffused with greyish brown.

*Male genitalia* (Figs 103, 104). Uncus cylindrical, downcurved, with tiny claw-shaped tip. Scaphium and subscaphium setose. Arms of tegumen dorsally dilated and fused in dorsal one-third, moderately sclerotised. Vinculum shorter than tegumen, with narrow but well-sclerotised arms, its ventral section U-shaped or trapezoidal. Valva lobular. Costa short, occupying from one-third to half of dorsal

margin of valva; short processus momenti present. Transtilla membranous. Valvula membranous and weakly setose. Lamella centralis present, arcuate, ventrally connected to sacculus. Proximal section of sacculus forms fold, dorsal margin of which connected to apico-lateral corners of juxta by membrane of annelifer. Distal saccular process robust, directed distally and somewhat upcurved apically. Juxta consisting of two weakly sclerotised stripe-shaped plates connected by medial membrane. Phallus cylindrical with relatively large coecum, curved proximally or distally. Vesica saccate, covered with graniculi, with short semiglobular or conical diverticula. Elasma absent.

*Female genitalia* (Figs 129, 130). Ovipositor short, broad conical. Papilla analis trapezoidal with rounded corners, setose. Pseudopapilla present, short, triangular and setose. Glandula reduced. Apophyses thin and elongate. 8<sup>th</sup> sternite with irregular postvaginal plate. Ductus bursae short, with dilated gelatinous posterior and tubular membranous anterior sections. Corpus bursae saccate, its posterior end sclerotised while medial and anterior sections densely covered with robust spinules. Appendix bursae short, conical, membranous, situated medially.

**Distribution:** Species of the new genus are known from mountains of northern Indochina.

**Species included:** The new genus currently comprises two valid species reviewed below.

*Eilemithuna transducta* (de Joannis, 1930), **comb. n.**

Figs 60–62, 103, 129

*Ilema transducta* de Joannis, 1930: 753. (Type locality: “Cha pa” [North Vietnam].)

**Diagnosis:** The forewing length is 9.0–10.5 mm in males and 11.0 mm in females. *Eilemithuna transducta* can be externally distinguished from *E. dimidilinea* by the somewhat more subapically downcurved costal margin of the forewing and the olive brown forewing ground colour, which is greyish brown in the congener. The male genital capsule of *E. transducta* differs clearly from *E. dimidilinea* in the shorter and narrower uncus, the weaker setose subscaphium, the longer tegumen, the U-shaped vinculum (it is rectangular with rounded corners in *E. dimidilinea*), the markedly longer valva with a large lobular valvula (it is reduced to a triangular lobe in *E. dimidilinea*), the dorsal margin of the saccular fold bearing a cluster of dentation medially and the longer and distally narrower distal saccular process bearing a spine-shaped tip whereas in *E. dimidilinea*, the distal saccular process is apically rounded. The phallus of *E. transducta* is smooth, proximally straight and distally S-like curved and dilated whereas in *E. dimidilinea*, it is proximally downcurved, medially and distally straight and bears a medial cluster of spines dorsally. The vesica of *E. transducta* is considerably broader than in *E. dimidilinea* and has broad semiglobular diverticula whereas in *E. dimidilinea* the diverticula are narrow-conical. The male genitalia of *E. transducta* differ from *E. dimidilinea*

in the flat and rugose postvaginal plate (it is medially swollen in *E. dimidilinea*), the markedly narrower and shorter gelatinous antrum-like posterior section of the ductus bursae, the considerably broader and ventrally swollen posterior sclerotised end of the corpus bursae, the narrower corpus bursae bearing finer scobination and the smaller appendix bursae. In addition, the 7<sup>th</sup> abdominal sternite of *E. transducta* is anteriorly sclerotised and has lateral gelatinous pockets, which are absent in *E. dimidilinea*.

**Holotype** (by monotypy): Examined from the photograph deposited in MNHN (<https://www.mnhn.fr/en/databases>).

**Material examined:** **China:** 1♂, [Yunnan Prov., Nujiang Lisu Autonomous Prefecture, Lushui City, Pianma Town] Upper Burma, Hpimaw Fort, nr Myitkyina, 8000 ft., 13.viii.1923, Capt. A.E. Swann [leg.], "Brit. Mus. 1923-488", NHMUK010292602 (NHMUK). **Myanmar:** 1♂, Upper Burma, Htawgaw, 6000 ft., Capt. A.E. Swann [leg.], NHMUK010292601 (NHMUK). **Vietnam:** 1♂, Mt Fan-si-pan, near Cha-pa, 22°20'N 103°40'E, 16[00]–1800 m, secondary forest, v.1995, local collectors, ex coll. Schintlmeister, gen. slide No. ZSM Arct. 2019-1106♂ (AV) (MWM/ZSM); 1♂ 1♀, Mt Fan-si-pan (North), Cha-pa, primary forest, 22°17'N 103°44'E, 1600 m, 20–30.iv.1995, V. Sinyaev & local collector, gen. slide No. ZSM Arct. 2021-496♀ (AV) (MWM/ZSM).

