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## RESEARCH ARTICLE

### The genus *Dioscore* Warren, 1907: two new species and analysis of characters spread (Lepidoptera: Geometridae: Geometrinae)

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**Abstract:** The genus *Dioscore* Warren, 1907 is reviewed. Diagnostic characters are listed for the genus and species included, the male genitalia are described for the first time for seven species and the female genitalia for three species. Two new species are described from Papua Indonesia: *Dioscore kirke* Lindt, Lennuk & Viidalepp **sp. nov.** and *Dioscore vilu* Lindt, Lennuk & Viidalepp **sp. nov.** The genus with its ten species is endemic to New Guinea and nearby islands; its taxonomic affinities are discussed.

**Key words:** Geometridae, Geometrinae, taxonomy, anellar complex, new species, Papua Indonesia.

## Introduction

The genus *Dioscore* Warren, 1907 was described referring to the wing shape and venation of the type species, *D. melanomma* Warren, 1907; the characteristic shape of the frenulum in males was also mentioned for *Halterophora bicolor* in describing the genus *Halterophora* (Warren 1896). Warren (1907) transferred a third species described earlier as *Loxochila meeki* Warren, 1903 to *Dioscore*, referring to the shape of the male frenulum.

Prout (1912: 74–75), when first revising the genus, put it onto a global scale and presented a good morphological description of *Dioscore* with fine figures of the male hind

leg and the frenulum. Prout also clarified the species level synonymy, grouping together the four Warren's species and adding a fifth, *D. homoeotes* Prout, 1911. The clubbed shape of the frenulum in males is stressed in the key to geometrine (Geometrinae) genera. The strongly produced anterior angle of the discal cell in the forewing and the main features of the male genitalia are listed.

Prout (1930–1938: 78) reviewed *Dioscore* in the context of the Indo-Australian fauna. He included eight species in the genus, and seven of these are well illustrated on colour plates. Prout found a resemblance between *Dioscore* and the genus *Geometra* Linnaeus, 1758 (as *Hipparchus* Leach, 1815), noting the difference that hind wing veins  $M_1$  and  $M_3$  are stalked with nearby veins in *Dioscore*. He separated the taxa into two sections according to the shape of the hind wing (roundish, or slightly angulate at the vein  $M_3$ ). Scoble (1999) used an alphabetical arrangement for the same taxa. Seven species of *Dioscore* are listed on the Papua-insects homepage (Vos 2016).

*Dioscore simplex* Warren, 1897 was transferred to *Orothalassodes* Holloway (Holloway 1996; Scoble 1999).

The genus with its unique shape of the male frenulum seems to have been overlooked by taxonomists for about eighty years. Good photos of *D. fulgurata* Warren, *D. melanomma* Warren and *D. nereis* Warren are available on the BOLD Systems: Taxonomy Browser's homepage.

## Material and methods

The present study was initiated by attempts to identify moths in the collection of the Estonian Museum of Natural History. Series of moths collected by A. Lindt (Estonian Museum of Natural History, Tallinn, Estonia), served as morphological comparison.

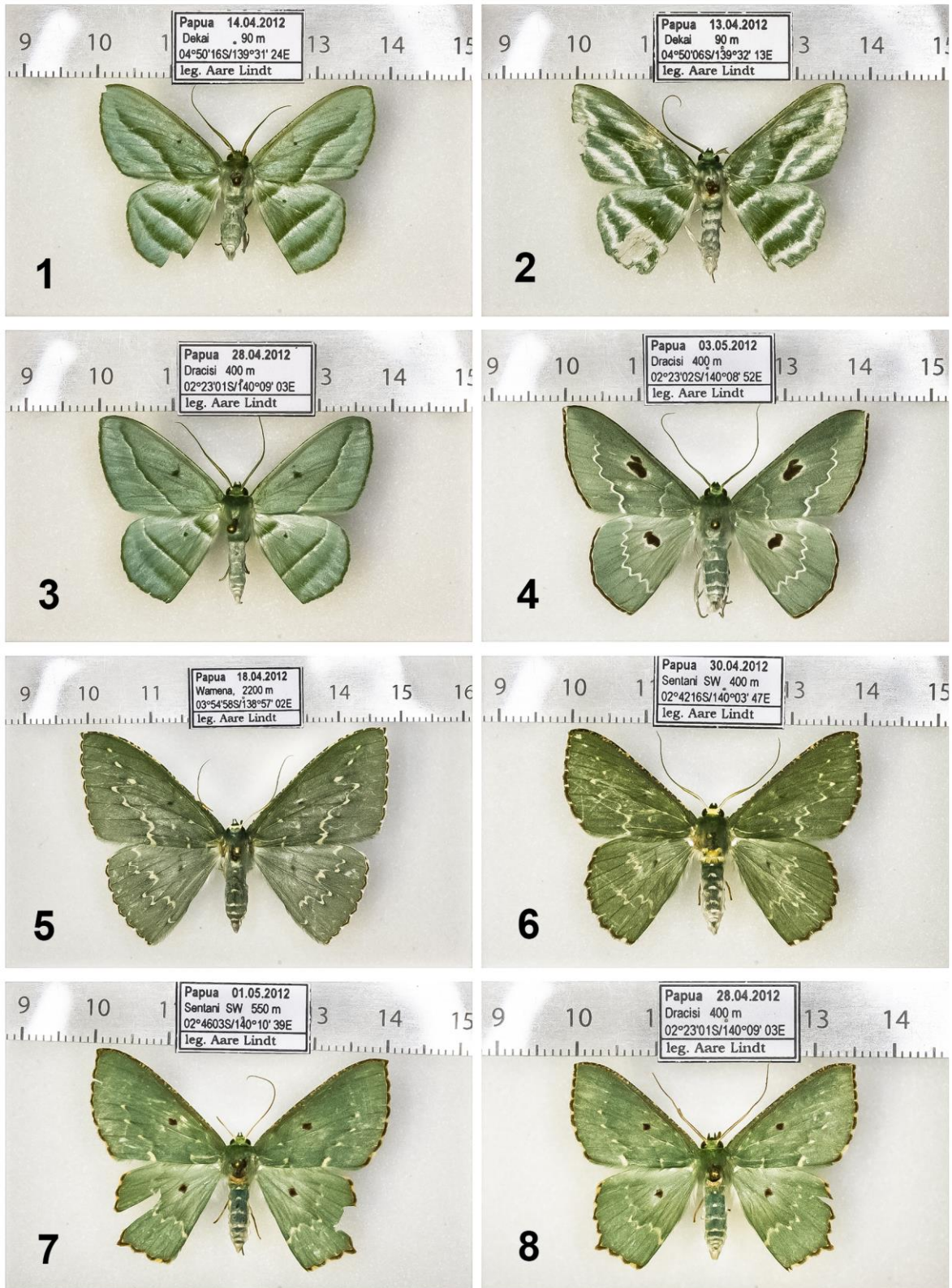
Genital slides of males and females were treated using established procedures (Hardwick 1950), embedded in Euparal and photographed in ventral view. Winged moths were mostly photographed prior to investigation of genital structures. Palpi, antennae and details of wing venation were measured using an ocular micrometer and binocular microscope BM-2. The same approach was used to measure the length of parts of male hind tibia and tarsus, the length of the proximal spurs and the distance from the base of proximal spurs to the base of distal spurs in dry specimens or in permanent slides. Moths were photographed using a Canon 300D digital camera, while genital slides were photographed with a Leica EC3 digital camera. The photographs were enhanced using Adobe Photoshop. BOLD Taxonomy browser's homepages (see References) were checked for similar images.

