



Description of six new species forming the *sumbana* species group of the genus *Nemophora* Hoffmannsegg (Lepidoptera, Adelidae) from the Lesser Sunda Islands in Indonesia

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Abstract

In this study six new species of the genus *Nemophora* Hoffmannsegg, 1798, are described from the Lesser Sunda Islands (Bali, Sumbawa, Sumba, and Timor) in Indonesia. These species (*N. sumbana* Kozlov, **sp. nov.**, *N. timorella* Kozlov, **sp. nov.**, *N. umbronitidella* Kozlov, **sp. nov.**, *N. wegneri* Kozlov, **sp. nov.**, *N. longipeniculella* Kozlov, **sp. nov.**, and *N. brevipeniculella* Kozlov, **sp. nov.**) constitute a monophyletic group, characterized by a Λ -shaped yellow marking on the forewing, with the dorsal section of the distal leg of this marking extending along the outer wing margin.

Key words: Bali Island, diagnoses, distribution, keys, new species, Sumba Island, Sumbawa Island, Timor Island

Introduction

The Lesser Sunda Archipelago consists of two parallel, linear chains of oceanic islands, including Bali, Lombok, Sumbawa, Flores, Sumba, Savu, Timor, Alor, and Tanimbar. The oldest of these islands have continuously been emergent for 10–12 million years (Hall 2009). This extended period of isolation has allowed for significant *in situ* diversification, making the Lesser Sundas home to many endemic species (Orme *et al.* 2005).

Given their current orientation, the Lesser Sundas may serve as ‘stepping stones’ for plants and animals dispersing between the Greater Sunda Shelf (including the Malay Peninsula, Borneo, Sumatra, Java, and Bali) and the Sahul Shelf (encompassing New Guinea, Australia, and their land-bridge islands). Thus, this island chain may function as a two-way filter for organisms migrating between two of the world’s great biogeographical realms, Asia and Australo-Papua. The recognition of this striking clinal mixture of species from different biogeographical realms (Wallace 1876) was a key insight that led to identification of the Wallace Line and, ultimately, to the creation of the field of biogeography. The critical role that the Lesser Sundas played in the development of biogeography underscores the importance of inventorying the flora and fauna of this archipelago.

Southeast Asia possesses a remarkable diversity of fairy moths, with many species of the genus *Nemophora* Hoffmannsegg, 1798, recently described from various parts of this region (Kozlov 2016, 2020, 2023, 2024). However, the known fairy moth fauna of the Lesser Sundas was previously limited to a single species, *N. punctifasciella* Kozlov, 2024. In this study, I describe six new *Nemophora* species from Bali, Sumbawa, Sumba, and Timor, which constitute a monophyletic *sumbana* species group. This publication is a part of the revision of the fairy moth subfamily Adelinae of the World.

Methods

The methods employed in this study are consistent with those described in previously published revisions of various *Nemophora* species groups (e.g., Kozlov 2016) and regional faunas (Kozlov 2023, 2024). For all primary types, I document the size and shape of all labels, the colour of the paper (if not white), and the original text (within

quotation marks). A vertical line (|) separates different lines of text on the labels, and any additional information clarifying the original text is placed in square brackets. The names of type localities are presented in their modern spelling.

Moths were measured using the ocular scale of a stereomicroscope. Forewing length excludes the fringe, and forewing width represents the maximum distance between the costal and dorsal wing margins perpendicular to the line connecting the base of the RS stem with the wing apex. The interocular index is calculated as the ratio between the vertical diameter of the compound eye and the interocular distance measured at the midpoint of the frons, between the base of the antennal sockets and the anterior tentorial pits. The occipital distance is defined as the ratio between the shortest interocular distance above the antennal sockets and the vertical diameter of the compound eye.

Some of the species described below are known only from poorly preserved specimens, necessitating the simultaneous publication of colour photographs of the moths and schematic drawings of their wing patterns. In keeping with the tradition established by Yasuda (1957) and continued by Hirowatari (1995, 2007), I have illustrated the male genitalia from both ventral and lateral views. These illustrations, which depict the non-deformed shape of the male genitalia, provide information that cannot be obtained from photographs of permanent slides. Female terminalia in the genus *Nemophora* lack robust diagnostic characters and were not examined in this study.

The following abbreviations are used: FWL, forewing length; PLB, labial palpus; WLR, width/length ratio. Abbreviations for collections: NHM — Natural History Museum, London, U. K.; RMNH — Naturalis Biodiversity Center, Leiden, The Netherlands.

Diagnosis of the *sumbana* species group

The *sumbana* species group is identified by the following combination of characters:

1. The distal part of the forewing features a Λ -shaped yellow marking linking the costa with the dorsum; the dorsal section of the distal leg of this marking extends along the outer wing margin. This forewing pattern element has not been observed in any *Nemophora* species outside the *sumbana* species group.
2. The base of the proboscis with a characteristic tuft of dark coppery brown semi-erect elongated scales (not observed in *N. wegneri*). In this feature, the *sumbana* species group is similar to the *kalshoveni* species group, which is distributed across the islands of the Oriental and Australian regions, including Sumatra, Java, Sangir, and New Guinea.
3. In males, the compound eyes are enlarged (interocular index 1.1–1.6), with the eyes closely approaching but not touching each other dorsally (occipital distance 0.05–0.15).
4. In male genitalia, the juxta with an exceptionally wide arrow head (WLR 1.1–1.3), which is triangular or anchor-shaped.

List of the species

Nemophora sumbana Kozlov, **sp. nov.**

Nemophora timorella Kozlov, **sp. nov.**

Nemophora umbronitidella Kozlov, **sp. nov.**

Nemophora wegneri Kozlov, **sp. nov.**

Nemophora longipeniculella Kozlov, **sp. nov.**

Nemophora brevipeniculella Kozlov, **sp. nov.**

Key to the species

1. Forewing base with 2–3 longitudinal glossy stripes 2
- Forewing base without longitudinal glossy stripes 5

2. Larger (FWL 6.6–7.5 mm); forewing base with 3 longitudinal glossy stripes. *N. sumbana*
 -. Smaller (FWL 4.3–6.0 mm); forewing base with 2 longitudinal glossy stripes. 3
3. Smaller (FWL 4.3–5.0 mm); external border of basal field of forewing at costa slightly closer to wing base than at dorsum.
 *N. timorella*
 -. Larger (FWL 5.2–6.0 mm); external border of basal field of forewing at dorsum significantly closer to wing base than at costa
 4
4. Forewing bronze; male antenna longer (3.7–4.1 × FWL), its scape yellow; base of proboscis with a tuft of dark coppery brown semi-erect elongated scales. In male genitalia, phallus relatively short (0.95 × vinculum); juxta anchor-shaped
 *N. umbronitidella*
 -. Forewing bright yellow; male antenna shorter (2.9–3.5 × FWL), its scape dark brown; base of proboscis with bronze to coppery bronze scales which do not form a tuft. In male genitalia, phallus relatively long (1.1 × vinculum); juxta arrow-shaped.
 *N. wegneri*
5. Bronze band of forewing fascia suffused with ochreous yellow scales; forewing apex suffused with ochreous scales; epiphysis articulated at 0.25 of the total length of tibia, unusually long, and reaches apex of tibia; female antenna thickened by dark brown scales up to forewing length. *N. longipeniculella*
 -. Bronze band of forewing fascia suffused with dark brown scales; forewing apex suffused with brown scales; epiphysis articulated at 0.5 of the total length of tibia, of typical length, and does not reach apex of tibia; female antenna thickened by dark brown scales up to 0.8 × forewing length *N. brevipeniculella*

