A review of the tiger moth genus *Amerila* Walker, 1855 from Flores Island, Indonesia, with a description of a new species (Lepidoptera: Erebidae: Arctiinae)

VITALY M. SPITSYN* & IVAN N. BOLOTOV

*N. Laverov Federal Center for Integrated Arctic Research of the Ural Branch of the Russian Academy of Sciences, Northern Dvina Emb. 23, 163000, Arkhangelsk, Russia

*Corresponding author: spitsyn.v.m.91993@yandex.ru

Received 26 May 2020 │ Accepted by V. Pešić: 3 July 2020 │ Published online 8 July 2020.

**Abstract**

The Flores Island is a part of the East Nusa Tenggara Group belonging to the Lesser Sunda Archipelago. The Lepidoptera fauna of this remote island comprises two species of the genus *Amerila* Walker, 1855, i.e. *Amerila astreus* (Drury, 1773) and *Amerila rosenfeldae* sp. nov. The first species is widespread from India and Southeast Asia to New Guinea, while the latter taxon appears to represent a lineage endemic to Flores.

**Key words:** New species, biogeography, taxonomy, Wallacea, Lesser Sunda Archipelago, East Nusa Tenggara.

**Introduction**

The East Nusa Tenggara Islands, a part of the Lesser Sundas, comprise several large landmasses, i.e. Flores, Sumba, Timor, and Wetar, and multiple smaller islands (Bolotov *et al.* 2017). This insular group harbors a largely endemic Lepidoptera fauna (e.g. Yakovlev 2015; Bolotov *et al.* 2017; Spitsyn & Bolotov 2018; Spitsyn *et al.* 2019; Spitsyn & Potapov 2020), revealing up to 90% of local endemic species in several families (Zolotuhin & Witt 2005; Zolotuhin 2009; Spitsyn & Bolotov 2020). In general, the fauna of tiger and lichen moths (Lepidoptera: Erebidae: Arctiinae) of the Lesser Sundas is still insufficiently known, while the insular endemism in this remote archipelago reaches relatively high levels, e.g. at least 32% of Arctiini taxa found on Flores can be considered endemic to this island (Bolotov *et al.* 2018). Furthermore, several endemic genera such as *Orhantarctia* Dubatolov & Kishida, 2005 and *Albarrania* Bolotov, Spitsyn & Kondakov, 2019 are known to occur in hard-to-reach mountain areas of the Lesser Sundas (Dubatolov & Kishida 2005; Bolotov *et al.* 2019).

Conversely, only one species in the genus *Amerila* Walker, 1855 was recorded from the Flores Island, i.e. the widespread *Amerila astreus* (Drury, 1773) (Bolotov *et al.* 2018). This genus is rich in endemic species described from New Guinea and adjacent islands (e.g. Häuser 1993), and discoveries of additional taxa from the Lesser Sunda Archipelago were expected. It should be noted that the taxonomic knowledge of *Amerila* representatives from the Oriental Region and Australasia is far from being complete (Holloway...
This work aims to describe one more *Amerila* species from remote mountain range in the middle part of the Flores Island and to report on further occurrences of *Amerila astreus* from this area.

### Materials and methods

The type series of the new species and samples of *Amerila astreus* were studied in the Lepidoptera collection of the Russian Museum of Biodiversity Hotspots [RMBH], N. Laverov Federal Center for Integrated Arctic Research of the Ural Branch of the Russian Academy of Sciences, Arkhangelsk, Russia. The specimens and genitalia processing and photographing followed those described in our earlier works (Spitsyn et al. 2019; Spitsyn & Bolotov 2020; Spitsyn & Potapov 2020).