**Distribution:** The species is known from Northern Vietnam (Lao Cai Province) (de Joannis 1930), Northern Myanmar (eastern Kachin State) and Southwest China (north-western Yunnan Province) (present study).

*Eilemithuna dimidilinea* (Černý, 2009), **comb. n.**

Figs 63–65, 104, 130

*Mithuna dimidilinea* Černý in Černý & Pinratana, 2009: 151, pl. 31: fig. 306. (Type locality: "N Thailand, Chiang Mai, Fang, Doi Pha Hom Pok, 2050 m, 20°07'30"N 99°08'49"E".)

**Diagnosis:** The forewing length is 9.5–10 mm in males and 11.0 mm in females. The detailed comparison with *E. transducta* is provided above in the diagnosis of the latter species.

**Holotype** (examined): **Thailand:** ♂, "N. Thailand | Chiang Mai-prov., Fang distr. | Doi Pha Hom Pok, 2050m | 20°07'30"N 99°08'49" E | 5–6.v.2006 leg. K. Černý [*recte*: Černý]" / red label "Holotype | *Mithuna dimidilinea* | Karel Černý 2009" / QR-code label "NHMUK 010889679" (NHMUK) (Fig. 63).

**Paratypes:** 19♂ 10♀, same data as in holotype, gen. slide No. AV7835♂ (CKC); 1♂ 2♀, same locality and collector as previous but 21.iv.2006 (CKC).

**Additional material examined:** **Thailand:** 1♀, same data as in holotype but 23–24.v.2011, gen. slide No. AV7836♀ (CKC).

**Distribution:** The species is currently known only from its type locality in Northern Thailand (Chiang Mai Province) (Černý & Pinratana 2009).

Genus *Mithunoconosia* gen. n.

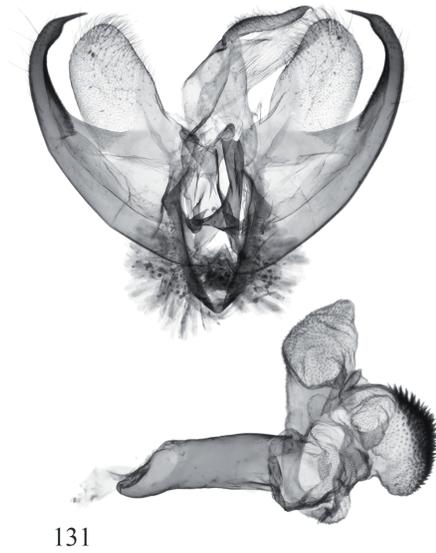
**LSID:** [urn:lsid:zoobank.org:act:EA185ADE-270C-444C-AD48-D428064F0F19](https://zoobank.org/act:EA185ADE-270C-444C-AD48-D428064F0F19).

**Type species:** *Mithuna clivusa* Bucsek, 2012, by present designation.

**Etymology:** The generic name is a combination of the genus-group names *Mithuna* and *Euconosia*. The gender is feminine.