The holotypes are deposited in the TAMZ collection (Estonian Museum of Natural History, Tallinn, Estonia). The paratypes are deposited in the IZBE collection (Estonian University of Life Sciences, Tartu, Estonia) and in the private collection of A. Lindt. The type specimens of TAMZ and IZBE collection are registered in the PlutoF database.

## Results

### Diagnostic characters of the genus *Dioscore* Warren

Adults (Figs 1–8): The characteristic build of the male frenulum (Figs 29–32) was first used in describing the moth genus *Halterophora* Warren, 1896 (type species: *H. bicolor* Warren, 1896), a homonym of *Halterophora* Rondini, a genus in Diptera. *Halterophora* was synonymized with *Dioscore* Warren by Prout (1912). The genus *Dioscore* is diagnosed by



**Figures 1–8.** Adults of *Dioscore* spp. **1**, *Dioscore thalassias*, male; **2**, *D. nereis*, male; **3**, *D. vilu* sp. nov., male; **4**, *D. melanomma*, male; **5**, *D. fulgurata*, male; **6**, *D. homoeotes*, male; **7**, *D. kirke* sp. nov., female; **8**, *D. kirke* sp. nov., male. Numbers on scale present centimeters.

shortly stalked or connate hind wing veins  $R_{5+M_1}$  and  $M_3+CuA_1$ , and by the unique build of the male frenulum. Females have no frenulum. The discal cell of the forewing is strongly produced towards the apex of the wing. There is one anal vein (A2) present in the hind wing. The male antennae are thinly bipectinate in the basal half (Fig. 24), with the inner pectinations shorter than the external ones. The ground colour of the wings is dark green or greyish green. The thorax and abdomen are covered with long hairscales, flat tufts, and white markings consisting of broad flat scales. The metathorax bears a flat crest of raised scales and is edged creamy brown or whitish posteriorly; the posterior edge of metathorax may also be edged whitish. The tergites A1 and A2 bear white spots, while the tergites A3–A7 are usually lined white along their posterior edges. The hind tibia bears two pairs of spurs, that of males being more or less dilated and provided with a hair pencil (Fig. 23). The male hind tarsus is as long as the tibia (*D. melanomma*, Prout, 1912: Fig. 6), or shorter than the tibia as in *D. kirke* **sp. nov.**, Fig. 23. The distance between the spur pairs exceeds the length of the spurs.

Male genitalia (Figs 9–22): the uncus and gnathos are short and stout, sclerotized strongly, roundish apically; the socii are large, roundish; the uncus and socii bear tufts of fine fan-like arranged hairs dorsally. The valvae are almost plain, with thin folds from the base of the costa to the mid-ventral margin, or have short costal or saccular ornamentation. The base of the valve costa projects as a small but strong triangular dorsal extension. The transtilla is a large rectangular plate connected to the triangular plate of the juxta as an anellar complex described for Neotropical Lophochoristini by Cook & Scoble (1995). The tegumen is sometimes longer than the vinculum, the vinculum has sometimes a prolonged saccus. The saccus is more or less cruciform, projecting keel-shaped towards the base of the juxta. The sacculi have short coremata at their bases. The eighth abdominal segment of the male is only weakly modified, the sternite being slightly sinuous at the posterior margin and a little shorter than the tergite. The third sternite has a pair of patches of thin setae pointing posteriorly in *D. kirke* **sp. nov.** (Fig. 25) but one common patch occurs in *D. nereis* (Fig. 33). The underside of the abdomen is scaled whitish, with a pair of yellowish blotches upon the setal patches on the third sternite. The female genitalia are characterized by a large triangular signum (lamina dentata).

### The species of *Dioscore*

*Dioscore thalassias* (Warren, 1903)

*Dioscore nereis* (Warren, 1912)

*Dioscore ancyla* Prout, 1924

*Dioscore vilu* **sp. nov.**

*Dioscore melanomma* Warren, 1907

*Dioscore fulgurata* (Warren, 1897)

=*Loxochila meeki* Warren, 1903 ?

*Dioscore homoeotes* Prout, 1911

*Dioscore bicolor* (Warren, 1896)

*Dioscore punctifimbria* (Warren, 1903)

*Dioscore kirke* **sp. nov.**

***Dioscore thalassias* (Warren, 1903)** (Figs 1, 9, 16, 29)

*Halterophora thalassias* Warren, 1903: 263; *Dioscore thalassias*: Warren, 1907: 132; Prout, 1912: 74, 1933–1938: 78. De Vos, 2016.