Taxonomic accounts

Family Adelidae Bruand, 1850

Genus *Nemophora* Hoffmannsegg, 1798

Nemophora sumbana Kozlov, sp. nov.

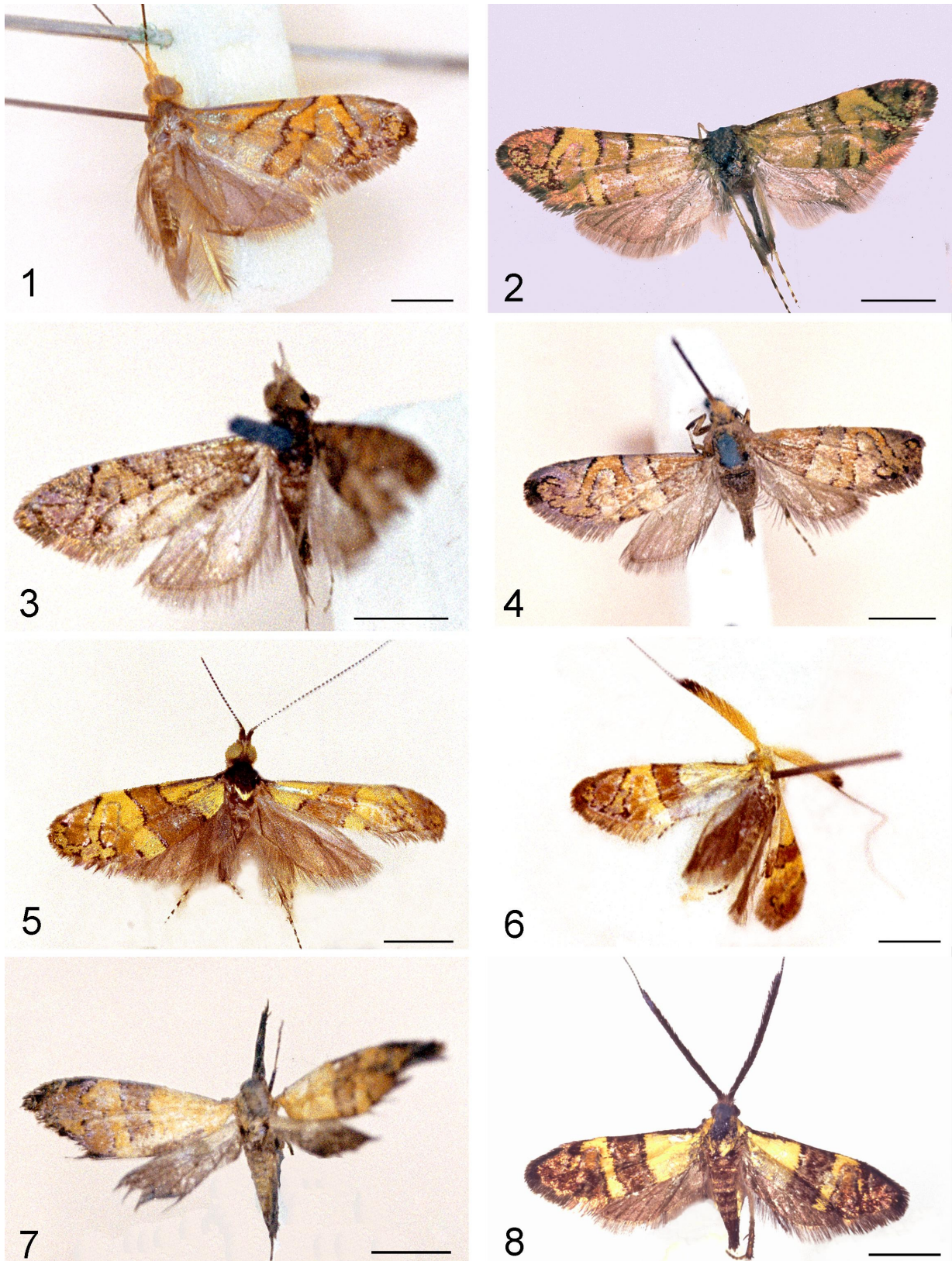
urn:lsid:zoobank.org:act:C3D8CCC3-EFFB-4E0B-A6A2-DDC74B34DED6

(Figs. 1, 9, 15)

Holotype ♂: Indonesia, Sumba Island, Pogobina (9° 36' S, 119° 25' E); labelled: 8 mm circle with red border, print 'Holo- | type'; 6 × 14 mm, print 'W. Sumba, 500 m | Pogobina, ix 1949 | Sutter & Wegner'; 6 × 18 mm, print 'HOLOTYPE ♂ | *Nemophora* | *sumbana* Kozlov' (RMNH) [examined]. **Paratypes**. 4 ♂, labelled: 8 mm circle with yellow border, print 'Para- | type'; 6 × 14 mm, print 'W. Sumba, 500 m | Pogobina, ix 1949 | Sutter & Wegner'. 2 ♂, labelled: 6 × 14 mm, print 'W. Sumba, 500 m | Pogobina, ix 1949 | Sutter & Wegner'. 1 ♂, labelled: 9 × 13 mm, print '[K. W.] Dammerman [leg.] | O. Soemba | 450 M. | Mao Marroe | V. 1925'. All paratypes bear the label: 6 × 18 mm, print 'PARATYPE ♂ | *Nemophora* | *sumbana* Kozlov' (all in RMNH) [examined].

Diagnosis. *Nemophora sumbana* differs from other species in the *sumbana* group by its large size, the extremely oblique external border of the basal field on the forewing (reaching the costa at 0.4 and the dorsum at 0.2 × FWL), the spot at the outer wing margin that does not reach the forewing apex, and relatively short labial palpi (0.3–0.4 × vertical eye diameter). In male genitalia, *N. sumbana* is very similar to *N. umbronitidella* (Figs. 3, 4), from which it differs by the smaller medial process of the transtilla, the shape of the anellus, and the relatively thick and straight tip of the phallus.

