

**TO THE KNOWLEDGE OF GEOMETRID MOTHS
OF NICARAGUA
(LEPIDOPTERA: GEOMETRIDAE).**



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TO THE KNOWLEDGE OF GEOMETRID MOTHS OF NICARAGUA (LEPIDOPTERA: GEOMETRIDAE).

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Introduction.

The material collected by O. Kurina, J. and V. Viidalepp in Central Nicaragua, GRANADA: Domitila Private Forest area, 28 May to 1 June, 2008 and 7 to 10 November, 2009 (15 species), in Southern Nicaragua, RIO SAN JUAN: Refugio Bartola, 2-8 June 2008 and 2 to 6 November, 2009 (40 spp.), and in MATAGALPA Selva Negra estate, 10 to 16 November, 2009 (31 spp.), comprising 73 species of the subfamily of Geometrinae of geometrid moths, is listed. The corresponding material is deposited in the collection of IZBE in Estonian University of Life Sciences.

Some other geometrine species mentioned from Nicaragua are referred to: *Synchlora indecora* by Prout, 1932 (as *Racheospila pomposa indecora* Prout, 1916, according to Pitkin (1993); *Oospila venezuelata* Walker (as *Auophyllodes venezuelata* Walker by Prout, 1932). Cook & Scoble (1995) list *Oospila concinna* Warren, *O. lilacina* Warren, and *O. atopochlora* Prout.

For each species, the collecting locality and corresponding number(s) of genitalic slides are given. Aside of a photograph of a voucher specimen, photos of male genitalic sclerites (armature and aedeagus, if relevant, the last abdominal sternite) are presented and provided with comparative notes. The original cites and essential publications dealing with the species are listed. The distribution of species according to the available literature is reviewed. The opportunity is taken to present some original, unpublished distribution data from French Guiana, Ecuador, Venezuela and Paraguay. Those are, however, listed without details, which will be published elsewhere. Photos of moths in nature are taken by T. Viidalepp and J-M. Maes, while text and microphotos are prepared by first author.

Part I. Subfamily Geometrinae, Emerald moths from Bartola Private Forest Area (Prov. San Juan).

Abstract.

Fourty species of green geometrid moths were collected on the Bartola site, 02-06.06.2008 and 02.-06.11.2009. The site, at the river San Juan, opposite the border of Costa Rica, is covered by rich wet tropical forest. Two species reach the southern border of Nicaragua from north: *Nemoria modesta* Dognin and *Chloropteryx jalapata* Dyar. Three species are endemic in Middle America: *Tachyphyle hamata* Schaus, *Nemoria adaluzae* Pitkin and *Oospila camilla* Schaus. Thirteen species have been mentioned earlier as having northern distribution limit in the fauna of nearby Costa Rica, the present data documenting their reaching Nicaragua. *Chavarriella semiornata* (Warren, 1901) (type locality: Panama) and *Lissochlora manostigma* (Dyar, 1912) (type locality: Mexico) are listed from Nicaragua by Pitkin (1993), whereas *Oospila lilacina* Warren, 1906 (type locality: French Guiana), *Oospila atopochlora* Prout, 1933 (type locality: Colombia) and *Oospila venezuelata* Walker, 1861 are listed for Nicaragua by Cook & Scoble, 1995: 48 & 54 (Zelaya Prov.: Eden, except *O. venezuelata* from Rio San Juan: Chontales).

Determinations of species in the genera *Synchlora* and *Chloropteryx* are tentative as these genera require a comprehensive revision.

***Rhodochlora brunneipalpis* Warren ?ssp. *minor* Prout.**

Rhodochlora brunneipalpis Warren, 1894: 385 (Guyana).

Rhodochlora brunneipalpis f. *minor* Warren, 1909: 87 (Peru).

Rhodochlora brunneipalpis minor Prout, 1932: 21 (Peru).

Rhodochlora brunneipalpis Warren: Pitkin, 1996 390.

Rhodochlora brunneipalpis minor. Chacón & Montero, 2007, pl. 201.

Distribution: according to Pitkin (1996): Guyana (*R. b. brunneipalpis*); Costa Rica, Colombia?, Peru (*R. b. minor*). New country record: Nicaragua.



Discussion. Three *Rhodochlora* species are listed for the fauna of adjacent Costa Rica. Two of these belong to the informal *R. rothschildi* Warren, 1901 group of species characterized by falcate forewing and more variegated facies. The third species, *R. brunneipalpis*, as well as *R. mathani* Prout, 1932 (Ecuador) and *R. rufaria*

Prout, 1932 (Peru, Brazil, Colombia, Fr. Guiana) have plainer wing markings similar to one another, slightly convex distal margin of forewing and flat, plate-like socii. *R. mathani* has hindwing distal margin roundly angulate at vein M3, while *R. rufaria* and *R. brunneipalpis* share round distal margin in hindwing. On the other hand, *R. rufaria* and *R. mathani* have the medial area of hind wing covered with rusty or grey-brown hue, which is absent in *R. brunneipalpis*. *R. rufaria* has extremely broad socii in male genitalia (cf. Pitkin, 1996, Fig. 124). It is common in French Guiana (pers. obs.).

The material from Mesoamerica is thus not homogeneous. The male from Bartola and eight studied males from Costa Rica share: 1) long and broad socii elbowed at middle, 2) long (2.8 – 3.5 mm) and thin aedeagus with two small apical carinae, 3) distally broader valva with costa slightly projecting apically. The studied material of putative *Rhodochlora mathani* (Ecuador) and *R. brunneipalpis minor* (from Peru) has aedeagus shorter (2.4 and 2.6 mm, respectively), socii slenderer and more evenly convex.

The male specimen from Bartola is specific by the longest finger-shaped projection from the base of valve costa; this projection is shorter, roundish, roughly as long as broad in the Costa Rica material. Three of the slides of *R. brunneipalpis* from the Costa Rica material have saccus emarginated centrally. The heterogeneity may be addressed to the phenotypical plasticity of Mesoamerican populations. A disjunct distribution area for a subspecies (*R. brunneipalpis minor*) is not logical, and the Mesoamerican population deserves a subspecies rank.

***Dichorda obliquata* Warren.**

Dichorda obliquata Warren, 1904: 503 (Mexico).

Dichorda obliquata Warren: Pitkin, 1996: 341-343, Fig. 94.

Distribution: according to Pitkin (1996): Mexico, Guatemala?, Costa Rica?. New country record: Nicaragua.

Discussion. The specimens from Bartola lack a blackish blotch on hindwing underside mentioned by Pitkin (1996) for *D. obliquata*, but a comparison of genitalic figures published for related species by Ferguson (1985) and Pitkin (1996) allows an exact identification.





