

# Two new emerald moth species from Ecuador, Peru and Bolivia (Lepidoptera: Geometridae, Geometrinae)

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## Abstract

Two new species: *Lissochlora janamariae* Lindt & Tasane, sp. n. from Ecuador and Bolivia and *Lissochlora hinoyosae* Lindt & Viidalepp, sp. n. from Peru, are described. The wing pattern, structure of palpi, antennae, legs and male genitalia of the new species are illustrated. The generic attribution of the new species is discussed. KEY WORDS: Lepidoptera, Geometridae, Geometrinae, *Lissochlora*, new species, Ecuador, Peru, Bolivia.

## Dos nuevas especies de polillas esmeraldas de Ecuador, Perú y Bolivia (Lepidoptera: Geometridae, Geometrinae)

## Resumen

Se describen dos nuevas especies: *Lissochlora janamariae* Lindt & Tasane, sp. n. de Ecuador y Bolivia y *Lissochlora hinoyosae* Lindt & Viidalepp, sp. n. de Perú. Se ilustra el dibujo alar, estructura del palpo, antena, patas y genitalia del macho de las nuevas especies. Se discute la atribución genérica de las nuevas especies. PALABRAS CLAVE: Lepidoptera, Geometridae, Geometrinae, *Lissochlora*, nuevas especies, Ecuador, Perú, Bolivia.

## Introduction

The emerald moth genus *Lissochlora* Warren, 1900 (type species: *Aplodes flavifimbriata* Warren, 1897) was originally described using the characters of wing shape and pattern. PROUT (1912) subsequently synonymized *Lissochlora* with *Racheospila* Guenée, 1857 and *L. flavifimbria* (Warren, 1897) with *Nemoria bryata* Felder & Rogenhofer, 1875. PROUT (1932) also used informal species groups to structure the large genus *Racheospila*. PITKIN (1993) redefined *Lissochlora* as a genus characterized by the presence of a spur or kink on the aedeagus, and by the absence of the autapomorphic characters of related genera *Nemoria* Hübner, *Phrudocentra* Warren, *Paromphacodes* Warren, *Poecilochlora* Warren and *Synchlora* Guenée. VIIDALEPP & LINDT (2012) transferred two species, *L. senescens* Prout and *L. niveiceps* Prout, from *Phrudocentra* to *Lissochlora*.

Both species described below have semidiaphanous wings with a suffused pattern, recalling some species in the genus *Hydata* Walker. The absence of funnel-shaped projections to the transtilla, which are autapomorphic for *Hydata*, venation of the wings, genital characters - especially the presence of a distinct spur on the aedeagus and a short uncus combined with tapering socii - place them in *Lissochlora*. Similar, broad suffusion on parts of the ante- and postmedial bands of both wings is characteristic of *Nemoria? roseilinearis* Dognin and *N. epaphras* Schaus. Forty-four described species were associated with *Lissochlora* by PITKIN (1993) and two species added by VIIDALEPP & LINDT (2012); here the total number of *Lissochlora* species is raised to forty-eight.

## Material and methods

The present study was initiated by attempts to identify moths in the collections of the Estonian Museum of Natural History (EMNH) and the IZBE collection deposited in the Estonian University of Life Sciences (EULS) during 1999-2010. Series of moths collected by A. Lindt (EMNH, Tallinn), served for 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, legs 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. The length of the distal process of the tibia was measured from its tip to the base of distal spurs on the inner side of the tibia, and compared to the length of the basal tarsomere. The length of the 3<sup>rd</sup> segment of the palpus was measured for males and females according to the availability of material. Moths were photographed using a Canon 300D digital camera, while genital slides were photographed with a Leica EC3 digital camera. Photographs were enhanced using Adobe Photoshop. BOLD and EOL homepages (see References) were checked for similar images.