Description. Male (Fig. 1). FWL 6.6–7.5 mm, WLR 0.35–0.40. Vertex bright ochreous; frons glossy golden. PLB 0.3–0.4 × vertical eye diameter, ochreous brown, with sparse raised ochreous brown piliform scales. Proboscis light brown, base anterolaterally with dense tuft of long and wide dark brown scales. Eyes enlarged, but not touching each other; interocular index 1.3–1.5; occipital distance 0.05–0.10. Antenna 3.0–3.9 × FWL. Scape and basal 5–8 flagellomeres ochreous brown, dorsally slightly thickened by ochreous scales; then colour of flagellum sharply changes to dark coppery brown, with irregular white marks on lateral sides of some flagellomeres; these marks never form complete rings. At about middle of flagellum its colour steadily changes to bronze, and apical 5–15 flagellomeres are white in some specimens. Tegulae and thorax brown to bronze; tegulae with brassy green tint. Forewing (Fig. 9) bronze, with ochreous pattern. Basal field with three glossy bronze longitudinal stripes; costal silver stripe reaches 0.30–0.35 × FWL; external border of basal field oblique, reaching costa at 0.4 and dorsum at 0.2 × FWL. Oblique band next to basal field of about same width at costa and dorsum, of same ochreous colour as



FIGURES 1–8. Adults of *Nemophora* spp. 1, *N. sumbana* Kozlov, **sp. nov.**, male, holotype, from Pogobina, Sumba Island, Indonesia; 2, *N. timorella* Kozlov, **sp. nov.**, male, paratype, from Timor Island, Indonesia; 3, *N. umbronitidella* Kozlov, **sp. nov.**, male, paratype, from Sumbawa Island, Indonesia; 4, ditto, female, paratype, from the same locality; 5, *N. wegneri* Kozlov, **sp. nov.**, male, holotype, from Mao Marroe, Sumba Island, Indonesia; 6, ditto, female, paratype, from Pogobina, Sumba Island, Indonesia; 7, *N. longipeniculella* Kozlov, **sp. nov.**, female, paratype, from Bali Island, Indonesia; 8, *N. brevipeniculella* Kozlov, **sp. nov.**, female, holotype, from Timor Island, Indonesia. Scale bar: 2 mm.

forewing base, except for narrow glossy bronze marginal lines. Oblique ochreous band linking costa with outer wing margin bordered by dotted narrow line of dark brown scales; its dorsal part extends along outer wing margin only towards wing base. Bronze background of distal part of forewing suffused with yellow scales, which form diffuse spot along external border of oblique ochreous band. Fringe bronze. Hindwing brown, with coppery tint; costal area yellowish grey; fringe brown. Legs glossy bronze to yellow; apices of tibiae and all tarsomeres brown. Epiphysis at 0.55, not reaching apex of tibia. Abdomen brown to bronze.

Female unknown.

Male genitalia (Fig. 15). Tegumen dome-shaped, with small medial ridge. Socii $1.6 \times$ medial diameter of phallus. Vinculum $2.8 \times$ length of valva, with slightly convex lateral margins and nearly straight distal margin with small medial protuberance. Tips of valvae at about same level as tip of tegumen. Ventral margin of valva with small lobe at $0.5 \times$ total length; dorsal valvar margin almost straight; tip of valva rounded. Valvae fused basally up to $0.3 \times$ total length; internal valvar margins indistinct. Anellus $0.25 \times$ length of valva. Transtilla with small triangular medial process. Juxta $0.55 \times$ length of phallus, anchor-shaped; arrow head extremely wide (WLR 1.3), with rounded tip and pointed lateral arms. Phallus $0.90\text{--}0.95 \times$ length of vinculum, in lateral view gently S-shaped; base of phallus narrowly bell-shaped, tip pointed.

Distribution. Indonesia, Sumba Island.

Etymology. The species is named after the type locality, Sumba Island.

Nemophora timorella Kozlov, sp. nov.

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(Figs. 2, 10, 16, 19)

Holotype ♂: Indonesia, Timor Island (approx. 9° S, 124° E); labelled: 8 mm circle with red border, print ‘Holo- | type’; 9×12 mm, print + black ink ‘S. W. TIMUR [=Timor Island] | 1500–3000 ft. | XI.–XII. | Doherty, 1891 | No. 41708’; 8×10 mm, print ‘Walsingham | Collection | 1910–427’; 9×16 mm, print ‘B. M. | Genitalia slide | No. 29981’; 6×18 mm, print ‘HOLOTYPE ♂ | *Nemophora* | *timorella* Kozlov’ (NHM) [examined]. **Paratypes.** 15 ♂, labelled: 8 mm circle with yellow border, print ‘Para- | type’; 9×12 mm, print + black ink ‘S. W. TIMUR | 1500–3000 ft. | XI.–XII. | Doherty, 1891 | No. 417**’ [** = 03, 04, 06, 07, 09–16, 18, 19; specimen no. 41718 has additional label: 11×32 mm, pencil ‘timurensis’]; 8×10 mm, print ‘Walsingham | Collection | 1910–427’; 6×18 mm, print ‘PARATYPE ♂ | *Nemophora* | *timorella* Kozlov’ (all in NHM) [examined].

Diagnosis. *Nemophora timorella* is most similar to *N. umbronitidella* (Figs. 3, 4), from which differs by its smaller size (FWL 4.3–5.0 mm), the pale yellowish brown basal field of the forewing, the nearly perpendicular external border of the basal field relative to the wing margins, a longer vinculum, the tips of the valvae slightly extending beyond the tip of the tegumen, a medial indentation in the fused basal parts of the valvae, and the triangular shape of the arrow head of the juxta. It differs from *N. longipeniculella* (Fig. 7) and *N. brevipeniculella* (Fig. 8) by the presence of two longitudinal silver stripes with brilliant iridescence in the dark ochreous brown basal field of the forewing.