***Tachyphyle acuta* Butler.**

Tachyphyle acuta Butler, 1881: 329 (Brazil).

Tachyphyle aganapla Dyar, 1913: 309 (Mexico).

Tachyphyle acuta Butler: Pitkin, 1996: 406.

Distribution: according to Pitkin (1996): Southern Mexico, Belize?, Panama?, Colombia?, Trinidad?, French Guiana?, Brazil. New country records: Nicaragua; Costa Rica, Ecuador, Paraguay; confirmed: French Guiana.





Discussion. The species is conservative in its morphological characters throughout the wide distribution area. It is also one of a few species recorded both in Domitila and Bartola sites, commoner in November. Long projecting saccus and flat cornutus on vesica are specific.

***Tachyphyle oleaster* Schaus.**

Tachyphyle oleaster Schaus, 1912: 288 (Costa Rica).

Tachyphyle oleaster Schaus: Prout, 1932: 46.

Tachyphyle oleaster Schaus: Pitkin, 1996: 407.

Distribution: according to Pitkin (1996) Honduras?, Costa Rica, Colombia?. New country records: Nicaragua, western Ecuador.



Discussion. Forewing middle field suffused silvery grey is characteristic of the species. In resting position, sharply projecting forewings with a blackish apical spot

give the species an appearance different from *T. acuta*. The shape of valva and aedeagus is also specific.

***Tachyphyle occulta* Warren (restored from synonymy).** 2M (slides 8034, 8043).

Tachyphyle occulta Warren, 1901: 451 (Colombia) (synonymized with *T. undilineata* by Prout, 1932: 46).

Tachyphyle undilineata Warren, 1900

Tachyphyle undilineata Warren (part.): Pitkin, 1996, Zoological Journal of the Linnean Society 118: 408.

Distribution: Colombia (Sierra Leone). New country record: Nicaragua.



Discussion. The primary type of *T. occulta* from Colombia (deposited in the NHM, London) is very similar to widely distributed *T. undilineata* Warr. However, its slightly shorter male antennal pectination was noticed at close examination, and thanks to the generosity of the staff of the British Museum, the specimen was genitalized and photos became available. Astonishingly, Nicaraguan specimens appeared identical with Colombian *T. occulta* and not with other close related species from Costa Rica. Male genitalia of *T. occulta* are characterized by harpe consisting of 12-18 thin claw-shaped thorns medially in valva, by length of uncus, fusion of sacculus to valva and shape of saccus (Figs above). It has been confused with *T. undilineata* Warr., which has 3-4 much stronger, claw- or horn-shaped, curved thorns as harpe, apically projecting sacculus (that of the right valva broken off in the pictured slide) and rounded vinculum (Figs below, according to specimens from French Guiana).



***Tachyphyle hamata* Schaus.**

Tachyphyle hamata Schaus, 1912: 288 (Costa Rica).

Tachyphyle hamata Schaus: Prout, 1932: 45.

Tachyphyle hamata Schaus: Pitkin, 1996: 406.

Distribution: according to Pitkin (1996): Costa Rica. New country record: Nicaragua.



Discussion. The brown-grey postmedial line across the wings and brown suffusion of forewing characterize both *T. hamata* described from Costa Rica and *T. maiester* Dyar, 1914, known according to a type specimen from Panama. The genitalic characters of the Panama species have not been described yet, whereas *T. hamata* has 3-4 short straight spines on the place of harpe, and there is no cornutus on aedeagus vesica.

***Tachyphyle basiplaga* (Walker).**

Geometra basiplaga Walker, 1861: 512 (Brazil).

Tachyphyle basiplaga Walker: Prout, 1932: 45.

Tachyphyle basiplaga Walker: Pitkin, 1996: 406.

Distribution: according to Pitkin (1996): Belize, Costa Rica, Colombia, Surinam, French Guiana, Brazil, Peru. New country records: Nicaragua; western Ecuador.



Discussion. Female antennae are dentate laterally, identical to the studied material from French Guiana. Male genitalia (pictured from a specimen from French Guiana) bear three leaf-like flat oval spines in the centre of valva; the shape of aedeagus and presence of a sclerite on aedeagus vesica are diagnostic as well.

***Phrudocentra vivida* (Warren).**

Melochlora vivida Warren, 1901: 446 (Venezuela).

Phrudocentra vivida Warren: Prout, 1912: 121.

Phrudocentra vivida Warren: Prout, 1932: 47.

Phrudocentra vivida Warren: Pitkin, 1996: 385.

Distribution: according to Pitkin (1996): Guatemala?, Costa Rica?, Panama?, Colombia?, Venezuela, French Guiana?, Brazil?, Peru?, Bolivia. New country records: Nicaragua; Ecuador. Confirmed: French Guiana, Costa Rica.



Discussion. Warren (1901) described the shape and colour of wings of this species. Prout (1912) synonymized *Melochlora* Warren, 1901 with *Phrudocentra* Warren, 1895 and *M. vivida* with the type of the last, *P. pupillata* Warren, 1897. Later (Prout, 1932: 47) he discussed the differences between (restored) *P. vivida* and *P. pupillata*, i.e. the presence of a distal projection in hind tibia of *P. pupillata* and its absence in

P. vivida. Some genitalic characters, such as longer uncus and shorter spining distal to aedeagus, also allow to separate *P. vivida* from *P. pupillata*.

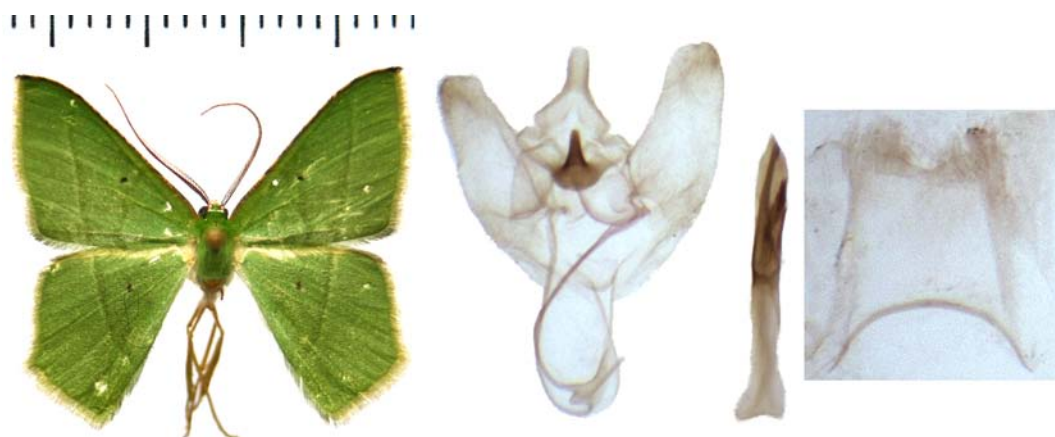
***Phrudocentra pupillata* Warren.**

Phrudocentra pupillata Warren, 1897: 429 (Guyana).