Identification: The brief original description of the wing pattern of *D. thalassias* stresses the presence of brown discal spots on the forewings and green discal spots on the hind wings. Prout (1930–1938) presents some comparative characters to discriminate *D. thalassias* from *D. nereis*: the facies being less contrasting in *D. thalassias*, the white band from the forewing apex to the anal margin being straight and edged proximally by a slenderer bluish green line.

Diagnosis: *Dioscore thalassias* has dark discal spots on paler ground colour and its wing fringe is darker than the submarginal areas of wings, while in *D. nereis* the medial fasciae on forewings are broader, covering the green discal spots, and its wing fringe is concolorous with the submarginal areas of wings.

Description: Adult: Wing span 37 mm (Fig. 1). The frons, interantennal fillet, vertex and thorax are dark green, the frons is slightly convex. The mesothorax is covered with sparse long hairscales, the metathorax is dorsally whitish; the basal abdominal segment is dorsally hairy, dark green, with a white line along the posterior edge. The wings are greenish grey, the forewing with a dark green postmedial band and the hind wing with ante- and postmedial bands; the dark bands are edged white distally. The fringe is unicolorous dark green, darker than the submarginal area of wings. The abdomen is green, sparsely scaled whitish and edged white posteriorly. The male antenna has 38 bipectinate segments; the length of inner and external pectinations at the tenth antennomere is 0.7 and 1.0 mm, respectively. The haustellum is well developed, the male hind tibia has two pairs of spurs.

Male genitalia (Figs 9, 16): The uncus is dilated apically, the socii are relatively weak. The valva is slender, with the costa reaching near the apex of the valvula, which is setose. The valva is much weaker sclerotized than in *D. nereis*, with only a slight subapical notch. There is a thin ridge from the base of the valve costa along the dorsal edge of the sacculus. The anellar complex consists of small juxta, a large transtilla, and a slenderer sclerotized band connected to it ventrally. The saccus is oval, the aedeagus cut straight at base.

Material: 1 ♂, Papua [Indonesia], Dekai, 13.04.2012, 90 m, 04°50'06"S/139°32'13"E; 1 ♂, the same locality but 14.04.2012, 90 m, 04°50'16"S/139°31' 24"E (slide 80).

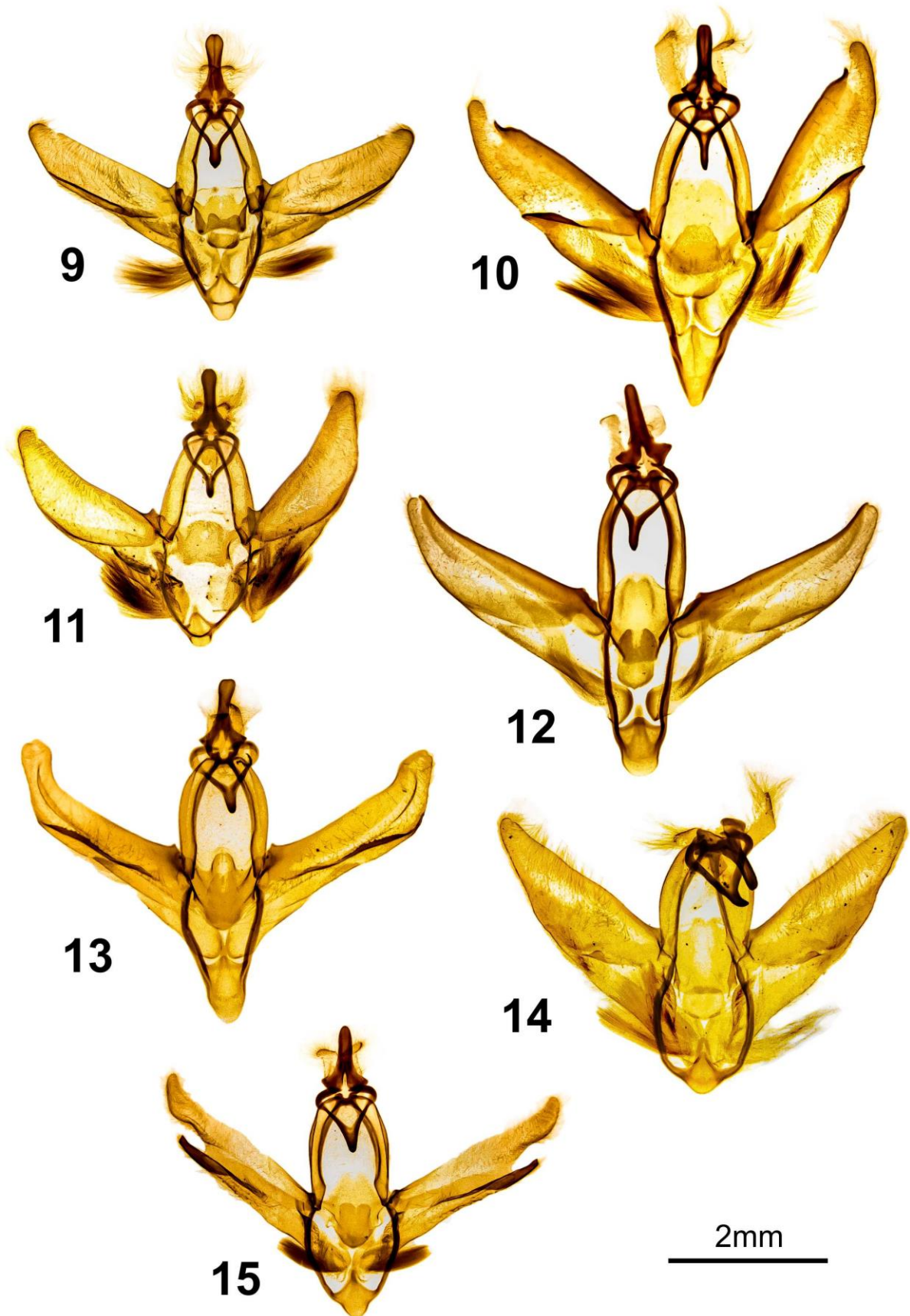
### ***Dioscore nereis* Warren, 1912** (Figs 2, 10, 17, 27, 33)

*Dioscore nereis* Warren, 1912: 28; Prout, 1933–1938: 78, pl. 4c.