### *Lissochlora janamariae* Lindt & Tasane, sp. n. (Figs 1, 2, 4, 6, 8, 10, 12)

Holotype ♂, Ecuador, Oriente, Cosanga, 2100 m, 0° 35' 26" S, 77° 50' 40" W, 19-II-2008 (A. Lindt), gen. slide IZBE 8404. Paratype ♀, Bolivia, Coloni, 1917 m, 2-X-2010, 17° 12' 45" S, 65° 49' 11" W (A. Lindt). The holotype is deposited in the Estonian Museum of Natural History collection, Tallinn, Estonia. Paratype in the collection of Museo de Historia Natural Noel Kempff Mercado, Santa Cruz, Bolivia.

Description: Wing span: 24 mm. Head: frons brown, whitish below, vertex greenish grey, interantennal fillet pure white. Male antennae pectinated, the length of pectinations reaching 0.11 mm on the tenth segment; antennae slightly dentate in female. Palpus grey, the length of the 3<sup>rd</sup> segment 0.085 mm in male, 0.13 mm in female. Thorax and abdomen: greenish grey dorsally, without crests and spots, lighter greyish below. Male hind tibia slender, two pairs of long spurs present, the proximal spurs longer than the distance between spur pairs. The distal process of the male hind tibia one third of the length of the basal tarsomere. Wings greenish grey, semi-diaphanous, ante- and postmedial bands broad, indistinct, grey in both wings, slightly darker and projecting dentate along veins towards the distal margin of wings. Discal spot large, indistinct, fused to subcostal shadow in forewing, smaller and indistinct in hind wing. Hind wing with an indistinct darker blotch at base. Marginal line absent, fringe greenish grey, slightly darker against vein ends. Underside of wings paler grey-green. Female has less diffuse wing markings, isolated forewing discal spot and slightly broader medial area.

Male genitalia: Uncus stout and finger-shaped, socii linear, slightly shorter than uncus, tapering to ventral tip. Gnathos ring shaped with long triangular distal process (cochlear). Valva with broad costal plate reaching near tip of valvula; its dorsal edge convex in basal half, with a smooth quer fold at the centre and smooth distally. Distal third of aedeagus sable-shaped. Sternite A8 has central rib complete; posterior edge slightly bilobed, two times shorter than anterior edge, which is concave.

Remark: This species is named in honour of Mag. Jana-Maria Habicht, botanist at the Estonian Museum of Natural History, Tallinn, who kindly assisted with microphotography of slides. Gender feminine.

### *Lissochlora hinojosae* Lindt & Viidalepp, sp. n. (Figs 3, 5, 7, 9, 11, 13)

Holotype ♂, Peru, Oxapampa, 2300 m, 14-17-XI-2003, 10° 27' 08" S, 75° 17' 04" W (A. Lindt). The holotype is deposited in the Estonian Museum of Natural History collection, Tallinn, Estonia.

Description: Wing span: 23 mm. Head: frons and interantennal fillet green, vertex greenish grey. Male antennae bipectinate, the length of pectinations reaching 0.08 mm on the tenth segment. Palpus fuscous, the length of the 3<sup>rd</sup> segment 0.06 mm long in male. Thorax and abdomen: greenish grey dorsally, without crests and spots, lighter greyish below. Male hind tibia slender, as long as tarsus, two pairs of long spurs present, the proximal spurs longer than the distance between spur pairs. Hind tibia with a distal process one quarter of the length of the basal segment of the tarsus. Wings greenish grey, semi-diaphanous, ante- and postmedian bands broad, indistinct, grey in both wings. Discal spots large, indistinct, separated from the costal shadow in forewing, postmedial band gently curved, parallel to distal margin of forewing, slightly angled at vein M3 in hind wing. Marginal line absent, fringe greenish grey. Underside of wings paler grey-green. Compared to the above-described species, veins in submarginal area of wings scaled darker, giving the species a more reticulate appearance.