Phrudocentra pupillata Warren: Prout, 1932: 47.

Phrudocentra pupillata Warren: Pitkin, 1996: 384.

Distribution: according to Pitkin (1996): Guatemala?, Belize?, Honduras?, Nicaragua?, Costa Rica?, Colombia?, Venezuela?, Trinidad?, Guyana, Surinam?, French Guiana?, Brazil?, Ecuador?, Peru?, Bolivia?. Confirmed: Nicaragua, Costa Rica, French Guiana.



Discussion. Prout's comment (1932: 47) on the length of male hind tibia distal projection: one-half of the length of the basal tarsal segment was used to discriminate between the sibling species and *P. pupillata* in series of moths from different Neotropical populations. The character is varying inter populations and not in all

cases it is in concordance with genitalic structures: the presence of more than two cryptic species within the *P. pupillata* group is tentatively assumed. Perhaps the problem will be solved using other methods, e.g. DNA sequencing. The Nicaraguan series is similar to the studied material from French Guiana and Costa Rica in the presence of longer and stouter spining distal to aedeagus, besides long stick-like sclerotization, and in broader and shorter uncus than in similar *P. vivida*.

***Phrudocentra marcida* Warren.**

Lissochlora marcida Warren, 1909: 79 (Brazil, Amazonas).

Racheospila marcida (Warren): Prout, 1912: 105 (Upper Amazon).

Phrudocentra marcida Warren: Prout, 1932: 47 (Brazil, Guyana).

Phrudocentra marcida Warren: Pitkin, 1996: 383.



Distribution: (according to Pitkin, 1996): Brazil, Guyana. New country records: Nicaragua, Fr. Guiana.

Both wings below with a distinct, 2-3 mm broad, green submarginal band. Male hindtibia with distal projection about 0.8 mm, antennal pectinations up to 0.35 mm long. A short series of similar moths from Fr. Guiana differs slightly in shorter wings (wing span 18-20 mm) and shorter hindtibial projection (0.37 mm) but has similar genitalic structures.

***Phrudocentra janeira* Schaus ssp? *tenuis* Warren.**

Tachyphyle janeira Schaus, 1897: 162 (Brazil).

Melochlora tenuis Warren, 1909: 80 (Trinidad).

Phrudocentra janeira Schaus: Prout, 1912: 122.

Phrudocentra janeira Schaus & *P. janeira tenuis* Warren: Pitkin, 1996: 382.

Phrudocentra janeira tenuis: Chacón & Montero, 2007, pl. 201.

Distribution: according to Pitkin (1996): [SE] Brazil (*P. j. janeira*); Trinidad, Belize, Costa Rica, Panama, Brazil (*P. j. tenuis*). New records: Nicaragua, French Guiana, Ecuador?, Paraguay.



Discussion. There is a problem of differentiation between *P. janeira* (described from SE Brazil), its subspecies *tenuis* from Trinidad, and very similar *P. vagilinea* Warren, 1906, described from French Guiana, according to wing pattern. The moths studied from Nicaragua, French Guiana and Paraguay are identical in their wing markings, others from Ecuador have forewing distal area more broadly blackish.

Warren, in original description of *M. tenuis* (1909), stressed the absence of reddish markings on wings, said to be characteristic of (*Melochlora*) *vagilinea* Warren (1906: 419) from French Guiana. The Nicaraguan specimen has short (0.75 mm), specifically shaped, heavy chitinized, broad uncus and medium-long (2.5 mm) filiform aedeagus. In continental Neotropical series (French Guiana, Ecuador and Paraguay), compared within the current study, the shape of uncus a.o. genital features is the same, but aedeagus is longer (3.0-3.5 mm).

***Phrudocentra albicoronata* Prout ssp. *sixola* Prout.**

Phrudocentra albicoronata Prout, 1916: 168 (Venezuela).

Phrudocentra albicoronata sixola Prout, 1932: 48 (Costa Rica).

Phrudocentra albicoronata Prout & *P. albicoronata sixola* Prout: Pitkin, 1996: 381.

Distribution: according to Pitkin (1996): Colombia?, Venezuela, French Guiana? Brazil? (*P. a. albicoronata*); Guatemala?, Costa Rica, Colombia (*P. a. sixola*). New country record: Nicaragua.



Discussion. The species is characterized by massive cochlear (central projection of gnathos), short uncus with tip truncate, and long (3.5 mm) simple aedeagus. Long basal projection of vinculum is diagnostic as well.

***Tachychlora amilletes* Prout.**

Tachychlora amilletes Prout, 1932: 44 (Costa Rica).

Tachychlora amilletes Prout: Pitkin, 1996: 402.

Tachychlora amilletes: Chacón & Montero, 2007, pl. 201.

Distribution: according to Pitkin (1996): Costa Rica, Colombia?, French Guiana?, Brazil?. New country record: Nicaragua.



Discussion. Spining of aedeagus is disjointed into short basal and apical series of small spinules, the character shared with one specimen from Costa Rica (see the figure left to the genital armature). Males from French Guiana serving for comparison have a continuous series of curved spines covering 2/3 of length of aedeagus (as in the figure right to the genital armature), and possibly represent another species, *Tachychlora lepidaria* Möschler, 1881, described from Surinam (the type of *T. amilletes* originates from Costa Rica).

***Pyrochlora motilonia* Viidalepp.**

Pyrochlora motilonia Viidalepp, 2009: 55-65 (Nicaragua).

Pyrochlora rhanis: Chacón & Montero, 2007, pl. 201.

Distribution: Nicaragua, Costa Rica, Ecuador.



Discussion. The recently described species, externally similar to the type species of the genus, *Pyrochlora rhanis* Cramer, 1777, differs in simpler structure of its male genitalia (simple aedeagus without an apical hook, and the distal sternite slightly emarginated distally, not incised deep and sclerotized (Viidalepp, 2009)). Female unknown, but ought to be larger than males like in related species.