**Diagnosis:** Unlike in *Eilemithuna* gen. n., the male of *Mithunoconosia* has setose ciliate antenna (similar to *Mithuna* whereas it is serrulate setose ciliate in *Eilemithuna*), a narrower and distally trapezoidal forewing with a cluster of androconia in the folded cell (it has more rounded corners and a flat cell lacking androconia in the similar genera) and an irregular forewing pattern consisting of areas of brown and blackish suffusion and blackish spots in the cell, at the costa and the terminal line interrupted into irregular dashes. In the male hindwing, the cell and the area along the costa are pale ochreous yellow, whereas in *Mithuna* and *Eilemithuna* the hindwing is more unicolorous. Species of the new genus are most externally reminiscent of *Euconosia* but can be distinguished by the smaller size, the shorter antenna and the distally narrower forewing; the male and female genitalia of the two genera are fundamentally different in many aspects (for *Euconosia*, see Holloway (2001)). The male genital capsule of *Mithunoconosia* differs from both *Mithuna* and *Eilemithuna* in the following features: (1) The vinculum has a corema densely covered with long flattened scales whereas the corema of *Mithuna* is sparsely covered with weak hairs and, in *Eilemithuna* gen. n. the corema is absent; (2) The juxta bears a robust process directed dorsad, whereas in *Mithuna* the juxta is flat and has apico-lateral plates and in *Eilemithuna* gen. n. the juxta consists of two narrow stripes and is apically fused with the proximal section of the sacculus by the annelifer; (3) Ventrally, the juxta is extended into a heavily sclerotised caulis, which terminates with two weakly sclerotised and rugose ligulose processes supporting the phallus ventrally (a feature unique for the genus); (4) The lamella centralis is broad, heavily sclerotised and ventrally strongly articulated with the base of the distal saccular process; and (5) The valvula is large, lobular and weakly sclerotised (similar to *Eilemithuna*) whereas in *Mithuna* the valvula has a heavy secondary sclerotisation. In the vesica, *Mithunoconosia* has areas of robust spinulose scobination, which are absent in *Mithuna* and *Eilemithuna*. The female genitalia of *Mithunoconosia* are characterised by the combination of the following features: (1) The ductus bursae is broad, well-sclerotised and has a flattened dorsal wall while its ventral wall is swollen, pyramidally protruding ventrad and has a deep V-shaped notch in the ventral margin of the ostium bursae; (2) The posterior section of the corpus bursae is weakly sclerotised rugose and scobinate; (3) The anterior section of the corpus bursae bears a longitudinal ribbon-shaped signum, which is absent in *Mithuna* and *Eilemithuna*; and (4) The appendix bursae is reduced and the ductus seminalis originates from the anterior part of the rugose posterior section of the corpus bursae dorsally. Additionally, the 7<sup>th</sup> abdominal sternite of *Mithunoconosia* bears large lateral gelatinous pockets (absent or small in *Mithuna* and *Eilemithuna*) and has a U-shaped ventral fold anteriorly of the ostium bursae; the pockets likely receive the distal saccular processes during copulation while the latter fold possibly serves as a structure receiving the process of the juxta.

**Description:** *Adults* (Figs 67, 68). Sexual dimorphism limited: female with broader forewing than in male. Antenna setose ciliate in both sexes. Body ochreous brown;



131

*Mithunoconosia clivusa*, HT  
W Malaysia, Pahang, slide MWM 37.197



132

*Mithunoconosia clivusa*, PT  
W Malaysia, Pahang, slide MWM 37.198

**Figs 131, 132.** *Mithunoconosia clivusa* (type species of *Mithunoconosia* gen. n.), male (131) and female (132) genitalia. The dissected specimens are deposited in MWM/ZSM.

male abdomen fuscous medially and pale ochreous distally. Forewing elongate, narrow and distally trapezoidal. Forewing ground colour ochreous or ochreous brown. In male, cell with longitudinal fold invaginated ventrad and bearing elongate cluster of androconial scales. Forewing pattern brown or fuscous, consisting of intense suffusion along veins and in postmedial area and irregular spots in the cell and at costal margin. Terminal line thin and interrupted. Hindwing grey brown with ochreous terminal line; in male area along costal margin and in cell ochreous, with elongate narrow subbasal cluster of hair-shaped scales stretching along vein Cu.

*Male genitalia* (Fig. 131). Uncus slender, apically pointed. Tuba analis membranous. Tegumen short with moderately broad and weakly sclerotised arms. Vinculum equal to or somewhat longer than tegumen, more heavily sclerotised and U-shaped, with medial saccate corema bearing elongate and flattened scales. Valva broad, lobular. Basis valvae narrow but heavily sclerotised, with short jugum distalis dorsally. Costa broad and moderately sclerotised, occupying proximal half or two-thirds of the dorsal margin of valva. Valvula broad, membranous and weakly setose. Both, diaphragmal and valval sections of transtilla membranous. Lamella centralis broad, well-sclerotised, smooth, ventrally fused with base of distal saccular process. Sacculus heavily sclerotised, with large upcurved distal process having elongate setose area along its dorsal side and bearing robust spike-shaped tip. Juxta trapezoidal with membranous medial ventral section, bearing

medial heavily sclerotised process directed dorsad. Caulis heavily sclerotised, occupying whole ventral wall of anellus, apically bearing two weakly sclerotised and rugose tongue-shaped processes supporting the phallus ventrally. Phallus cylindrical, almost straight, with short conical and apically rounded coecum. Vesica with several conical or saccate diverticula bearing clusters of graniculi, spinulose scobination and short spine-like cornuti.