Description. Male (Fig. 2). FWL 4.3–5.0 mm, WLR 0.37–0.39. Vertex light brown; frons with iridescent silver to light golden scales, and with row of pale ochreous brown piliform scales below antennal sockets. PLB $0.5\text{--}0.6 \times$ vertical eye diameter ($1.3\text{--}1.6 \times$ length of scape), brown. Proboscis brown, base covered with dark coppery brown semi-erect elongated scales, forming small tuft. Eyes enlarged, occipitally closely approaching, with rounded dorsal margins; interocular index 1.3–1.6, occipital distance 0.05–0.07. Antenna $3.4\text{--}3.9 \times$ FWL. Scape ochreous brown, flagellum bronze, basal 20–30 flagellomeres with rings of white scales, which gradually disappear towards apex. Tegulae and thorax light ochreous brown, with slight coppery tint on external margins of tegulae. Forewing (Fig. 10) bronze, with pale yellow basal field reaching costa at 0.35 and dorsum at $0.40 \times$ FWL, ochreous yellow medial band, and oblique yellow band linking costa with outer wing margin. Basal field with two longitudinal glossy silver stripes with slight brilliant iridescence; lower stripe very narrow. Yellow medial band with sinuate margins, medially suffused with ochreous scales; on both sides bordered by narrow lines of dark brown scales. Bronze background of distal part of forewing suffused with ochreous scales, except for costal area near apex that is entirely bronze. Oblique yellow band, linking costa with outer wing margin, bordered by narrow line of dark brown scales; at outer wing margin it expands between veins M1 and CuA1 and is suffused with dark brown scales. Some of dark brown scales all over forewing show brilliant iridescence. Fringe bronze. Hindwing brown with coppery iridescence;

costal area grey; anal field semitranslucent; fringe brown to light brown. Legs bronze; bases of all tarsomeres light yellow. Epiphysis at 0.6, reaching apex of tibia. Abdomen coppery brown dorsally, brown with bronze iridescence ventrally.

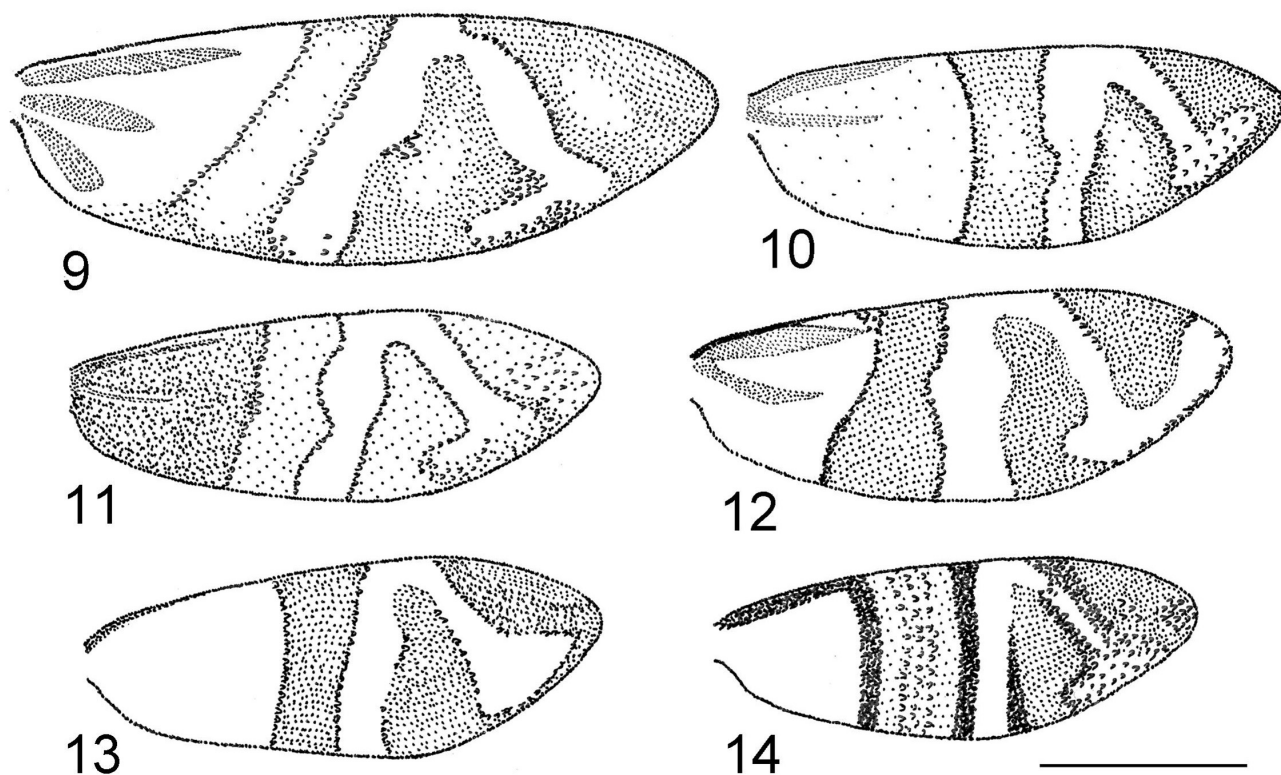
Female unknown.

Male genitalia (Figs. 16, 19). Tegumen onion-shaped. Socii $1.6\text{--}1.8 \times$ medial diameter of phallus. Vinculum $2.7 \times$ length of valva, with straight lateral margins and slightly convex distal margin. Tips of valvae slightly extend beyond tip of tegumen. Ventral margin of valva medially with small lobe at $0.4 \times$ total length; dorsal margin straight; tip of valva narrowly rounded. Valvae fused basally up to $0.2 \times$ total length; internal margins not visible. Fused parts of valvae between ventral margins with distinct medial indentation. Anellus $0.35 \times$ length of valva. Transtilla with wide triangular medial process. Juxta $0.6 \times$ length of phallus; arrow head triangular, extremely wide (WLR 1.3), with pointed tip and short pointed lateral arms. Phallus $0.9 \times$ length of vinculum, in lateral view shallowly C-shaped; tip narrow, hook-shaped; base narrowly funnel-shaped.

Distribution. Indonesia, Timor Island.

Etymology. The species is named after the type locality, Timor Island.

Comments. Although Walsingham clearly labelled one male specimen as the type of a proposed new species, he never published its description.



FIGURES 9–14. Forewing pattern of *Nemophora* spp. 9, *N. sumbana* Kozlov, **sp. nov.**; 10, *N. timorella* Kozlov, **sp. nov.**; 11, *N. umbronitidella* Kozlov, **sp. nov.**; 12, *N. wegneri* Kozlov, **sp. nov.**; 13, *N. longipeniculella* Kozlov, **sp. nov.**; 14, *N. brevipeniculella* Kozlov, **sp. nov.** Scale bar: 2 mm.