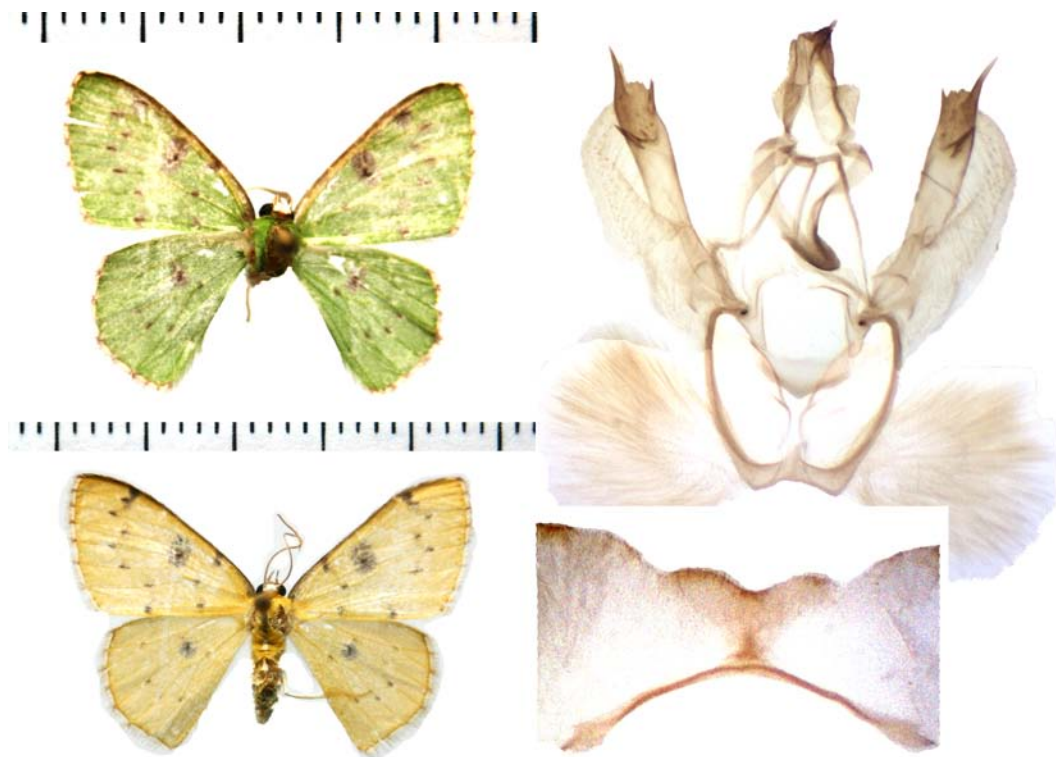
***Lissochlora manostigma* (Dyar).**

Racheospila manostigma Dyar, 1912: 91 (Mexico).

Racheospila manostigma Dyar: Prout, 1932: 26.

Lissochlora manostigma Dyar: Pitkin, 1993: 39-159.

Distribution: according to Pitkin (1993): Mexico, Guatemala, Nicaragua, Costa Rica.



Discussion. Frons slender, light brown (also in yellow-coloured female). Male antennal pectination 0.5 mm long. Wing pattern of *L. manostigma* is characteristic in thin brown speckling at veins and large, suffused discal spots. White spots at abdominal tergites A1 and A3 large, edged brown. Short sternite A8, short-tipped uncus and distally spined valve costa in male genitalia are diagnostic. One fresh specimen was coloured deep yellow instead of green at collecting.

***Nemoria adjunctaria* (Dyar).**

Dryadopsis adjunctaria Dyar, 1914: 230 (Panama).

Dryadopsis adjunctaria Dyar: Prout 1932: 40.

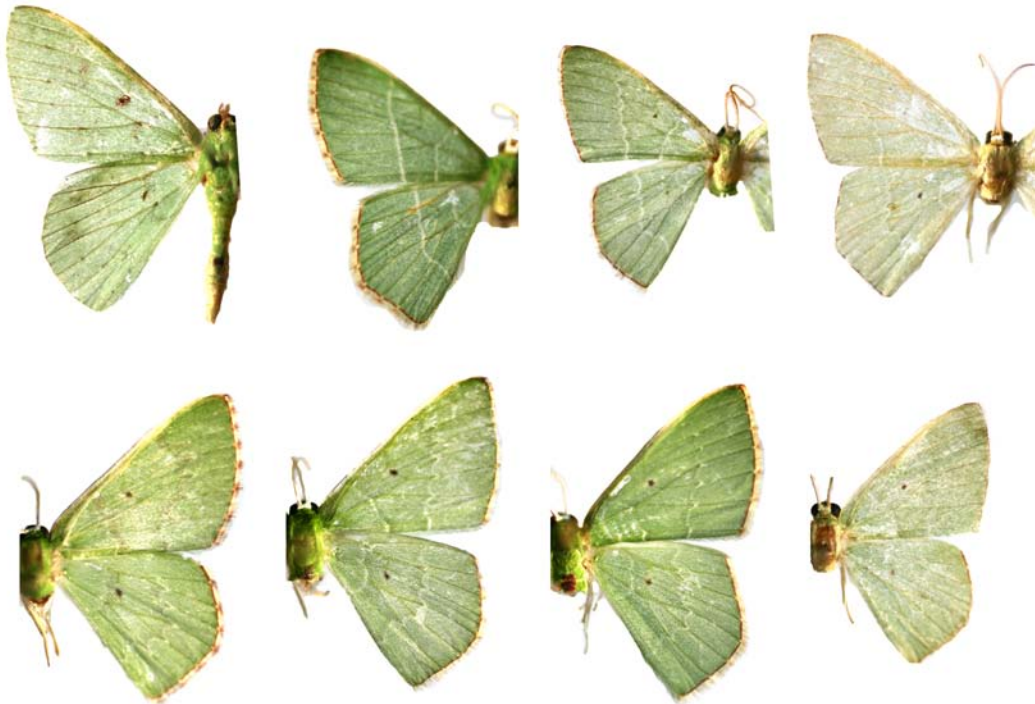
Nemoria adjunctaria Dyar: Pitkin 1993: 65.



Distribution: according to Pitkin, 1993: Guatemala, Costa Rica, Panama, Colombia.
New country record: Nicaragua.

Discussion. *N. adjunctaria* is distinctive by rich brown speckling of wings, combined with one large white spot on the abdomen (*L. manostigma* has two large spots); in four similar looking species from Costa Rica, the white abdominal spot is absent. Frons brown with four white spots at corners.

Other Nicaraguan *Nemoria* species are similar to one another, as seen from the figure below:



Upper row, from left to right: *N. punctilinea*, *N. marielosae*, *N. adaluzae*, *N. pacificaria*; below, *N. dentilinea*, *N. tutala*, *N. remota*, *N. defectiva*.