*Female genitalia* (Fig. 132). Ovipositor narrow-conical. Papilla analis trapezoidal with rounded corners, weakly setose. Apophyses elongate and thin, anterior one shorter than posterior one. Ductus bursae broad, well-sclerotised, with flattened dorsal and swollen and ventrally protruding ventral walls; ventral margin of ostium bursae with deep V-shaped notch. Corpus bursae subdivided into two sections by medial constriction. Posterior section weakly sclerotised, rugose and scobinate. Anterior section of corpus bursae membranous, ovoid and bearing longitudinal ribbon-shaped signum. Appendix bursae reduced; ductus seminalis originating from anterior part of posterior section of corpus bursae dorsally. 7<sup>th</sup> abdominal sternite with large lateral gelatinous pockets and U-shaped ventral fold anteriorly of ostium bursae.

**Distribution:** The genus is distributed from Northeast India to Indochina reaching Malay Peninsula in the south.

**Species included:** At the moment, the new genus comprises three valid species: *M. clivusa* (Bucsek, 2012), comb. n., *M. pulverea* (Bucsek, 2012), comb. n. and *M. strigifera* (Hampson, 1900), comb. n.

### CONCLUSIONS

As a result of the present review, the genus *Mithuna* has been found to be surprisingly diverse. The number of known species in the genus has increased significantly—from 10 known species, of which four are transferred to other genera in the present paper—to 28, including 17 newly described species. Of the new species, 12 are described from the mountains of northern Indochina, which is a well-known biodiversity hotspot. In terms of the number of species and major lineages of *Mithuna*, this area is most diverse suggesting that it may be the centre of origin of the genus. The results of the present study highlight the limitations of our knowledge of the true biodiversity of the tropical lichen moths, and it is likely that further new species of the genus *Mithuna* await discovery.