***Nemophora umbronitidella* Kozlov, sp. nov.**

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(Figs. 3, 4, 11, 17, 20)

Holotype ♂: Indonesia, Sumbawa Island (approx. $8^{\circ} 20' S$, $118^{\circ} E$); labelled: 8 mm circle with red border, print ‘Holo- | type’; 9×13 mm, print + black ink ‘SAMBAWA [=Sumbawa Island], | 3000–5500 ft., | (virgin forest), | Doherty, 1891. | No 40729’; 8×10 mm, print ‘Walsingham | Collection | 1910–427’; 7×17 mm, black frame, black ink ‘Typ | umbreonitida ♂ | W | Named by Wlsm. ’; 9×16 mm, print ‘B. M. | Genitalia slide | No. 29492’; 6×18 mm, print ‘HOLOTYPE ♂ | *Nemophora* | *umbronitidella* Kozlov’ (NHM) [examined]. **Paratypes.** 2 ♂, labelled: 8 mm circle with yellow border, print ‘Para- | type’; 9×13 mm, print + black ink ‘SAMBAWA, | 3000–5500 ft., | (virgin forest), | Doherty, 1891. |

No 40730 [or 40731]; 8 × 10 mm, print ‘Walsingham | Collection | 1910–427.’; 6 × 18 mm, print ‘PARATYPE ♂ | *Nemophora | umbronitidella* Kozlov’. 1 ♀, labelled: 8 mm circle with yellow border, print ‘Para- | type’; 9 × 13 mm, print + black ink ‘SAMBAWA, | 3000–5500 ft., | (virgin forest), | Doherty, 1891. | No 40732’; 8 × 10 mm, print ‘Walsingham | Collection | 1910–427.’; 7 × 17 mm, black frame, black ink ‘Typ | umbronitida ♀ | W. | Named by Wlsm.’; 6 × 18 mm, print ‘PARATYPE ♀ | *Nemophora | umbronitidella* Kozlov’ (all in NHM) [examined].

Diagnosis. *Nemophora umbronitidella* is most similar to *N. timorella*, from which it differs by larger size (FWL 5.2–5.7 mm), an oblique external border of the basal field of forewing, a shorter vinculum, the tip of the tegumen slightly extending beyond the tips of the valvae, a medial protuberance in the fused basal parts of the valvae and an anchor-shaped juxta. It differs from *N. longipeniculella* (Fig. 7) and *N. brevipeniculella* (Fig. 8) by the presence of two longitudinal silver stripes with brilliant iridescence in the dark ochreous brown basal field of the forewing.

Description. Male (Fig. 3). FWL 5.2–5.7 mm, WLR 0.35–0.37. Vertex pale yellow above antennal sockets to ochreous brown along occipital margin; frons with iridescent silver to light golden scales through which brown colour of head capsule may be visible, and with row of pale ochreous yellow piliform scales below antennal sockets. PLB 0.5 × vertical eye diameter (0.8–0.9 × length of scape), light brown. Proboscis brown, base densely covered with dark coppery brown semi-erect elongated scales, forming characteristic tuft. Eyes enlarged, occipitally closely approaching, with rounded dorsal margins; interocular index 1.3–1.4, occipital distance 0.05–0.07. Antenna 3.7–4.1 × FWL. Scape yellow, flagellum coppery brown, basal 27–32 flagellomeres with rings of white scales, which gradually disappear towards apex. Tegulae and thorax dark ochreous brown. Forewing (Fig. 11) bronze, with dark ochreous brown basal field reaching costa at 0.35 and dorsum at 0.30 × FWL, ochreous yellow medial band, and oblique yellow band linking costa with outer wing margin. Basal field with two longitudinal glossy silver stripes with slight brilliant iridescence; lower stripe very narrow. Ochreous yellow medial band with sinuate margins, on both sides bordered by narrow lines of dark brown scales. Bronze background of distal part of forewing suffused with yellow scales. Oblique yellow band linking costa with outer wing margin bordered by narrow line of dark brown scales; at outer margin it expands between veins RS4 and CuA2 and is suffused with brown scales. Some of dark brown scales all over forewing show brilliant iridescence. Fringe bronze. Hindwing brown with coppery iridescence; costal area grey; anal field semitranslucent; fringe brown to light brown. Legs bronze; bases of all tarsomeres white to light yellow. Epiphysis at 0.65, reaching apex of tibia. Abdomen brown with bronze iridescence.

Female (Fig. 4). FWL 5.6 mm. Base of antenna thickened by appressed dark brown scales (distal part of antenna missing). Otherwise similar to male.

Male genitalia (Figs. 17, 20). Tegumen onion-shaped. Socii 1.3 × medial diameter of phallus. Vinculum 2.2 × length of valva, with straight lateral margins and slightly convex distal margin. Tip of tegumen slightly extends beyond tips of valvae. Ventral margin of valva with small lobe at 0.55 × total length; dorsal margin straight; tip of valva narrowly rounded. Valvae fused basally up to 0.4 × total length; internal margins not visible. Fused parts of valvae between ventral margins with distinct triangular protuberance. Anellus 0.2 × length of valva. Transtilla with wide triangular medial process. Juxta 0.55 × length of phallus; arrow head anchor-shaped, extremely wide (WLR 1.1), with widely rounded tip and long pointed lateral arms. Phallus 0.95 × length of vinculum, in lateral view shallowly C-shaped; tip narrow, base widely funnel-shaped.

Distribution. Indonesia, Sumbawa Island.

Etymology. The specific epithet is derived from *umbro* (Latin: shade) and *nitidus* (Latin: bright, shining) and refers to the diagnostic trait of this species.

Comments. Although Walsingham clearly labelled one male and one female as types of a proposed new species, he never published its description.

Nemophora wegneri Kozlov, sp. nov.