***Nemoria punctilinea* (Dognin).**

Miantonota punctilinea Dognin, 1902: 337 (Venezuela).

Racheospila punctilinea Dognin: Prout, 1912: 107.

Racheospila punctilinea Dognin: Prout, 1932: 29.

Nemoria punctilinea Dognin: Pitkin, 1993: 69.

Distribution: according to Pitkin (1993), Mexico, Costa Rica, Trinidad, Venezuela, Colombia, French Guiana, Ecuador, Brazil, Peru, Bolivia. New country record: Nicaragua.



Discussion. See also the discussion in Part 3 (Selva Negra). One of the largest species of *Nemoria* in Nicaragua. Frons patterned green and brown, abdomen dorsum with one blackish spot on the fourth segment. Faint whitish transverse lines

accompanied by tiny brownish spots at veins. Medially bulbed uncus and distally broadened valva are diagnostic.

***Nemoria adaluzae* Pitkin.**

Nemoria adaluzae Pitkin, 1963: 84 (Costa Rica).

Distribution: according to Pitkin, 1963: Costa Rica. New country record: Nicaragua.



Discussion. Frons is green (light green, and broader than e.g. in *N. venezuelae*). Pure white dorsal spots at green abdomen combined with reddish marginal line in wings and a row of spines dorsally at aedeagus are diagnostic for *N. adaluzae*. Also the distal projection of hind tibia in male of *N. adaluzae* is only 0.25 mm long, that in *N. venezuelae* – 0,5 mm long.

***Nemoria defectiva* (Prout).**

Racheospila dentilinea defectiva Prout, 1932: 27 (Peru).

Nemoria defectiva Prout: Pitkin, 1993: 87.

Distribution: according to Pitkin (1993): Costa Rica, Colombia, Peru. New country record: Nicaragua.



Discussion. *N. defectiva* is similar to following *N. dentilinea*, but has slenderer, darker green frons and lacks the olive or brownish shading proximally to the white postmedial line. Male genitalia are distinct by short, rounded socii at uncus base.

***Nemoria dentilinea* (Warren).**

Racheospila dentilinea Warren, 1897: 430 (Guyana).

Racheospila dentilinea Warren: Prout, 1912: 106.

Racheospila dentilinea Warren: Prout, 1932: 27.

Nemoria dentilinea Warren: Pitkin 1993: 88.

Distribution: Costa Rica, Guyana, French Guiana, Venezuela, Colombia, Ecuador, Peru, Brazil, Bolivia. New country record: Nicaragua.



Discussion. Green frons and slightly darker green shadow distal to the antemedial and proximal to the postmedial line are characteristic of the species.

***Nemoria tutala* (Dognin), (form B).**

Geometra tutala Dognin, 1898: 213 (Ecuador).

Racheospila tutala Dognin: Prout, 1912: 106.

Racheospila tutala Dognin: Prout, 1932: 28.

Nemoria tutala Dognin: Pitkin, 1993: 82.

Distribution: according to Pitkin, 1993: (Form A:) French Guiana, Venezuela, Colombia, Ecuador, Brazil; (Form B:) Mexico, Guatemala, Costa Rica. New country record: Nicaragua.



Discussion. Frons dark green with white spots below. Male antenna with pectinations longer than in other similar species (0.35 mm versus 0.25 mm). According to the configuration of male genitalic structures, esp. the shape and length of the basal costal projection of valva, the moth is identified as the „form B” described by Pitkin (1993).

***Nemoria modesta* (Dognin).**

Miantonota modesta Dognin, 1911: 22 (Mexico).

Racheospila modesta Dognin: Prout, 1932: 25.

Nemoria modesta Dognin: Pitkin 1993: 97.

Distribution: Mexico. New record: Nicaragua.



Discussion. Frons broad, light green, two white spots dorsally at abdomen not ringed brown. According to laterally saw-toothed aedeagus, the species bears similarity to *N. toxeres* Prout (with brown frons) (available for comparison from Costa Rica) and to *N. zelotes* Ferguson from Arizona and Texas, differing from both in details of male genitalia (cf. Ferguson, 1985: 41, 53). Tentatively identified as *N. modesta* (Dognin).

***Nemoria remota* (Warren).**

Racheospila remota Warren, 1900: 139 (Costa Rica).

Racheospila remota Warren: Prout, 1912: 106.

Racheospila remota Warren: Prout, 1932: 28.

Nemoria remota Warren: Pitkin, 1993: 95.

Distribution: according to Pitkin (1993): Mexico, Guatemala, Costa Rica, Panama, Colombia. New country record: Nicaragua.



Discussion. Frons slender, dark green, dorsum of abdomen with 2 blackish spots. Male antennal pectinations (0.25 mm) and distal projection of male hind tibia (0.5 mm) shorter than in similar *N. tutala*. Costal sclerotization of valva ends in a transverse ridge across the valva tip.

***Nemoria venezuelae* (Prout).**

Racheospila fontalis venezuelae Prout, 1932: 27 (Venezuela).

Racheospila sectifimbria Prout, 1932: 27 (Peru)(synonymized by Pitkin, 1993).

Nemoria venezuelae Prout: Pitkin, 1993: 97.

Distribution: according to Pitkin (1993): Belize, Guatemala, Costa Rica, Venezuela, French Guiana, Colombia, Brazil, Peru. New country record: Nicaragua.



Discussion. Frons green; dorsum of abdomen with three white spots ringed brown. Sternite A8 characteristically shaped, with two long pointed projections distally. Uncus long, distal end of valva indented. Wings a little more straight-edged than in other species of Nicaraguan *Nemoria*.

***Oospila camilla* Schaus.**

Oospila camilla Schaus, 1913: 350 (Costa Rica).

Oospila camilla Schaus: Prout, 1933: 58.

Oospila camilla Schaus: Cook & Scoble, 1995: 24.

Distribution: according to Cook & Scoble (1995): Costa Rica (Limon province). New country record: Nicaragua.



Discussion. Wing span of the female 27.0 mm, the length of antennal pectinations 0.5 mm and that of the 3rd segment of palpus 0.75 mm.

The species is, externally, similar to widespread (from Guatemala to Northern Argentina) *O. asmura* Druce, 1892 (described from Panama) and *O. circumscissa* Prout, 1918 (from Peru), but very different in its genitalic characters.

***Oospila rosipara* (Warren).**

Racheospila rosipara Warren, 1897: 431 (Venezuela).

Racheospila flavicincta Warren, 1900: 137 (Venezuela). (Synonymized by Cook & Scoble, 1995).

Racheospila conversa Dognin, 1908: 264 (Fr. Guiana) (synonymized by Prout, 1932).