### Table 1. Occurrences of *Amerila* species (Lepidoptera: Erebidae: Arctiinae: Amerilini) from Flores Island (with its offshore island), East Nusa Tenggara, Indonesia.

| Species            | Locality                  | Habitat                                    | Latitude     | Longitude    | Collecting date | Reference       |
|--------------------|----------------------------|--------------------------------------------|--------------|--------------|-----------------|-----------------|
| *A. astreus*       | Flores: Sano Ngoang Lake  | Primary mountain rainforest                | 8°43'1"S     | 120°0'10"E  | 23.i.2015       | Bolotov et al.  (2018) |
| (Drury, 1773)      |                            |                                             |              |              |                 |                 |
| *A. astreus*       | Kanawa Island              | Scarce forest of *Ziziphus jojoba*         | 8°29'31"S    | 119°45'27"E | 26.iv.2011      | Bolotov et al.  (2018) |
| (Drury, 1773)      | Flores: Borong             | Dry monsoon forest and banana plantations  | 8°49'05"S    | 120°37'33"E | 24-27.i.2020    | This study       |
| *A. astreus*       | Flores: Bajawa, Wolokoro   | Heavily disturbed monsoon forests and eucalyptus plantings | 8°49'02"S    | 120°56'03"E | 28-31.i.2020    | This study       |
| (Drury, 1773)      | Ecolodge                   |                                             |              |              |                 |                 |
| *A. astreus*       | Flores: Baja, Manululu     | Eucalyptus plantation with fragmented areas of natural vegetation | 8°51'45"S    | 120°59'40"E | 01-02.ii.2020   | This study       |
| (Drury, 1773)      | Ecolodge                   | Mountain monsoon forest                     | 8°35'21"S    | 119°59'12"E | 05-07.ii.2020   | This study       |
| *A. astreus*       | Flores: Labuan Bajo, Mbeliling | Disturbed monsoon forest                    | 8°30'42"S    | 119°54'09"E | 13.ii.2020      | This study       |
| (Drury, 1773)      | Mountain Ecolodge          | Eucalyptus plantation with fragmented areas of natural vegetation | 8°51'45"S    | 120°59'40"E | 01-02.ii.2020   | This study       |
| *Amerila rosenfeldae* | Flores: Labuan Bajo, Mbeliling | Heavily disturbed monsoon forests and eucalyptus plantings | 8°49'02"S    | 120°56'03"E | 31.i.2020       | This study       |
| sp. nov.           | Flores: Bajawa, Manululu   |                                            |              |              |                 |                 |
|                    | Ecolodge                   |                                            |              |              |                 |                 |
Taxonomy

Family Erebidae Leach, [1815]
Subfamily Arctiinae Leach, [1815]
Tribe Amerilini Dubatolov, 2010

Genus *Amerila* Walker, 1855

Type species: *Sphinx astreus* Drury, 1773

*Amerila astreus* (Drury, 1773)

Type locality: Malaysia.

Figs 1E-F, 2D-E, Table 1

**Material examined.** INDONESIA: East Nusa Tenggara, Flores Island, Sano Ngoang Lake, geothermal site, primary mountain rainforest, 8º43'1"S, 120º0'10"E, altitude 670 m a.s.l., 23.i.2015, 1♀, Bolotov leg.; Kanawa Island, scarce forest of *Ziziphus jojoba*, 8º29'31"S, 119º45'27"E, altitude 3 m a.s.l., 26.iv.2011, 1♂, Bolotov leg.; Flores Island, Borong, dry monsoon forest and banana plantations, 8º49'05"S, 120º37'33"E, altitude 100 m a.s.l., 24-27.i.2020, 6 specimens, V. Spitsyn & E. Spitsyna leg.; Flores Island, Bajawa, Wolokoro Ecolodge, heavily disturbed monsoon forests and eucalyptus plantings, 8º49'02"S, 120º56'03"E, altitude 1010 m a.s.l., 28-31.i.2020, 2 specimens, V. Spitsyn & E. Spitsyna leg.; Flores Island, Bajawa, Manulalu Ecolodge, eucalyptus plantation with fragmented areas of natural vegetation, 8º51'45"S, 120º59'40"E, altitude 1100 m a.s.l., 01-02.ii.2020, 2 specimens, V. Spitsyn & E. Spitsyna leg.; Flores Island, Labuan Bajo, Mbeliling Mountain Ecolodge, mountain monsoon forest, 8º35'21"S, 119º59'12"E, altitude 510 m a.s.l., 05-07.ii.2020, 2 specimens, V. Spitsyn & E. Spitsyna leg.; Flores Island, Labuan Bajo, disturbed monsoon forest, 8º30'42"S, 119º54'09"E, altitude 100 m a.s.l., 13.ii.2020, 3 specimens, V. Spitsyn & E. Spitsyna leg.; Flores Island, Labuan Bajo, disturbed monsoon forest, 8º30'42"S, 119º54'09"E, altitude 100 m a.s.l., 13.ii.2020, 3 specimens, V. Spitsyn & E. Spitsyna leg.