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## REFERENCES

- BAE, Y.S., BAYARSAIKHAN, U. & KIMSUN, C. 2016. *Biodiversity of Cambodia. Tiger Moths (Insecta, Lepidoptera)*. National Institute of Biological Resources, Incheon. 303 pp.
- BUCSEK, K. 2012. *Erebidae, Arctiinae (Lithosiini, Arctiini) of Malaya Peninsula-Malaysia*. Institute of Zoology SAS, Bratislava. 170 pp.
- BUCSEK, K. 2014. *Erebidae, Arctiinae (Lithosiini, Arctiini) of Malay Peninsula—Malaysia. Supplementum*. Institute of Zoology SAS, Bratislava. 10 pp., figs 15+15a, pl. 2.
- BUCSEK, K. 2016. Several other species of Lithosiini (Erebidae, Arctiinae) found on mainland Malaysia. *Entomofauna* **37** (37): 573–580.  
[https://www.zobodat.at/pdf/ENT\\_0037\\_0573-0580.pdf](https://www.zobodat.at/pdf/ENT_0037_0573-0580.pdf)
- BUCSEK, K. 2020. Contribution to the knowledge of Lithosiini (Erebidae, Arctiinae) of central and northern Laos, part 4. *Entomofauna carpathica* **32** (2): 47–87.  
<https://entomospol.sk/entomofauna/rocnik-32-cislo-2>
- ČERNÝ, K. & PINRATANA, A. 2009. *Moths of Thailand. Vol. 6. Arctiidae*. Brothers of Saint Gabriel in Thailand, Bangkok. 283 pp.
- DE JOANNIS, J. 1930. Lépidoptères hétérocères du Tonkin. 3<sup>e</sup> partie. *Annales de la Société entomologique de France* **99** (Suppl.): 559–835.
- DUBATOLOV, V.V. & BUCSEK, K. 2016. New lichen-moth taxa (Lepidoptera, Arctiidae, Lithosiinae) from Vietnam. *Euroasian Entomological Journal* **15** (3): 228–238.
- HAMPSON, G.F. 1896. *The Fauna of British India, including Ceylon and Burma. Moths*. Vol. 4. Taylor and Francis, London. 594 pp. <https://www.biodiversitylibrary.org/item/180032>
- HAMPSON, G.F. 1900. Catalogue of the Arctiidae (Nolinae, Lithosiinae) in the British Museum. In: *Catalogue of the Lepidoptera Phalaenae in the British Museum*. Vol. 2. Trustees of the British Museum, London. 590 pp. <https://www.biodiversitylibrary.org/item/103292>
- HOLLOWAY, J.D. 2001. The moths of Borneo. Part 7. Family Arctiidae, subfamily Lithosiinae. *Malayan Nature Journal* **55**: 279–486.
- HÜBNER, J. 1816–[1826]. *Verzeichnis bekannter Schmettlinge*. Augsburg. 431 pp.  
<https://doi.org/10.5962/bhl.title.48607>
- ICZN [INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE]. 1999. *International Code of Zoological Nomenclature*. 4<sup>th</sup> ed. International Trust for Zoological Nomenclature, The Natural History Museum, London. 306 pp.  
<https://www.iczn.org/the-code/the-code-online>
- KIRTI, J.S. & SINGH, N. 2016. *Arctiid Moths of India*. Vol. 2. Nature Books India, New Delhi. 214 pp.
- KISHIDA, Y. 1995. Arctiidae. In: Haruta, T. (Ed.), *Moths of Nepal*. Part 4. *Tinea* **14** (Suppl. 2): 39–43.
- KONONENKO, V.S. 2010. *Micronoctuidae, Noctuidae: Rivulinae – Agaristinae (Lepidoptera). Noctuidae Sibiricae*. Vol. 2. Entomological Press, Sorø. 475 pp.
- KRÜGER, M. 2015. *Generic classification of Afrotropical footman moths sensu stricto (Lepidoptera: Erebidae: Arctiinae: Lithosiini (partim.))*. Transvaal Museum Monograph. Vol. 15. Ditsong National Museum of Natural History, Pretoria. 176 pp.
- LAFONTAINE, J.D. & MIKKOLA, K. 1987. Las-och-nyckel systemen i de inre genitalierna av Noctuidae (Lepidoptera) som taksonomiska kaennetecken. *Entomologiske Meddelelser* **55**: 161–167.
- MOORE, F. 1878. A revision of certain genera of European and Asiatic Lithosiinae, with characters of new genera and species. *Proceedings of the General Meetings for Scientific Business of the Zoological Society of London* **1878**: 3–37, pls. 1–3.  
<https://doi.org/10.1111/j.1469-7998.1878.tb07927.x>
- SOMMERER, M. 2002. To agree or not to agree – the question of gender agreement in the International Code of Zoological Nomenclature. *Nota Lepidopterologica* **25**: 191–204.  
<http://biodiversitylibrary.org/page/41371966>
- VAN NIEUKERKEN, E.J., KARSHOLT, O., HAUSMANN, A., HOLLOWAY, J.D., HUEMER, P., KITCHING, I.J., NUSS, M., POHL, G.R., RAJAEI, H., RENNAND, E., RODELAND, J., ROUGERIE, R., SCOBLE, M.J., SINEV, S.YU. & SOMMERER, M. 2019. Stability in Lepidoptera names is not served by reversal to gender agreement: a response to Wiemers *et al.* (2018). *Nota Lepidopterologica* **42** (1): 101–111.  
<https://doi.org/10.3897/nl.42.34187>

- VOLYNKIN, A.V. 2024. On the terminology of the genitalia structures of lichen moths (Lepidoptera: Erebiidae: Arctiinae: Lithosiini) with some references to Noctuidae. *Ecologica Montenegrina* **73**: 176–207.  
<https://doi.org/10.37828/em.2024.73.18>
- VOLYNKIN, A.V., ČERNÝ, K. & HUANG, S.-Y. 2025. On the generic assignment of the taxa placed in the Oriental footman-moth genus *Teulisna* with the description of three new genera, one subgenus and eighteen new species. *Ecologica Montenegrina* **88**: 104–163.  
<https://doi.org/10.37828/em.2025.88.10>
- WALKER, F. 1862. Catalogue of the Heterocerous lepidopterous insects collected at Sarawak, in Borneo, by Mr. A. R. Wallace, with descriptions of new species. *Journal of the Proceedings of the Linnean Society. Zoology* **6**: 82–145.  
<https://www.biodiversitylibrary.org/item/39615#page/94>
- WELTER-SCHULTES, F.W. 2012. *Guidelines for the capture and management of digital zoological names information*. 2013–03 ed. Global Biodiversity Information Facility, Copenhagen. 121 pp. <http://www.gbif.org/document/80625>
- WILEMAN, A.E. 1911. New Lepidoptera-Heterocera from Formosa. *The Entomologist* **44** (574): 109–111.