Racheospila microspila Warren, 1909: 86 (Peru) (synonymized by Cook & Scoble, 1995).

Oospila rosipara Warren: Prout, 1912: 133.

Oospila rosipara Warren: Prout, 1933: 57.

Distribution: according to Cook & Scoble (1995): Guatemala, Costa Rica, Panama, French Guiana, Venezuela, Colombia, Ecuador, Brazil, Peru. New country record: Nicaragua.



Discussion. Distal blotches in wings may be blackish, or vary from light to dark brown.

***Oospila albipunctulata* Prout.**

Oospila albipunctulata Prout, 1932: 54 (Colombia).

Oospila albipunctulata Prout: Cook & Scoble, 1995: 27.

Oospila albipunctulata: Chacón & Montero, 2007, pl. 200.

Distribution: according to Cook & Scoble (1995): Costa Rica, Panama, Colombia.
New country record: Nicaragua.



Discussion. The species is characterized by absence of discal spots in forewings and presence of white discal spots in hind wings; in other small-sized congeneric species, the colour and location of discal spots in wings is different (Cook & Scoble, 1995). Female antennae pectinate in basal two-thirds, with length of pectinations up to 0.3 mm.

***Oospila ruptimacula* Warren.**

Oospila ruptimacula Warren, 1901: 448 (Ecuador).

Oospila ruptimacula Warren: Prout, 1912: 133.

Oospila aliphera Dognin, 1923: 20 (Bolivia)(synonymized by Cook & Scoble, 1995).

Oospila ruptimacula Warren: Prout, 1923: 58.

Oospila ruptimacula Cook & Scoble, 1995: 63.

Distribution: according to Cook & Scoble (1995): Belize, Costa Rica, Colombia, Ecuador, Brazil, Peru, Bolivia. New country record: Nicaragua.



Discussion. The shape of the pale tornal blotch in forewing (reaching the origin of vein CuA_1 but not the discal spot) and the presence of solid patches of brown irroration in submarginal blotches are diagnostic for this widespread species.

***Oospila albicoma* (Felder & Rogenhofer).**

Racheospila albicoma Felder & Rogenhofer, 1875: pl. 127 fig. 2 (Brazil).

Oospila albicoma Felder & Rogenhofer: Warren, 1900: 136.

Oospila minorata Warren, 1909: 83 (Brazil)(Synonymized by Prout, 1933).

Oospila albicoma Felder & Rogenhofer: Prout, 1912: 133.

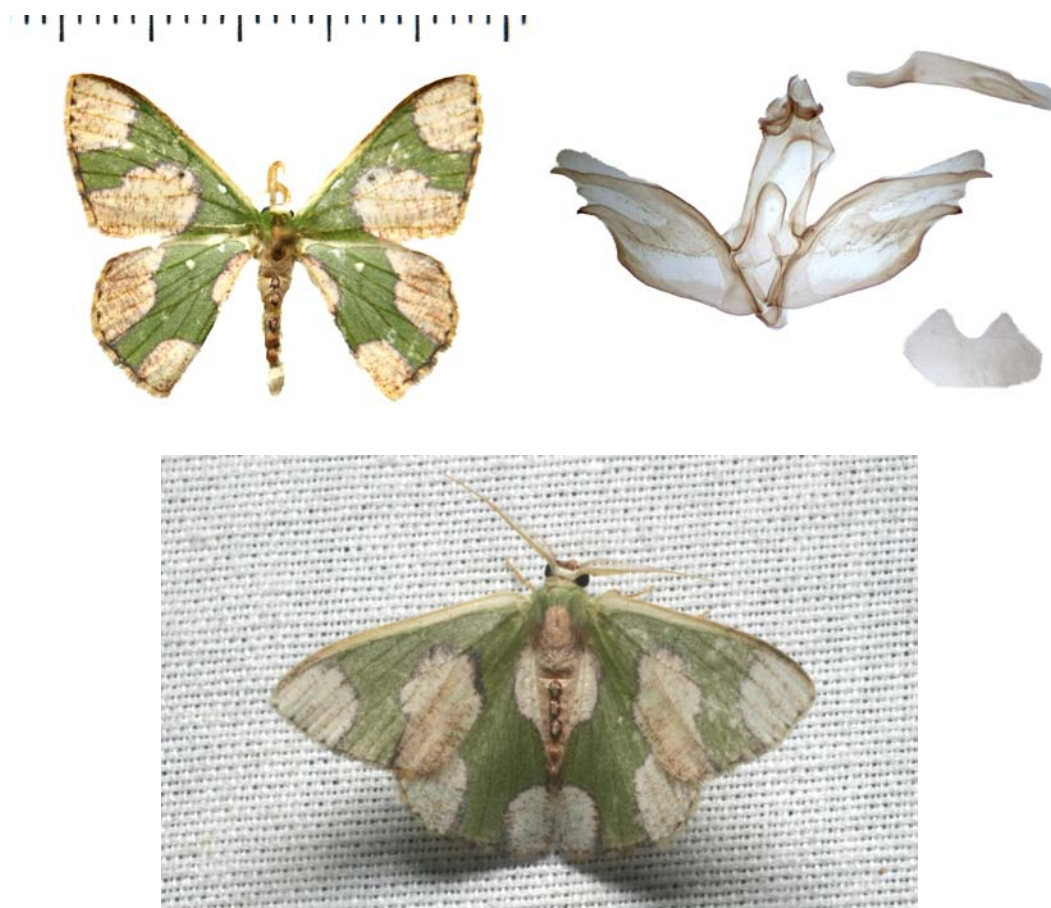
Oospila deliciosa Thierry-Mieg, 1916: 42 (Fr. Guiana) (Synonymized by Cook & Scoble, 1995).

Oospila albicoma Felder & Rogenhofer: Prout, 1933: 57.

Oospila albicoma Felder & Rogenhofer: Cook & Scoble, 1995: 38.

Oospila albicoma: Chacón & Montero, 2007, pl. 200.

Distribution: Costa Rica, Surinam, Guyana, French Guiana, Venezuela, Colombia, Ecuador, Peru, Brazil. New country record: Nicaragua.



Discussion. *Oospila albicoma* and *O. concinna* Warren, 1900 have similar wing pattern and genital structures. However, the latter species has markedly larger wings: forewing is shorter than 19 mm in *O. albicoma* and longer than 20 mm in *O. concinna*. Both are common in nearby Costa Rica. *O. concinna* has earlier been listed for Nicaragua (Zelaya) by Cook & Scoble (1995).

***Oospila concinna* Warren.**

Oospila concinna Warren, 1900: 136 (Venezuela).