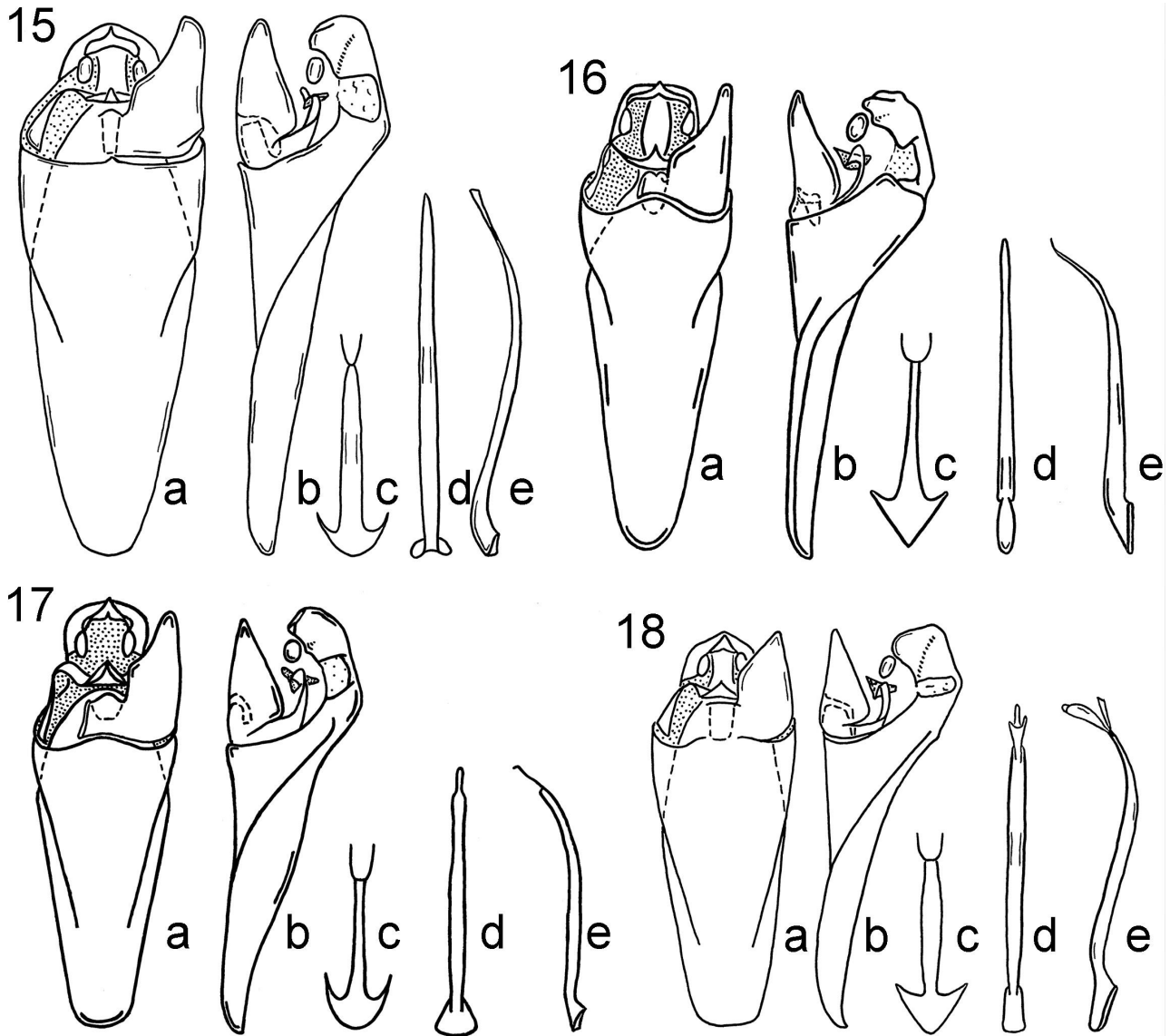
urn:lsid:zoobank.org:act:37C2CA18-18CE-45CF-A632-FF1258E1DEB6

(Figs. 5, 6, 12, 18)

Holotype ♂: Indonesia, Sumba Island, Mao Marroe (approx. 9° 58' 30" S, 120° 30' 45" E); labelled: 8 mm circle with red border, print ‘Holo- | type’; 9 × 13 mm, print ‘[K. W.] Dammerman [leg.] | O. Soemba | 450 M. | Mao Marroe | V. 1925’; 6 × 18 mm, print ‘HOLOTYPE ♂ | *Nemophora | wegneri* Kozlov’ (RMNH) [examined]. **Paratypes.** 5 ♂ 2 ♀, labelled: 8 mm circle with yellow border, print ‘Para- | type’; 6 × 14 mm, print ‘W. Sumba, 500 m | Pogobina, ix 1949 | Sutter & Wegner’. 6 ♂, labelled: 6 × 14 mm, print ‘W. Sumba, 500 m | Pogobina, ix 1949 | Sutter & Wegner’. 1 ♂, labelled: 8 mm

circle with yellow border, print 'Para- | type'; 7 × 14 mm, print 'C. Sumba, 4–500 m | Lindi Watju | 27.ix–15.x.1949 | Sutter & Wegner'. All paratypes bear the label: 6 × 18 mm, print 'PARATYPE ♂ [or ♀] | *Nemophora* | *wegneri* Kozlov' (all in RMNH) [examined].

Diagnosis. *Nemophora wegneri* is most similar to *N. umbroritidella* (Figs. 3, 4), from which it differs by the bright yellow posterior margin of the otherwise dark brown metathorax (in males only), shorter male antennae, dark brown scape, and a long phallus (1.1 × length of the vinculum) with a prominent ventral lobe near the apex.



FIGURES 15–18. Male genitalia of *Nemophora* spp. 15, *N. sumbana* Kozlov, **sp. nov.**; 16, *N. timorella* Kozlov, **sp. nov.**; 17, *N. umbroritidella* Kozlov, **sp. nov.**; 18, *N. wegneri* Kozlov, **sp. nov.**; a: genital complex, ventral view (right valva not shown); b: genital complex, lateral view; c: juxta; d: phallus, ventral view; e: phallus, lateral view. Scale bar: 0.2 mm.

Description. Male (Fig. 5). FWL 5.3–5.9 mm, WLR 0.36–0.42. Vertex with dark brown to brown piliform scales along occipital margin and above antennal sockets, and pale yellow scales between compound eyes; frons glossy golden. PLB 0.45–0.55 × vertical eye diameter, ochreous brown, with sparse raised dark brown scales. Proboscis light brown, base laterally with bronze to coppery bronze scales which, however, do not form a tuft. Eyes enlarged, occipitally closely approaching; interocular index 1.15–1.35; occipital distance 0.05–0.15. Antenna 2.9–3.5 × FWL. Scape dark brown, ventrally in some specimens with a few yellow scales; basal 0.6–0.7 of flagellum with alternating rings of dark brown and white scales; apical part of flagellum silver to white. Tegulae dark brown with bronze tint; thorax dark brown, except for bright yellow posterior margin of mesothorax. Forewing (Fig. 12) bright yellow with

ochreous pattern. Basal field with two glossy golden longitudinal stripes; costal margin dark brown; external border oblique, reaching costa at 0.35 and dorsum at $0.25 \times \text{FWL}$. Oblique stripe next to basal field at costa narrower than at dorsum (0.13 vs. $0.22 \times \text{FWL}$, respectively), ochreous, clearly contrasting yellow colour of forewing base, except for narrow glossy bronze lines preceding dark brown margins. Transverse band and oblique band linking costa with outer wing margin bright yellow, bordered near wing margins by dotted narrow lines of dark brown scales and in medial zone of forewing by narrow glossy golden lines; yellow spot expands along outer wing margin up to wing apex. Bronze background of distal part of forewing suffused with ochreous scales forming compact spot along external border of oblique ochreous band. Fringe bronze, with few ochreous scales forming dotted marginal line. Hindwing brown, with coppery tint; costal area grey; fringe brown. Legs glossy bronze to yellow; apices of tibiae and all tarsomeres brown. Epiphysis at 0.5, reaching apex of tibia. Abdomen brown to bronze.