**Diagnosis.** This widespread species can be distinguished from other taxa from tropical Asia and Australasia by having a pink dorsal side of the abdomen in both the male and the female. Externally, it resembles *A. eugenia* (Fabricius, 1794) (type locality India) but can be distinguished from it by having a grey ground color of the wings, a lesser curved ampulla, and larger coremata. This species can be separated from *A. rhodopa* Walker, 1864 (type locality India) and *A. vitrea* Plötz, 1880 (type locality West Africa) by having a clear dark, elongated spot between the cell apex and the costa on the forewing, and from *A. fumida* (Swinhoe, 1901) (type locality Indonesia: Halmahera Is.; Timor) by having semitransparent wings.

**Distribution.** India, Sri-Lanka, Nepal, mainland China, Taiwan, the Philippines, Indochina, Indonesia, and New Guinea (Dubatolov 2010). On the Flores Island, this species was recorded from the sea level to 1100 m a.s.l. (Bolotov et al. 2018; this study).

*Amerila rosenfeldae* sp. nov.

Figs 1A-D, 2A-C, 3, Table 1

https://zoobank.org/urn:lsid:zoobank.org:act:06B657CF-1478-41B5-8E28-D70870E86DD2

**Holotype.** Male RMBH Sph0835, INDONESIA: East Nusa Tenggara Islands, Flores Island, Bajawa, Manululu Ecolodge, eucalyptus plantation with fragmented areas of natural vegetation, 8º51'45"S, 120º59'40"E, altitude 1100 m a.s.l., 01-02.ii.2020, V. Spitsyn & E. Spitsyna leg.

**Paratypes.** INDONESIA: the type locality, same date and collectors, 3♂, 1♀; East Nusa Tenggara Islands, Flores Island, Bajawa, Wolokoro Ecolodge, heavily disturbed monsoon forests and eucalyptus plantings, 8º49'02"S, 120º56'03"E, altitude 1010 m a.s.l., 28-31.i.2020, 2♂, V. Spitsyn & E. Spitsyna leg. [RMBH Sph0836-Sph0841].

**Diagnosis.** The novel species is similar to *A. astreus* but can be distinguished from it by having a larger size, broader wings, a pink edging on the patagium and tegula, and much smaller male coremata. Further, the new species can be separated from *A. erythropus* (Rothschild, 1917) [endemic to the Umboi Island between New Guinea and New Britain] by having a strait termen and acute apex of the hindwing. The male genitalia structure of the new species is similar to that of *A. abdominalis* (Rothschild, 1933) (type locality Malaysia) and *A. omissa* (Rothschild, 1910) (type locality India). However, the new species can be
distinguished from these two taxa by having a sclerotized plate in the vesica near large cornuti and by a monochromatic dorsal side of the abdomen.

**Figure 1.** *Amerila* spp. from Flores Island, Indonesia. **A-D** *A. rosenfeldae* sp. nov.: **A)** male upperside (holotype); **B)** female upperside (paratype); **C)** male underside (holotype); **D)** female underside (paratype). **E-F** *A. astreus*: **E)** male upperside; **F)** female upperside. Scale bar = 10 mm. (Photos: Vitaly M. Spitsyn).