Oospila concinna Warren: Prout, 1912: 133.

Oospila eminens Schaus, 1912: 428 (Costa Rica) (synonymized by Cook & Scoble, 1995).

Oospila concinna Warren: Prout, 1933: 57.

Oospila concinna Warren: Cook & Scoble, 1995: 40-42.

Distribution: according to Cook & Scoble (1995): Guatemala, Nicaragua, Costa Rica, Venezuela, Colombia, Ecuador, Brazil, Peru, Bolivia.



Discussion. A male moth photographed but not captured in Bartola may well belong to *O. concinna*. Attached figures of genitalia from a male collected in Costa Rica (genit. prep. 8064, coll. A. Selin, Tallinn) with long projections from valve costa and saccus much broader and relatively shorter than in the preceding species.

***Oospila confluaria* (Warren).**

Racheolopha confluaria Warren, 1906: 422 (Fr. Guiana).

Oospila mesocraspeda Prout, 1912: 134 (Panama)(synonymized by Cook & Scoble, 1995).

Oospila confluaria Warren: Prout, 1932: 56.

Oospila confluaria Warren: Cook & Scoble, 1995: 46.

Distribution: according to Cook & Scoble (1995): Costa Rica, Panama, Surinam, Guyana, French Guiana, Colombia, Brazil. New country record: Nicaragua.



Discussion. The Nicaraguan material differs from slides available for comparison (e.g., from French Guiana) in very broad ampulla (cf. Cook & Scoble, 1995, Fig. 120) and broadly sclerotized sternite A8. Further study has to clear out, whether it is a case of clinal variation of characters, or a distinct taxon.

***Synchlora expulsata atrapoides* (Prout).**

Eucrostis expulsata Walker, 1861: 566 (Brazil).

Racheospila expulsata Walker: Prout, 1912: 109.

Racheospila expulsata Walker: Prout, 1932: 39.

Racheospila expulsata atrapoides Prout, 1932: 39 (Mexico).

Synchlora expulsata Walker & *S. e. atrapoides* Prout: Pitkin, 1996: 396-397, fig. 126.

Distribution: according to Pitkin (1996): Colombia, Venezuela, Guyana, French Guiana, Ecuador, Peru, Brazil, Bolivia (*S. e. expulsata*); Mexico, Guatemala, Honduras, Costa Rica (*S. e. atrapoides* Prout). New country record: Nicaragua.



Discussion. Forewing costa brown with fore edge white, distal margin brown, edged basally yellow; white marginal line cut by brown spots at veins. Tergites brown with a row of contrasting white spots edged darker brown. Male antennal pectinations 1.0 mm long, hindtibia with distal projection 0.6-0.62 mm long. Male antennal pectinations longer than in populations from French Guiana and Ecuador used for comparison: character of the subspecies *S. e. atrapoides* Prt. in addition to a slight dilation of marginal line between veins M_1 and M_3 in forewing. Socii subapically dentate, cochlear long, thin and tapering, harpe broad, triangular (much slenderer in specimens from French Guiana).

***Synchlora superaddita* (Prout).**

Racheospila superaddita Prout: Prout, 1913: 416.

Racheospila superaddita Prout: Prout, 1932: 39.

Synchlora superaddita Prout: Pitkin, 1993: 112.

Synchlora superaddita Prout: Pitkin, 1996: 400.

Distribution: according to Pitkin (1996): Mexico?, Guatemala?, Trinidad, Colombia, Surinam?, French Guiana?, Ecuador?, Brazil?, Peru?, Bolivia?. New record: Nicaragua.



Discussion. Wings with much slenderer reddish marginal line than in *S. expulsata atrapoides*, which is projecting onto white fringes at vein ends, and with broken white line along base of fringes. Abdomen dorsally green, white spots at tergites edged red, those on first tergites fused. Male antennal pectinations 0.75 mm long, hindtibial distal projection 0.6 mm long. Horn-shaped curved socii and costal projections of valva are distinctive for the species. The genus requires throughout revision, and the current identification is tentative. There are some very slight external differences between the wing pattern of the specimen of *S. superaddita* from Domitila (smaller, marginal line brownish red and more wavy) and *S. superaddita* from Bartola (slightly larger, marginal line smoother and more reddish), by identical genital structures. Specimens agreeing in build of genitalia with those pictured, are available for comparison from Ecuador.

***Synchlora pulchrifimbria* (Warren).**

Racheospila pulchrifimbria Warren, 1907: 209 (Surinam).

Racheospila pulchrifimbria Warren: Prout, 1912: 110.

Racheospila pulchrifimbria Warren: Prout, 1932: 39.

Synchlora pulchrifimbria Warren: Pitkin, 1996: 400.

Distribution: according to Pitkin (1996): Honduras?, Costa Rica, Colombia?, Venezuela, Trinidad, Surinam, French Guiana, Ecuador?, Brazil, Peru. For the first time recorded for Nicaragua; the record fits the known distribution pattern of the species.



Prout (1932) characterized *S. pulchrifimbria* by the presence of white marks at forewing costa indicating ante- and postmedial lines, not stressed in the original description.

***Synchlora gerularia* (Hübner).**

Phalaena Geometra ocellata Stoll, 1790: 156, pl. 34.

Comibaena gerularia Hübner, 1823: 284.

Geometra? stollaria Guenée, 1858: 370.

Racheospila marginiplaga Walker, 1861: 583 (Brazil).

Racheospila rufidorsaria Snellen, 1874: 41, pl. 3 (Colombia).

Racheospila jucunda Felder & Rogenhofer, 1875: pl. 127 (Brazil).

Synchlora gerularia Hübner: Ferguson 1985: 88.

Synchlora gerularia Hübner: Pitkin 1996: 397-398.

Distribution: according to Pitkin (1996): U.S.A.: Texas; Mexico, Guatemala, Honduras, Costa Rica, Panama, Colombia, Venezuela, Trinidad, Guyana, Surinam, French Guiana, Ecuador?, Brazil, Peru, Bolivia, Paraguay, Argentina. New country record: Nicaragua.



Discussion. Maculation of wings varies between brown and blackish. A very common roadside species in Nicaragua (occurring in Domitila site and, more frequently, also in Bartola site).

***Chloropteryx dealbata* (Warren).**

Gelasma dealbata Warren, 1909: 76 (Peru).

Chloropteryx dealbata Warren: Prout, 1912: 179.

Chloropteryx dealbata Warren: Prout, 1933: 64, pl. 8.

Chloropteryx dealbata Warren: Pitkin, 1996: 338.