Female (Fig. 6). FWL 5.0–6.0 mm. Antenna $1.5\text{--}1.6 \times \text{FWL}$, basal $0.30\text{--}0.35$ of flagellum dorsally with dense cover of raised scales forming very thick brush, which is ochreous yellow except for tip where its colour turns to dark brown; distal part of flagellum dark bronze, with irregular markings of white scales. Tegulae and thorax bright yellow. Otherwise similar to male.

Male genitalia (Fig. 18). Tegumen dome-shaped, with small medial ridge. Socii oval, $1.2 \times$ medial diameter of phallus. Vinculum $2.6\text{--}2.7 \times$ length of valva, with slightly convex lateral margins and gently W-shaped distal margin. Tips of valvae at about same level as tip of tegumen. Ventral margin of valva with small lobe at $0.6 \times$ total length; dorsal valvar margin almost straight; tip of valva pointed. Valvae fused basally up to $0.3 \times$ total length and also fused to vinculum; internal valvar margins indistinct. Anellus $0.3 \times$ length of valva. Transtilla with wide triangular medial process. Juxta $0.55 \times$ length of phallus; arrow head triangular, extremely wide (WLR 1.3), with pointed tip and pointed lateral arms. Phallus $1.1 \times$ length of vinculum, in lateral view gently S-shaped; tip pointed, with prominent ventral lobe; base of phallus narrowly bell-shaped.

Distribution. Indonesia, Sumba Island.

Etymology. The species is named in honour of A. M. R. Wegner, a former director of the Zoological Museum in Bogor, Indonesia, a renowned insect collector, and a well-known specialist on the fauna of the Tengger Mountains, who collected most of the specimens of this species.

Comments. The coordinates of the type locality (Mao Marroe) were identified using a map published by Dammerman (1926).

Nemophora longipeniculella Kozlov, sp. nov.

urn:lsid:zoobank.org:act:6D766E8A-4D2B-4D65-8D20-3C542866281C

(Figs. 7, 13)

Holotype ♀: Indonesia, Bali Island (approx. $8^{\circ} 20' \text{ S}$, 115° E); labelled: 8 mm circle with red border, print 'Holo- | type'; 7×15 mm, print 'BALI | Doherty. 1896'; 8×10 mm, print 'Walsingham | Collection | 1910-427'; 6×18 mm, print 'HOLOTYPE ♀ | *Nemophora longi- | peniculella* Kozlov' (NHM) [examined]. **Paratype.** 1 ♀, labelled: 8 mm circle with yellow border, print 'Para- | type'; 7×15 mm, print 'BALI | Doherty. 1896'; 8×10 mm, print 'Walsingham | Collection | 1910-427.'; 6×18 mm, print 'PARATYPE ♀ | *Nemophora longi- | peniculella* Kozlov' (NHM) [examined].

Diagnosis. *Nemophora longipeniculella* is most similar to *N. brevipeniculella* (Fig. 8), from which it differs by the longer (almost equal to the forewing length) part of the female antenna thickened with dark brown scales, the ochreous yellow scales suffusing the bronze band adjacent to the forewing base, the ochreous scales at the forewing apex, and the unusually long epiphysis articulated at 0.25 of the total length of tibia and reaching its apex. It differs from females of *N. umbroritidella* (Fig. 4) by the yellow forewing base (females of *N. timorella* are unknown).

Description. Male unknown.

Female (Fig. 7). FWL 4.9–5.1 mm, WLR 0.35. Vertex and frons brown. PLB $1.0\text{--}1.1 \times$ vertical eye diameter ($1.0\text{--}1.1 \times$ length of scape), brown. Proboscis brown, base covered with dark coppery brown semi-erect elongated scales forming small tuft. Antenna $>1.3 \times \text{FWL}$. Scape and basal part of flagellum dark coppery brown, dorsolaterally thickened by semi-erect dark brown scales; brush formed by these scales reaches $0.95 \times \text{FWL}$; flagellum grey beyond this brush. Tegulae and thorax ochreous yellow to yellow. Forewing (Fig. 13) ochreous brown, with pale yellow basal field expanding to $0.4 \times \text{FWL}$ at both costa and dorsum, pale yellow medial band, and oblique yellow band linking costa with outer wing margin. Basal spot reduced to dark line along costa; forewing base separated

from bronze background by interrupted line of coppery brown scales. Pale yellow medial band with straight internal margin and sinuate external margin, on both sides bordered by interrupted lines of coppery brown scales. Oblique yellow band linking costa with outer wing margin bordered by sparse coppery brown scales; this band expands into wide spot along outer margin. Costal part of forewing bronze near apex. Fringe brown. Hindwing dark brown with coppery iridescence; costal area yellowish grey; fringe brown to light brown. Legs coppery brown to bronze; bases of all tarsomeres light yellow. Epiphysis at 0.25, unusually long, reaching apex of tibia. Abdomen dorsally ochreous brown, ventrally bronze at base to coppery brown at apex.

Distribution. Indonesia, Bali Island.

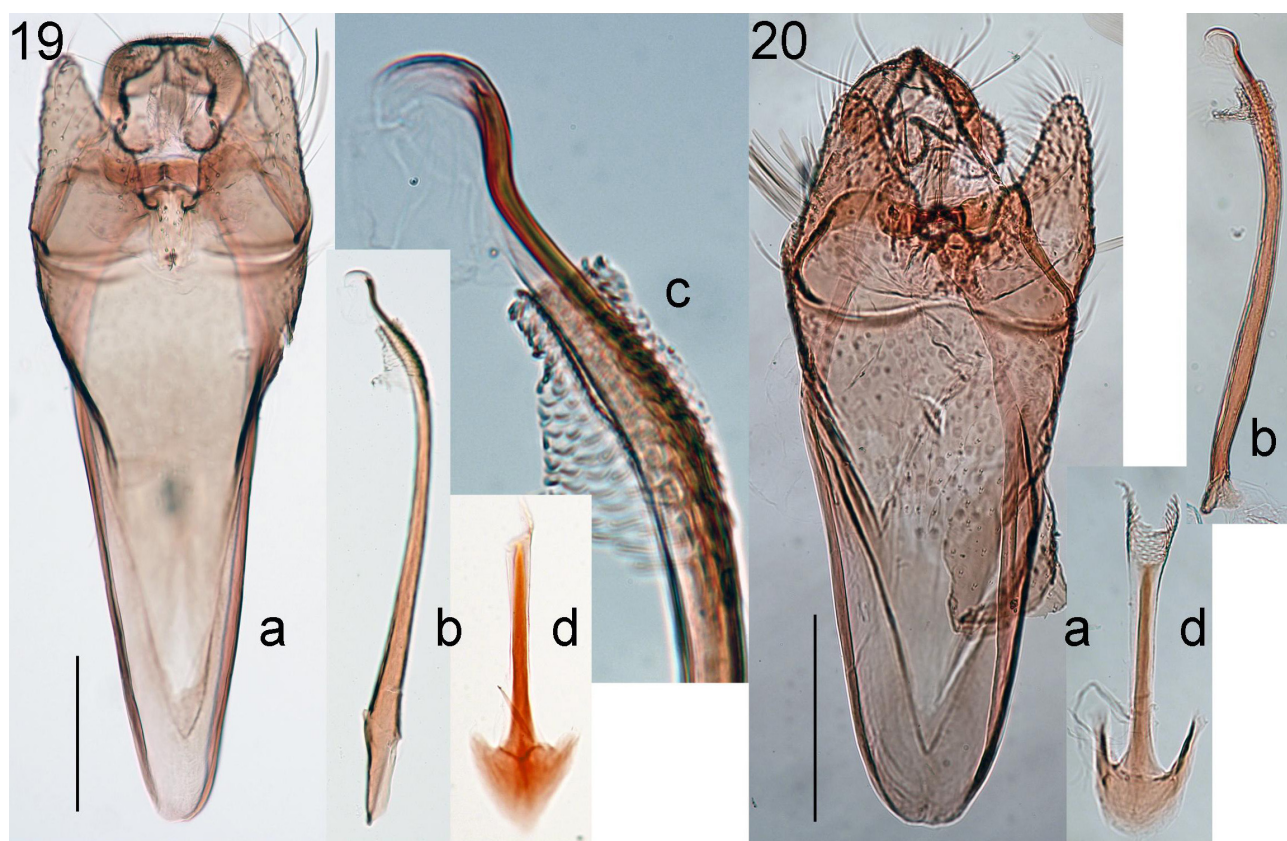
Etymology. The specific epithet is derived from longus (Latin: long) and peniculus (Latin: brush) and refers to the diagnostic trait of this species.