Male genitalia: Uncus stout and finger-shaped, socii linear, slightly shorter than uncus, tapering to ventral tip. Gnathos ring shaped with triangular cochlear, more slender than in previous species. Costal plate of valva broad, reaching close to the apex of the valvula; basal two-thirds of dorsal edge convex, with a deep incision at the erect, stout costal quer-fold, smooth distally. Aedeagus sable-shaped in distal third and with a lateral spur. Sternite A8 slightly longer than in *L. janamariae*, with central rib complete, posterior edge slightly bilobed, anterior edge concave, two times longer than the distal sclerotization.

Discussion: The wing markings of *L. janamariae* and *L. hinojosae* fit well with the original description of *Blechroma epaphras* Schaus, which is placed by PROUT (1932: 34) near *Racheospila hena* and *R. multiseriata*. PITKIN (1993: 66, Fig. 152) provided illustrations of the male genitalia of *Nemoria epaphras*; they are nemoriine and thus well distinct from a *Lissochlora*. A group of species have one or two quer-folds across the dorsal edge of the costal plate of valva: *Lissochlora punctiseriata* Dognin (*florifera* Prout), *L. multiseriata* Dognin, *L. hena* Dognin, *L. jenna* Dognin, *L. rufipicta* Prout and others. However, all these species have ante- and postmedian bands represented by rows of grey streaks or spots on the veins. The first three of the listed species also have enlarged discal spots on the wings. Both new species have proximal spurs on the hind leg that are as long as or longer than the distance between spur pairs-which is a characteristic shared by some species of a related genus, *Phrudocentra* Warren (VIIDALEPP & LINDT, 2012).

Remark: This species is named in honour of Ms Michaela Antonieta Hinojosa Yanouch from Yacu Parque Museo del Agua, Quito, Ecuador. Gender feminine.

## Acknowledgements

We thank officials at the Ministerio del Ambiente, Quito, Ecuador; Ministerio de Agricultura, Instituto Nacional de Recursos Naturales, Lima, Perú, and Museo de Historia Natural Noel Kempff Mercado, Santa Cruz, Bolivia, for providing collecting licenses. Ms Michaela Antonieta Hinojosa Yanouch from Yacu Parque Museo del Agua, Quito, Ecuador; Dr. M. Ramst and Mag. Jana-Maria Habicht kindly assisted us during various stages of the work. John Davosin kindly read and corrected linguistically the first version of the article. We thank anonymous referees for constructive comments on the manuscript, and Dr. Antonio Vives for providing translation of the abstract into Spanish.