Identification: see the text for *D. thalassias* above. In *D. thalassias*, the discal spots are dark, contrasting against the light ground colour, while in *D. nereis* the discal spots are covered by broader dark bands on both wings. The fringe of *D. nereis* is not darker than the ground colour.

Description: Adult: Wing span 37–38 mm in males, 38 mm in females. The facies is as described above as compared to *D. thalassias*. The wings are dark bluish green with three slanting white bands across both wings (Fig. 2). The green discal spots, fused with the dark central band, differentiate this species from less contrastingly marked *D. thalassias*, which has also brown forewing discal spots. The submarginal area and fringe of wings are concolorous with the ground colour. The frons is dark green, the interantennal fillet white, the thorax green and hairy, the abdominal tergites green with white posterior edges. The abdomen is white below with two yellow subbasal spots (Fig. 25).

Male genitalia (Figs 10, 17): The uncus and the distal projection of the gnathos are short, black, pollex-shaped, as long as socii. The valve costa is produced at apex like a thin hook. A strong oblique fold runs from the base of the costa to the centre of the ventral margin of the valva, which is sclerotized and pointed at apex. The saccus is long, conical. The juxta



**Figures 9–15.** *Dioscore* spp., male genitalia. **9,** *D. thalassias*; **10,** *D. nereis*; **11,** *D. vilu* sp. nov.; **12,** *D. melanomma*; **13,** *D. fulgurata*; **14,** *D. homoeotes*; **15,** *D. kirke* sp. nov.

is connected to the transtilla plate, which is longer than in *D. thalassias*. The aedeagus is slender. Female genitalia (Fig. 27): the apophyses posteriores are 1.5 times longer than the apophyses anteriores, the tergite A7 is nearly triangular, the ostium is broadly rounded-triangular, with its posterior edge much broader than in *D. kirke* **sp. nov.** described below. The corpus bursae is longish, the lamina dentata is small, triangular.

Material: 1 ♂, 13.04.2012, Dekai, 90 m, 04°50'06"S/139°32'13"E; 1 ♂, 15.04.2012, Dekai, 90 m, 04°50'13"S/139°31'39"E; 1 ♀, 28.04.2012, Dracisi, 400 m, 02°23'01"S/140°09'03"E.

***Dioscore vilu* Lindt, Lennuk & Viidalepp sp. nov.** (Figs 3, 11, 18, 30)

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Holotype: male, Papua [Indonesia], Dracisi, 400 m, 02°23'01"S/140°09'03"E. 28.04.2012, A. Lindt leg. (slide 84) (id: TAMZ0177802). The holotype is deposited in TAMZ collection (Estonian Museum of Natural History, Tallinn, Estonia).

Diagnosis: a greyish green moth with a conspicuous olive brown straight postmedial line edged distally by a white line slanting from near the forewing apex to the middle of the anal margin of the hind wing (Fig. 7).

Description: Adult: Wing span 37 mm (Fig. 4). The wings are greyish green, the forewings have a grey-edged costa and are lined olive green and white as described in the diagnosis; the fringe is olive green. The hind wings are paler near the costal edge. The submarginal band is absent on the forewings but present as a suffused dark green band on the hind wings. The discal spots are blackish, large on forewings, smaller on hind wings. The frenulum is clubbed leaf-shaped. The male antennae have 38 pectinate segments, the length of the longest external and inner pectinations being 1.2 and 0.75 mm, respectively, i.e. longer than in *D. nereis* and *D. thalassias*. The dorsum of the thorax and the abdomen is hairy, greenish grey, with whitish blotches consisting of broad scales: a thin line along the posterior margin of the metathorax and broad bluish white bands on the tergites.