**Description. Male.** Wingspan 53-58 mm, forewing length 28-31 mm (*N* = 6). Eye olive. Antenna brown, with a pink color proximally. Frons white with a black central spot. Vertex white with a black central spot. Labial palpus short (approximately equal to 1.5 eye’s diameter), pink, with black stripes. Thorax whitish gray with six black spots on the dorsal side, two black dots from each side near the base of the forewings, and one black spot laterally. Patagium and tegula white with pink edging and black central spots. Patagium with one more spot anteriorly. Legs pink; inner side of the femur white; outer side of the foreleg and middle leg’s tibia pink with a brown stripe. The foreleg coxa large, pink, with a white base and black central dot. Forewing almost transparent, greyish basally and near the anal edge. Forewing apex and distal part of the costal margin (from the middle of the cell) light brown. The cell apex with a large light brown or black spot. Forewing base with two black dots, and a large, pink rectangular spot formed by elongated scales. Hindwings semitransparent, darkened at the apex and along the termen, with sparse pink scales at the base and along the termen. Underside of both wings follows pattern of the upper side, but without two dots and a pink spot at the base of the forewing. The base of the costal vein pink. Abdomen pink ventrally, and white with two rows of black dots dorsally.
Figure 2. Male genitalia of *Amerila* spp. from Flores Island, Indonesia. **A-C.** *A. rosenfeldae* sp. nov.: **A)** male genitalia (holotype); **B)** aedeagus (holotype); **C)** female genitalia (paratype). **D-E.** *A. astreus:* **D)** male genitalia; **E)** aedeagus. (Photos: Vitaly M. Spitsyn).

Figure 3. Type locality of *A. rosenfeldae* sp. nov.: eucalyptus plantation with fragmented areas of natural vegetation, 8°51′45″S, 120°59′40″E, altitude 1100 m a.s.l., near Bajawa, Flores Island, Indonesia. (Photo: Vitaly M. Spitsyn).
Male genitalia. Tegumen large and broad. Uncus small, with acute apex. Saccus small, wide. Valva rounded, densely covered with long hairs. Coremata rather small, rounded. Ampulla is directed to the base of the valva (its direction to the outer margin of the valva on the slide is an artefact of preparation; see Fig. 2A). Juxta broad. Aedeagus short and very broad. Vesica long, equipped with double strong cornuti and a sclerotized plate below the cornuti.

Female. Wingspan 62 mm, forewing length 31 mm (N = 1). Externally, similar to the male but differs from it by having narrower and elongated wings. The rectangular pink spot near the base of the forewing, and the pink edging on the patagium and tegula are absent.

**Distribution.** This species is known to occur in two mid-altitude localities (altitude 1010–1100 m a.s.l.) south of the town of Bajawa at the foothill of the Inerie Mount on Flores.

**Etymology.** The novel species is dedicated to Dr. Sonia B. Rozenfeld (Moscow, Russia), a Russian ornithologist.

**Acknowledgements**
This study was partly supported by the Russian Ministry of Science and Higher Education (project No. AAAA-A17-117033010132-2) and the Russian Foundation for Basic Research, RFBR (project No. 19-34-90012).

**References**

Bolotov, I. N., Kondakov, A. V. & Spitsyn, V. M. (2018) A review of tiger moths (Lepidoptera: Erebidae: Arctiinae: Arctiini) from Flores Island, Lesser Sunda Archipelago, with description of a new species and new subspecies. *Ecologica Montenegrina*, 16, 1–15. https://doi.org/10.37828/em.2018.16.1

Bolotov, I. N., Kondakov, A. V., Spitsyn, V. M., Gofarov, M. Yu. & Kolosova, Yu. S. (2017) *Leptocneria vinarskii* sp. nov. (Lepidoptera: Erebidae: Lymantriinae), an overlooked Wallacean lineage of the Australian genus. *Scientific Reports*, 7, 1–7. https://doi.org/10.1038/s41598-017-12797-3

Bolotov, I. N., Spitsyn, V. M., Kondakov, A. V., & Tomilova, A. A. (2019) A review of *Barsine* (Lepidoptera: Erebidae: Arctiinae: Lithosiini) from the East Nusa Tenggara Islands, Indonesia, with description of a new subspecies. *Ecologica Montenegrina*, 20, 207–214. https://doi.org/10.37828/em.2019.20.17

Dubatolov, V. V. (2010) Tiger-moths of Eurasia (Lepidoptera, Arctiidae) (Nyctemerini by R. de Vos & V. V. Dubatolov). *Neue Entomologische Nachrichten*, 65, 1–106.