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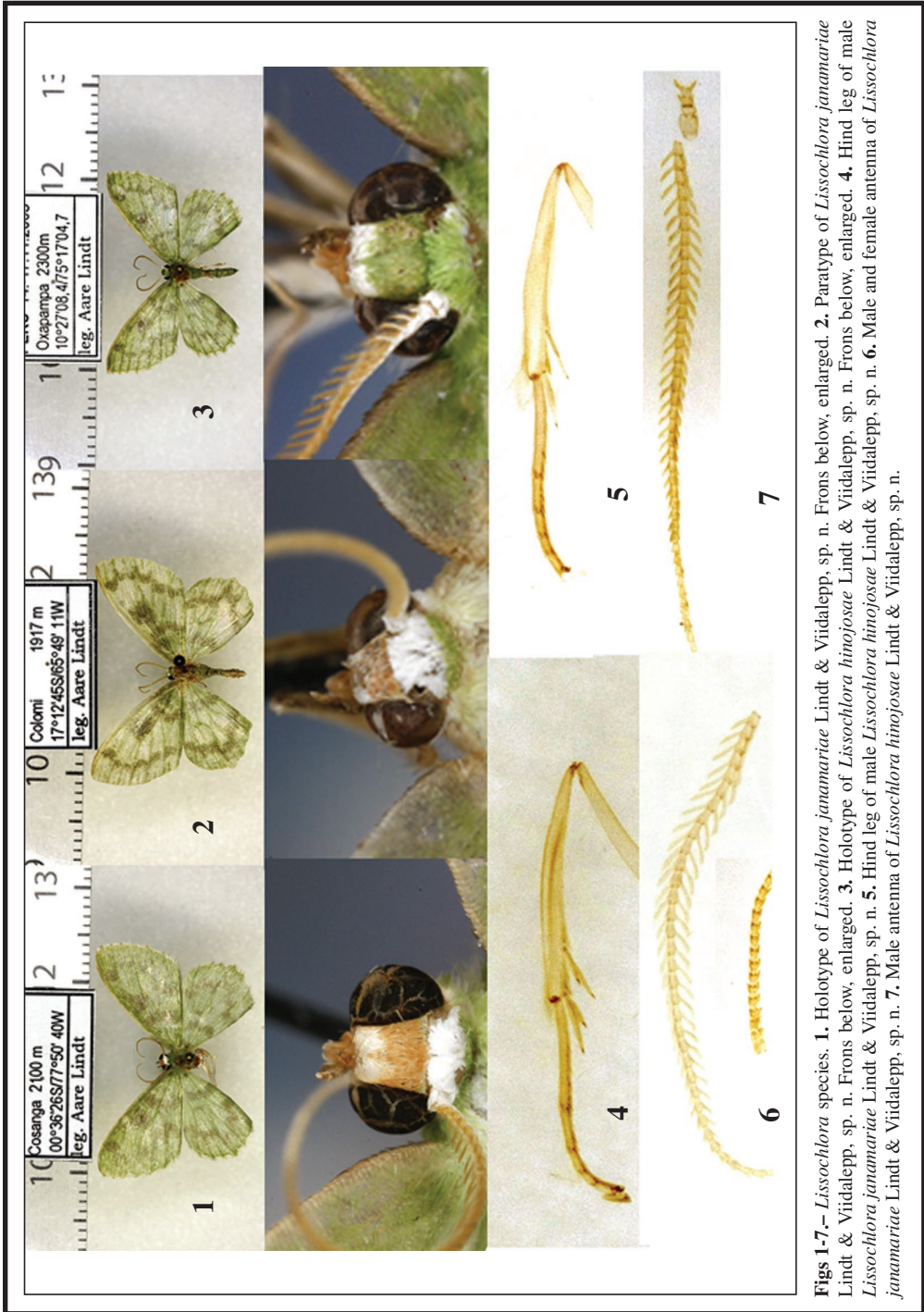
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(Recibido para publicación / *Received for publication* 30-IV-2013)