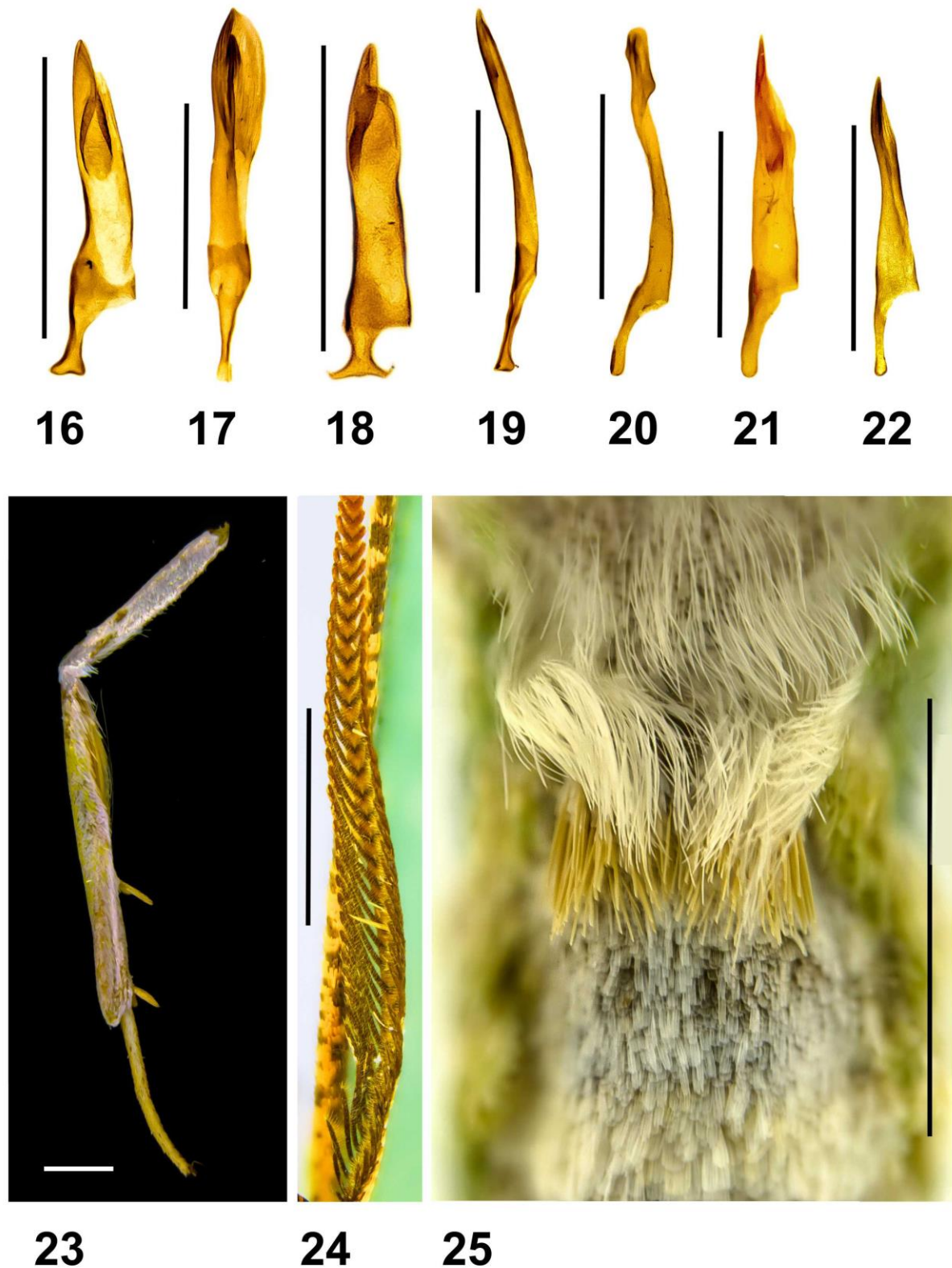
Male genitalia (Figs 11, 18): The uncus and gnathos are similar to those in *D. thalassias*. The genitalia differ from those of *D. thalassias* in the shape of the valvae (smoothly tapering to tips) and in ornamentation. There is a rugose fold near the base of the sacculus in addition to the medial fold. The flat blade-shaped aedeagus is also similar to that in *D. thalassias*, esp. in its short coecum, which is nearly fishtail-shaped in the new species. The last abdominal segment is simple as in *D. thalassias*.

***Dioscore melanomma* Warren, 1907** (Figs 4, 12, 19, 31)

*Dioscore melanomma* Warren, 1907: 132; Prout, 1912: 74–75, Fig.; 1933–1938: 78, pl. 10f.

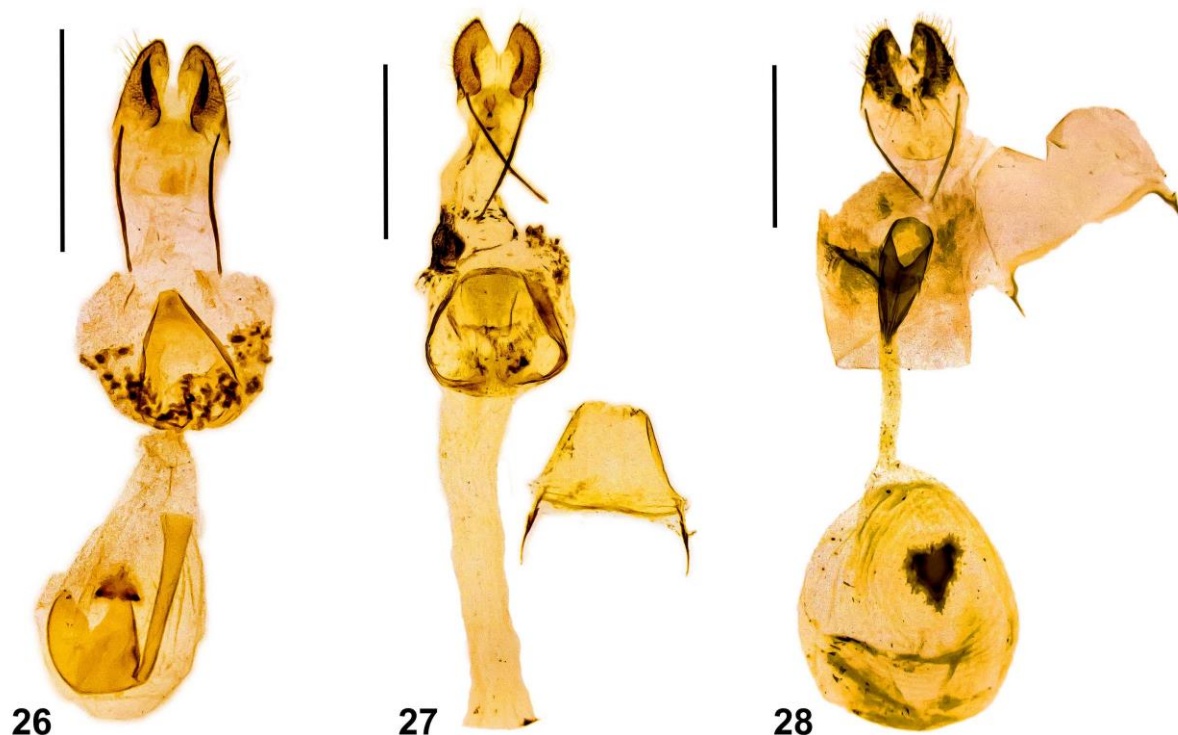
Diagnosis: the species is distinctive in its wing markings: both wings are greyish green with contrasting large black discal marks ringed white (Fig. 4), resembling the wing pattern in the genera *Chloroglyphica* Warren, 1894 and *Euxena* Warren, 1894.

Description: The available descriptions refer to green or greyish green wings with continuous jagged white antemedial and postmedial lines and large oblong black discal marks encircled in white. The male antenna has 37 pectinate segments. The male abdomen is dark green above, with the posterior edges of the tergites edged whitish, and white below, with two yellow blotches near its anterior end.