Dubatolov, V. V. & Kishida, Y. (2005) New genera of Arctiinae (Lepidoptera, Arctiidae) from South and East Asia. *Tinea*, 18(4), 307–314.

Häuser, C. & Boppré, M. (1997) A revision of the Afrotropical taxa of the genus *Amerila* Walker (Lepidoptera: Arctiidae). *Systematic Entomology*, 22, 1–44.

Häuser, C. L. (1993) A critical catalogue of species-group names of the genus *Amerila* Walker, 1855 (Lepidoptera: Arctiidae). *Nachrichten des Entomologischen Vereins Apollo*, 13, 365–392.

Holloway, J. D. (1988) *The Moths of Borneo 6: family Arctiidae, subfamilies: Syntominae, Euchromiinae, Arctiinae; Noctuidae misplaced in Arctiidae* (Camptoma, Aganinae). Kuala Lumpur, 101 pp.

Przybyłowicz, L., Maicher, V., László, G. M., Sáfián, S. & Tropek, R. (2019) *Amerila* (Lepidoptera: Arctiinae: Arctiini) of Cameroon with morphological remarks on male and female genitalia. *Zootaxa*, 4674(2), 283–295. https://doi.org/10.11646/zootaxa.4674.2.8

Singh, N. & Singh, J. (2012) Genitalic studies of *Amerila eugenia* (Fabricius) (Lepidoptera: Arctiidae) from Karnataka, India. *Journal of Threatened Taxa*, 4(2), 2398–2401.

Spitsyn, V. M. & Bolotov, I. N. (2018) *Barsine podbolotskayae* sp. n. from Flores Island, Lesser Sunda Archipelago, Indonesia (Lepidoptera, Erebidae, Arctiinae). *ZooKeys*, 768, 105–111. https://doi.org/10.3897/zookeys.768.24345

Spitsyn, V. M. & Bolotov, I. N. (2020) *Eupterote elisavetae* sp. nov. from Flores Island, Indonesia (Lepidoptera: Eupterotidae). *Ecologica Montenegrina*, 29, 51–55. http://dx.doi.org/10.37828/em.2020.29.8
Spitsyn, V. M. & Potapov, G. S. (2019) Redescription of *Amerila abdominalis* (Rothschild, 1933), a little-known species of tiger moth from Southeast Asia (Lepidoptera: Erebidae: Arctiinae). *Zootaxa*, 4671(3), 446–448. https://doi.org/10.11646/zootaxa.4671.3.11

Spitsyn, V. M. & Potapov, G. S. (2020) A new species of the genus *Odonestis* from the Flores Island, Indonesia (Lepidoptera: Lasiocampidae). *Ecologica Montenegrina*, 29, 47–50.

http://dx.doi.org/10.37828/em.2020.29.7

Spitsyn, V. M., Bolotov, I. N., Kondakov, A. V. & Tomilova, A. A. (2019) *Estigena wallacei* sp. nov. from West Flores, Indonesia (Lepidoptera: Lasiocampidae). *Ecologica Montenegrina*, 22, 27–33.

https://doi.org/10.37828/em.2019.22.2

Yakovlev, R. V. (2015) Patterns of geographical distribution of carpenter moths (Lepidoptera: Cossidae) in the Old World. *Contemporary Problems of Ecology*, 8(1), 36–50.

https://doi.org/10.1134/S1995425515010151

Zolotuhin, V. V. (2009) Peculiarities of island endemism in Lasiocampidae (Lepidoptera). *Zoologicheskii Zhurnal*, 88(1), 35–46.

Zolotuhin, V.V. & Witt, T.J. (2005) Contribution to the knowledge of Indonesian Lasiocampidae (Lepidoptera). *Tinea*, 19(1), 59–68.