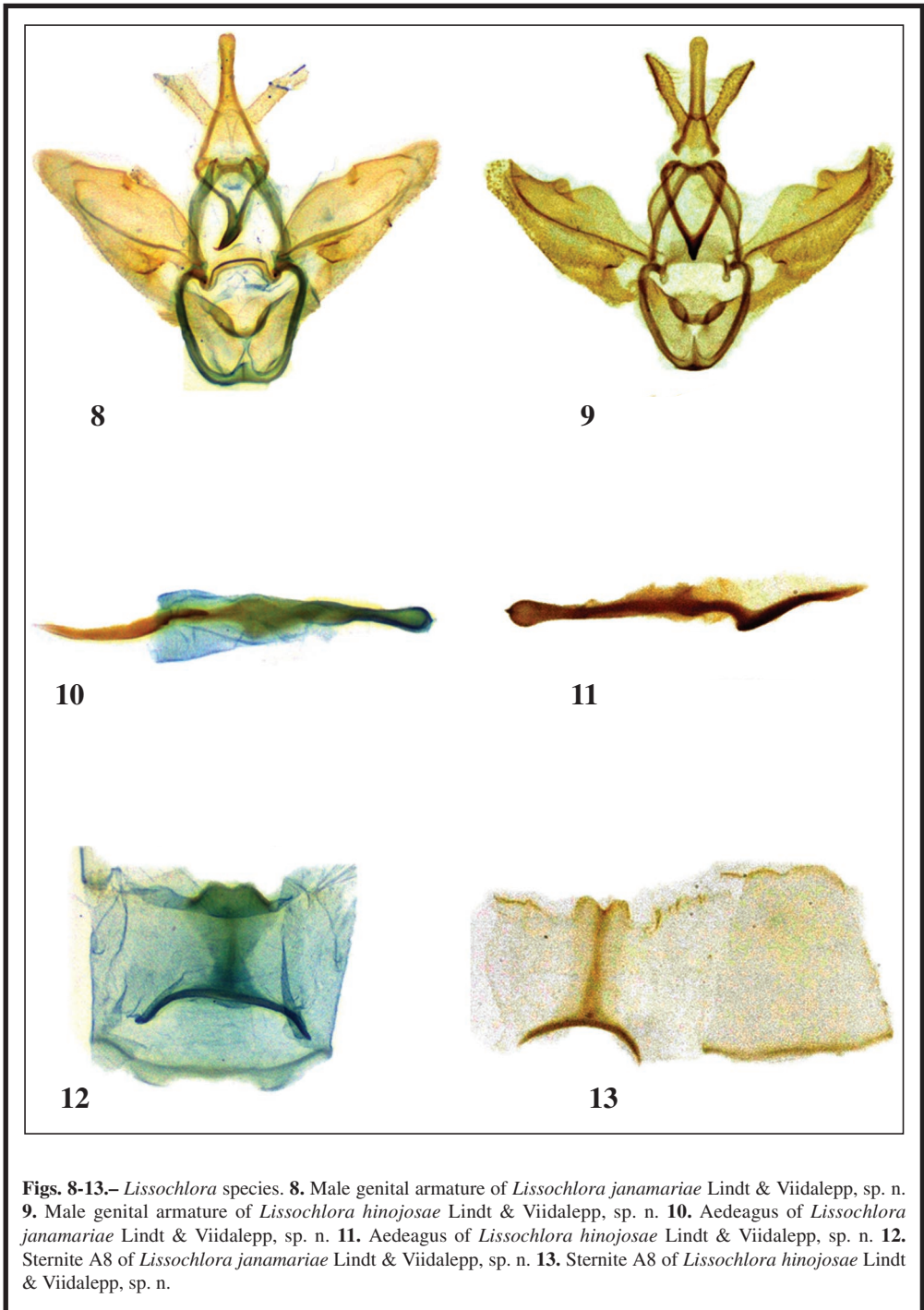
(Revisado y aceptado / *Revised and accepted* 27-VI-2013)

(Publicado / *Published* 30-III-2014)



**Figs 1-7.**— *Lissochlora* species. **1.** Holotype of *Lissochlora janamariae* Lindt & Viidalepp, sp. n. Frons below, enlarged. **2.** Paratype of *Lissochlora janamariae* Lindt & Viidalepp, sp. n. Frons below, enlarged. **3.** Holotype of *Lissochlora hinojosae* Lindt & Viidalepp, sp. n. Frons below, enlarged. **4.** Hind leg of male *Lissochlora janamariae* Lindt & Viidalepp, sp. n. **5.** Hind leg of male *Lissochlora hinojosae* Lindt & Viidalepp, sp. n. **6.** Male and female antenna of *Lissochlora janamariae* Lindt & Viidalepp, sp. n. **7.** Male antenna of *Lissochlora hinojosae* Lindt & Viidalepp, sp. n.





**Figs. 8-13.**– *Lissochlora* species. **8.** Male genital armature of *Lissochlora janamariae* Lindt & Viidalepp, sp. n. **9.** Male genital armature of *Lissochlora hinojosae* Lindt & Viidalepp, sp. n. **10.** Aedeagus of *Lissochlora janamariae* Lindt & Viidalepp, sp. n. **11.** Aedeagus of *Lissochlora hinojosae* Lindt & Viidalepp, sp. n. **12.** Sternite A8 of *Lissochlora janamariae* Lindt & Viidalepp, sp. n. **13.** Sternite A8 of *Lissochlora hinojosae* Lindt & Viidalepp, sp. n.