**Figures 16–25.** *Dioscore* spp. male aedeagi, hindleg, antenna and anterior abdominal segments below. Aedeagi: **16**, *D. thalassias*; **17**, *D. nereis*; **18**, *D. vilu* **sp. nov.**; **19**, *D. melanomma*; **20**, *D. fulgurata*; **21**, *D. homoeotes*; **22**, *D. kirke* **sp. nov.**; **23**, *D. kirke* **sp. nov.**, male hindleg; **24**, *D. kirke*, male antenna, proximal segments; **25**, *D. kirke*, anterior segments of male abdomen from below. Scale bars, 2 mm.





**Figures 26–28.** *Dioscore* spp., female genitalia and tergite A7. **26**, *D. kirke* sp. nov.; **27**, *D. nereis*; **28**, *D. fulgurata*. Scale bars, 2 mm.

Male genitalia (Figs 12, 19): as characterized by Prout (1912). The valva is slender, tapering to a slightly upturned tip, without any ornamentation. The anellar complex consists of a long plate of transtilla and a dorsally notched juxta, which has lateral connections to the lateral points of transtilla. The saccus is prolonged, oval, the coremata are relatively weak. The female genitalia are unknown.

Material: 2 ♂, 13.04.2012, Dekai, 90 m, 04°50'06"S/139°32'13"E; 1 ♂, 14.04.2012, Dekai 90 m, 04°50'16"S/139°31'24"E; 1 ♂, 30.04.2012, Sentani SW, 400 m 02°42'16"S/140°03'47"E; 1 ♂, 01.05.2012, Sentani SW, 550 m, 02°46'03"S/140°10'39"E; 1 ♂, 03.05.2012, Dracisi, 400 m 02°23'02"S/140°08'52"E.

#### ***Dioscore fulgurata* Warren, 1897** (Figs 5, 13, 20, 28)

*Halterophora fulgurata* Warren, 1897: 39; *Dioscore fulgurata* Prout, 1912: 75; 1933–1938: 78, pl 10f; Vos, 2016. *Loxochila meeki* Warren, 1903: 359; *Dioscore meeki* (Warren): Warren, 1907: 132 (synonymized with *D. fulgurata* by Prout, 1912: 75).

Identification: Prout (1930–1938) described this species, *D. homoeotes* Prout and *D. punctifimbria* Warren, 1903 as similar in their dark green ground colour of wings and fragmented white ante- and postmedial lines, and in their brown and white chequered fringe of wings.

Diagnosis: the outer margins of the forewings of *D. fulgurata* are straight and the anal margins of its hind wings relatively long (Fig. 5).

Description: Wing span 45–48 mm. The wings are dark green; see the diagnosis. The metathorax has a raised crest of whitish scales. The postmedial line is an irregular row of

white streaks between the veins, the distal margin of the wings is slightly notched at vein ends and the fringe is spotted white against the vein ends.

Male genitalia (Figs 13, 20): The uncus and the cochlear are round-tipped, strong and short. The valva is characteristically slender, parallel-sided, with its distal end upcurved, ornamented by a slender, roughly sclerotized ridge along the ventral margin, which bifurcates subapically. The transtilla and juxta are of an equal length. The aedeagus is thin, the posterior edge of the sternite A8 is slightly concave. Female genitalia (Fig. 28): the apophyses posteriores are twice the length of the apophyses anteriores. The tergite A7 of females is bilobed at its posterior edge. The ostium is long and slender, funnel-shaped, the ductus bursae is as long as corpus bursae, the lamina dentata is large, triangular.

Material: 2 ♂, 1 ♀, 18.04.2012, Wamena, 2200 m 03°54'58"S/ 138°57'02"E; 3 ♂, 20.04.2012, Wamena, 2350 m 03°54'31"S/138°57'11"E.

### ***Dioscore homoeotes* Prout, 1911** (Figs 6, 14, 21)

*Dioscore homoeotes* Prout, 1911: 267; 1912: 75; 1933–1938: 78.

Identification: Prout (1911, 1930–1938) stressed the convex distal margin of wings as diagnostic for *D. homoeotes* as opposed to *D. fulgurata*, in which the distal margin of forewing is almost straight (Fig. 5). The distal edge of the hind wing is rounded (Fig. 6), not slightly angulate at the vein M<sub>3</sub> as in *D. punctifimbria* Warren.

Diagnosis: The distal margin of the hind wing is convex (Fig. 6), less notched at vein ends than in *D. fulgurata* and not angulate at the vein M<sub>3</sub> as in *D. punctifimbria* Warren.

Description: Wing span 40 mm. Very similar to *D. fulgurata* in its wing colour, differing in that its vertex is creamy, not green as in *D. fulgurata*, more rounded at the distal margin of the hind wing and slightly crenulate, the whitish ornamentation of the abdomen is broader, and the crest of the metathorax is light yellow, not white. The series listed below is tentatively positioned here, although it has as many pectinations on the antennae as in *D. fulgurata* and other species of *Dioscore* – 37–38. The heavier marked discal spots and slightly shorter anal margin of the hind wing distinguish this species from *D. fulgurata*.