***Nemophora brevipeniculella* Kozlov, sp. nov.**

urn:lsid:zoobank.org:act:CDB9D2FC-5604-4372-95E0-9D0245FCD4F3

(Figs. 8, 14)

Holotype ♀: Indonesia, Timor Island (approx. 9° S, 124° E); labelled: 8 mm circle with red border, print ‘Holo- | type’; 9 × 12 mm, print + black ink ‘S. W. TIMUR [=Timor Island] | 1500–3000 ft. | XI.–XII. | Doherty, 1891 | No. 41721’; 8 × 10 mm, print ‘Walsingham | Collection | 1910–427.’; 9 × 22 mm, black ink ‘didesma | ♀ type’; 6 × 18 mm, print ‘HOLOTYPE ♀ | *Nemophora brevipeniculella* Kozlov’ (NHM) [examined]. **Paratypes.** 2 ♀, labelled: 8 mm circle with yellow border, print ‘Para- | type’; 9 × 12 mm, print + black ink ‘S. W. TIMUR | 1500–3000 ft. | XI.–XII. | Doherty, 1891 | No. 41717 or 41720’; 8 × 10 mm, print ‘Walsingham | Collection | 1910–427.’; 6 × 18 mm, print ‘PARATYPE ♀ | *Nemophora brevipeniculella* Kozlov’ (both in NHM) [examined].



FIGURES 19–20. Male genitalia of *Nemophora* spp. 19, *N. timorella* Kozlov, **sp. nov.**, holotype, from Timor Island, Indonesia, genitalia preparation 29981 (NHM); 20, *N. umbronitidella* Kozlov, **sp. nov.**, holotype, from Sumbawa Island, Indonesia, genitalia preparation 29492 (NHM); a: genital complex, ventral view; b: phallus; c: apex of phallus; d: juxta. Scale bar: 0.2 mm (valid for a, b and d only).

Diagnosis. *Nemophora brevipeniculella* is most similar to *N. longipeniculella*, from which it differs by the shorter ($0.8 \times$ forewing length) part of the female antenna thickened with dark brown scales, the dark brown scales densely suffusing the bronze band adjacent to the forewing base, the brown scales at the forewing apex, and the typical size of the epiphysis, which is articulated at 0.5 of the total length of tibia and does not reach its apex. It differs from females of *N. umbrunitidella* (Fig. 4) by the yellow forewing base (females of *N. timorella* are unknown).

Description. Male unknown.

Female (Fig. 8). FWL 4.7–5.0 mm, WLR 0.33–0.38. Vertex brown; frons with iridescent silver to light golden scales, and with row of brown piliform scales below antennal sockets. PLB $0.9\text{--}1.0 \times$ vertical eye diameter ($1.0 \times$ length of scape), brown. Proboscis brown, base covered with dark coppery brown semi-erect elongated scales, forming small tuft. Antenna $2.0 \times$ FWL. Scape and basal part of flagellum dark brown, dorsolaterally thickened by semi-erect dark brown scales; brush formed by these scales reaches $0.8 \times$ FWL. Flagellum bronze beyond this brush; 10–15 flagellomeres next to brush with white rings. Tegulae and thorax yellow. Forewing (Fig. 14) bronze, with pale yellow basal field expanding to $0.3 \times$ FWL at both costa and dorsum, pale yellow medial band, and oblique yellow band linking costa with outer wing margin. Basal spot dark brown, connected with dark brown band separating yellow forewing base from bronze background of distal part of forewing. Pale yellow medial band almost straight, on both sides bordered by dark brown bands. Bronze field between basal field and fascia medially densely suffused with dark brown scales. Oblique yellow band linking costa with outer wing margin bordered by dark brown scales; irregular spot along outer wing margin dark brown, sparsely suffused with ochreous brown scales. Costal part of forewing bronze near apex. Fringe brown. Hindwing dark brown with coppery iridescence; costal area light yellow; fringe brown to light brown. Legs coppery brown to bronze; bases of all tarsomeres light yellow. Epiphysis at 0.5, not reaching apex of tibia. Abdomen dorsally brown with coppery iridescence, ventrally bronze except terminal sternite which is coppery brown; lateral parts of tergites with yellow scales.

Distribution. Indonesia, Timor Island.

Etymology. The specific epithet is derived from *brevis* (Latin: short) and *peniculus* (Latin: brush) and refers to the diagnostic trait of this species.

Comments. Although Walsingham clearly labelled the holotype of a proposed new species, he never published its description.

The females of *N. brevipeniculella* were collected from the same locality as the males of *N. timorella*. Although the males of *N. brevipeniculella* and the females of *N. timorella* remain unknown, I have opted to describe *N. brevipeniculella* as a separate species rather than consider these specimens as females of *N. timorella*. This decision is primarily based on the lack of sexual dimorphism in wing coloration, as well as in the position and length of the epiphysis in both *N. umbrunitidella* and *N. wegneri*, species closely related to both *N. timorella* and *N. brevipeniculella*.

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