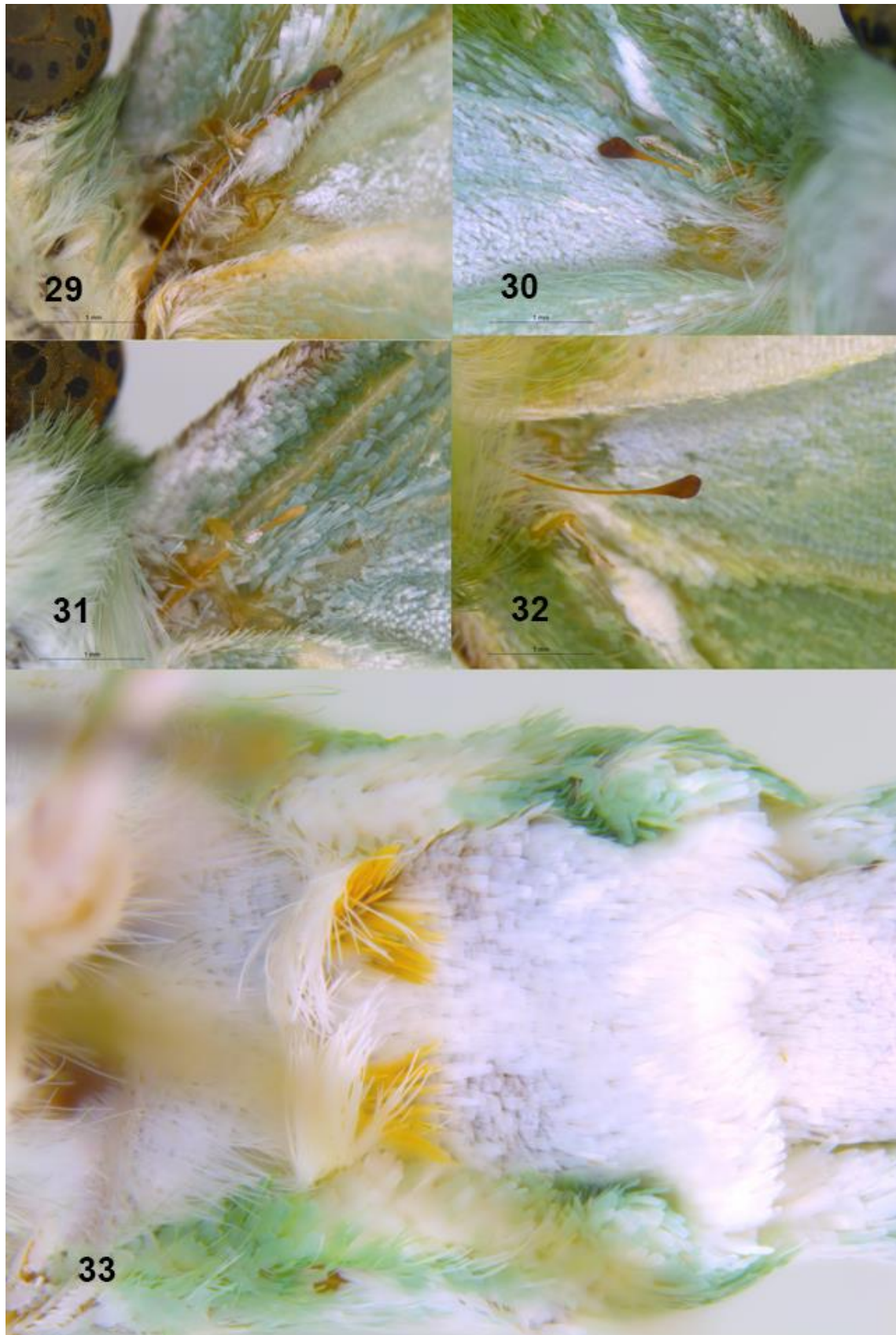
Male genitalia (Figs 14, 21): The uncus and gnathos are strong and round-tipped as given in the genus description. The valva is tapering to the distal end, bearing a short transversal ridge from the base of the costa to the centre of the ventral margin of the valva, being enlarged as a small crista just before the margin. The transtilla is a long plate. The saccus is short, the coremata are present, thin. The aedeagus is short, with a long tapering ventro-distal projection and a filiform coecum.

Material: 1 ♂, 14.04.2012, Dekai 90 m, 04°50'16"S/139°31'24"E; 1 ♂, 30.04.2012, Sentani SW, 400 m 02°42'16"S/140°03'47"E; 1 ♂, 01.05.2012, Sentani SW, 550 m 02°46'03"S/140°10'39"E.

### ***Dioscore kirke* Lindt, Lennuk & Viidalepp sp. nov.** (Figs 7, 8, 15, 22, 23, 24, 25, 26, 32)

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Holotype: male, Papua [Indonesia], Dracisi 28.04.2012, 400 m, 02°23'01"S/140°09'03"E (id: TAMZ0177803). Paratypes: 1 ♂, Dekai Dekai 14.04.2012, 90 m, 04°50'16"S/139°31'24"E (slide 77); 1 ♂ ♀ (id: TAMZ0177804), Sentani SW, 01.05.2012, 550 m, 02°46'03"S/140°10'39"E (slide 81) (A. Lindt). The holotype is deposited in TAMZ collection (Estonian Museum of Natural History, Tallinn, Estonia).



**Figures 29–33.** *Dioscore* males: frenulum and anterior segments of abdomen: Frenulum: **29**, *D. thalassias*; **30**, *D. vilu* **sp. nov.**; **31**, *D. melanomma*; **32**, *D. kirke* **sp. nov.**; **33**, *D. nereis*, anterior abdominal segments below.

Diagnosis: the new species is similar to *D. fulgurata* in its wing pattern, differing in that the hind wing is sharply short-tailed (Fig. 8) and the discal spots are larger in both wings, and also in its male and female genitalic characters.

Description: Adult: Wing span 34–36 mm in males, 40 mm in females. The haustellum is functional, the palpi are short and stout. The frons is dark green, convex, the interantennal fillet and vertex are green. The thorax is hairy, green with a dark brown patch, the metathorax has a low light brown crest. The abdomen is hairy, greenish grey dorsally, with white markings consisting of broad robust scales: a square white spot on the tergite A1, a broader rectangular white blotch on the tergite A2, and whitish lines on the posterior edges of A3–A6. The male antennae are bipectinate on 37 segments (Fig. 24), the external pectinations are one-half longer than the inner ones (1.0 and 0.7 mm long, respectively). The female antennae are filiform. The male hind tibiae have two pairs of spurs and a short distal process (Fig. 23), the tarsus is shorter than the tibia. The vein  $M_1$  in the forewing is separate, while  $M_3$  and  $CuA_1$  are connate. In the hind wing, the veins  $R_s$  and  $M_1$  as well as  $M_3$  and  $CuA_1$  are connate, with the distal margin shortly tailed at the vein  $M_3$ . The frenulum is present in males, clubbed leaf-shaped to the distal tip (Fig. 32). The wings are deep green with a bluish tint, the discal spots are black, angulate in both wings. The costal edge of the forewing is striated light brown and dark brown; three white spots mark the place of the antemedial line. The white postmedial lines on the forewings are fragmented into vein-spots. The two larger spots near the anal margin are connected by a white bar and those at the hind margin by conspicuous jagged lines. Underside, the forewings are light green, the hind wings silvery shining, the discal spots minute, brown in both wings. The marginal line is thin on both wings, light brown, thicker at vein ends; the fringe is light brown, chequered dark brown at vein ends, the dark brown colour prevailing at the subapical part of the forewing fringe. Males have one patch of deciduous setae at the sternite A3 (Fig. 33).

Male genitalia (Figs 15, 22): The uncus and gnathos are stout and sclerotized strongly, the cochlear is broader at base. The valva is slender, parallel-sided, the sacculus has a long, rugose distal projection. The saccus is triangular; short but thick coremata pencils are present at the bases of the sacculi. The aedeagus is broad blade-shaped but with a thin filiform anterior part (coecum). The last abdominal segment is not modified in males.

Female genitalia (Fig. 26): The ovipositor lobes are lemon slice shaped, the posterior apophyses being relatively stout. The ostium is rounded-triangular, its posterior edge being shorter than in *D. nereis*. The sterigma is covered with sparse broad scales. The corpus bursae is pear-shaped, with a large lamina dentata.

## Discussion

Prout (1930–1938) placed *Dioscore*, in the context of the Indo-Australian fauna, between the (as recently delimited by Pitkin *et al.* (2007)) pseudoterpnine (Pseudoterpninae) genera and *Eucyclodes* Warren, 1894, having mentioned earlier (Prout 1912) the genitalic similarity of *Dioscore* with *Hipparchus* Leach, 1815 (*Geometra* Linnaeus, 1758). With that placement, Prout (1930–1938) probably indicated that the genus *Dioscore* seems to lack close relatives in the subfamily.

The build of the male frenulum and the shape of the uncus and gnathos (short, stout, sclerotized black and rounded, not tapering to tip) are autapomorphic for the genus *Dioscore*. The uncus and socii are hairy dorsally, the hairs are fine and spread fan-shaped. A similar frenulum modification is known in the unrelated Neotropical genus *Strepsizuga* Warren, 1908

(Larentiinae, Triphosini) (Viidalepp 2011) but associated in this case with a modified retinaculum.

The frenulum is absent in *Dioscore* females. Pseudoterpninae genera have the frenulum usually present in both sexes (Pitkin *et al.* 2007). Its presence in females is supposed to be plesiomorphic (Holloway 1996), or primitive (Prout 1912), such genera have traditionally been placed at the beginning of the system (e.g. Han & Xue 2011).

The uncus in the male genitalia is thumb-shaped, sclerotized strongly, and hairy on its dorsal side in *Dioscore*. Some uncal vestiture is observable e.g. in the afrotropical geometrine genus *Bathycolpodes* Prout, 1912 (e.g. *B. perdistincta* Herbulot, 2003). The Indo-Australian tropical genus *Dysphania* Hübner, 1819 (Dysphaniini) has a short, strong and more or less hooked uncus and an antagonistically hooked distal process of the gnathos. In *Dysphania*, the dorsal surface of the uncus and socii is covered with dense and long tufts, and there is one patch of setae on the third sternite of the abdomen in males of *Dysphania*. Pseudoterpnine genera usually have a bifid uncus and their uncus and socii are sparsely hairy on the dorsal surface (Han & Xue 2011).

A short uncus with a rounded tip is shown for *Chlorocoma octoplagiata* Holloway, 1979 (Holloway 1979, Fig. 47). A thumb-shaped uncus and a distal process of gnathos comparable to that in *Dioscore* are present in the *thalassina* and *quinquemaculata* species groups of the genus *Oospila* Warren, 1897 (which belongs to Lophochoristini) in the New World fauna. In other species groups of *Oospila*, the uncus is reduced and the gnathi are separated, hook-like, not fused into a gnathos. Paired gnathi are interpreted as a degenerated gnathos (Schmidt 2015). The genus *Oospila* has two characters distinguishing it from all other Geometrinae genera (Cook & Scoble 1995): the abdominal dorsal crests formed of specialised scales, and conspicuous sclerotization of the juxta, transtilla and other structures surrounding the aedeagus in male genitalic armature into the anellar complex.

Wings are densely scaled, deep green with a bluish tint in some *Dioscore* species, greyish green in others. This deep bluish green pigment of wings is rare in moths but characteristic for *Tanaorhinus* Butler, 1879, which is placed in the tribe Geometrini by Inoue (1961) and Han & Xue (2011) and shares with *Dioscore* the shape of the discal cell in forewings. The distal tip of the forewing discal cell appears produced towards the wing apex also in numerous geometrine genera of the Old World fauna.

There is a large triangular rugose plate in corpus bursae of female *Dioscore* instead of the typical (Holloway 1996) bicornute signum of Geometrinae.

The genus *Dioscore* has few affinities with the Indo-Australian genera of Geometrinae, while sharing some traits with the Neotropical genera of Lophochoristini (e.g. the presence of abdominal ornamentation). The build of the derivatives of the tenth abdominal segment (the uncus and the gnathos) in male genitalia, that of the frenulum in male hind wings, and the presence of the lamina dentata in the corpus bursae of females are autapomorphic characters of the genus. The presence in *Dioscore* of a putative analogy to the anellar complex in the male genital armature described for Neotropical Lophochoristini needs detailed investigation in a broader set of Indo-Australian and afrotropical geometrine genera. Further detailed investigation of the bioecology and barcodes of *Dioscore* may show that the genus is to be separated in a tribe of its own in the context of the world fauna of the subfamily Geometrinae.

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