Distribution: according to Pitkin (1996): Costa Rica, Colombia, Venezuela, Guyana, French Guiana, Peru. New country record. Nicaragua.



Discussion. *C. dealbata*, described from Peruvian Andes, is characterized by greyish-olive colour and largely pale costal half of the medial field in hind wing (Warren, 1909; Prout, 1933); by apically bulbed socii and apically dilated, ventrally incised uncus. One worn specimen from Nicaragua externally agrees well with the material used for comparison in configuration of valvae and socii. However, there is a difference in the shape of (laterally flattened) uncus between populations from Ecuador (uncus straight-lined ventrally), French Guyana (uncus apex concave ventrally), and from Nicaragua and Costa Rica (2 slides) with uncus markedly excised subapically. No external differences (e.g. in structure of antennae, legs and venation) observed between the populations studied, and tentatively the species is referred to as *C. dealbata*, but the complex should be studied according to the series of fresh material.

Chloropteryx albidata (Warren) (restored from synonymy).

Gelasma albidata Warren, 1897: 425 (Costa Rica) (synonymized with *C. opalaria* by Prout, 1933).

Iodis opalaria Guenée, 1858: 357.

Hypnochlora olvidaria Schaus, 1897: 161 (Brazil) (synonymized with *albidata* Warr. by Prout, 1912).

Thalera dalica Dognin, 1898: 218 (Ecuador) (synonymized by Prout, 1912).

Distribution: Costa Rica (*C. albidata*, according to Warren); for *C. opalaria*, according to Pitkin (1996): Mexico, Honduras?, Guatemala?, Costa Rica, Colombia, Venezuela?, Trinidad?, Guyana?, French Guiana?, Ecuador, Brazil, Peru, Bolivia, Paraguay?. New country records: Nicaragua, Western Ecuador.



Discussion. Some cryptic species seem to be hidden within the group hitherto summarized under the name *C. opalaria* and characterized by suffused greyish ante- and postmedial bands on whitish ground of wings. The small-sized species (forewing

length 10 mm or less) has small compact juxta and distinct tapering projection from the base of valve costa. Larger moths, examined from populations of Ecuador, Venezuela, French Guiana and Paraguay share a distinct H-shaped juxta, agreeing with definition of *C. opalaria* (see Pitkin, 1996, Fig. 92, and part III of the present review). The solution of the problem depends on re-investigation of types of taxa, synonymized by Prout, in the first place, of those of *C. albidata* Warr.: the facies of moths from South Nicaraguan lowland series and specimens from Monte Verde NP, Costa Rica (O. Kurina leg.) fits well with the short original description by Warren.

***Chloropteryx languescens* (Warren).**

Iodis languescens Warren, 1897: 425 (Surinam) (synonymized with *C. glauciptera* Hampson, 1895 by Prout, 1912 and restored as species by Prout, 1933).

Chloropteryx languescens Warren: Pitkin, 1996: 339.

Distribution. According to Pitkin, 1996: Mexico?, Costa Rica, Panama?, Colombia, Trinidad, Guyana?, Surinam, French Guiana, Ecuador?, Brazil?, Peru?, Bolivia?.
New country record: Nicaragua.



Discussion. Dull greyish green or, if faded, greenish grey with thin whitish postmedial line, and darker grey-green discal spots. Marginal line blackish, disrupted, fringes chequered yellow and dark grey. Below, pale greyish, hind wing apex suffused

blackish. Abdomen with tergites A2 to A4 brown-grey with grey crests in blackish frame. Male genitalia outstanding with short and broad, truncate saccus and rounded harpe to valva base, with a row of setae along lacinia costae; uncus tapering to apex, socii parallel-sided, slender. The specimen fits well with a series from French Guiana.

***Chloropteryx jalapata* Dyar.**

Chloropteryx jalapata Dyar, 1916: 31 (Mexico).

Chloropteryx jalapata Dyar: Prout, 1933: 63.

Chloropteryx jalapata Dyar: Pitkin, 1996: 338.

Distribution: according to Pitkin (1996): Mexico, Guatemala, Ecuador? New record: Nicaragua.



Discussion. A small and delicate light bluish green, fading olive-grey species with whitish ante- and postmedial lines jagged and shadowed darker, as diagnosed in the original description. Wings below pale greyish without ochreous hue and without dark suffusion at forewing tornus and apex of hind wing. Slender valvae, socii and projecting saccus characterize the species. The determination is tentative as the genus needs a through revision.

***Chloropteryx subrufescens* (Warren).**

Gelasma subrufescens Warren, 1906: 417 (French Guiana).

Chloropteryx subrufescens Warren: Prout, 1912.

Chloropteryx subrufescens Warren: Prout, 1933: 65.

Chloropteryx subrufescens Warren: Pitkin, 1996: 341.

Distribution: according to Pitkin (1996): Guatemala?, Costa Rica, Colombia?, Guyana? French Guiana, Brazil?. New country record: Nicaragua.



Discussion. Green-grey small moths, with whitish transverse line inconspicuous, fringes chequered pale and dark grey. Wings below pale grey with ochreous tint and dark suffusion at hindwing apex. Male hindtibia without distal projection. Male genitalia: valva slender with a thin ridge at base, socii slender, linear. Moths fit with samples from French Guiana, and with original and subsequent descriptions; however, the genus requires a thorough morphological revision.

Part II. Subfamily Geometrinae, Emerald moths from Domitila Private Forest Area.

Abstract.

Fifteen species of emerald geometrids were collected in dry lowland forest at Domitila site, Granada Province. The occurrence of *Lophochorista calliope* Druce, *Synchlora irregularia* Barnes & McDunnough and *Chlorochlamys appellaria* Pearsall in the province Granada reflects the northern influence on the local biodiversity, and *Oospila permagna* Warren has here its northernmost population. Thirty-eight species are listed from wet tropical forest at Bartola site, Rio San Juan Province. One species, *Pyrochlora motilonia* Viidalepp, 2009 was described as new in another publication. *Tachyphyle occulta* Warren is raised from synonymy with *T. undilineata* Warren and redescribed.

***Tachyphyle acuta* Butler.** See the Part I for material from Bartola.

Tachyphyle acuta Butler, 1881: 329 (Brazil).

Tachyphyle aganapla Dyar, 1913: 309 (Mexico).

Tachyphyle acuta Butler: Prout, 1932: 45.

Tachyphyle acuta Butler: Pitkin, 1996: 405.

Distribution: according to Pitkin (1996): Southern Mexico, Belize?, Panama?, Colombia?, Trinidad?, French Guiana?, Brazil. New records: Nicaragua, Ecuador, Paraguay; confirmed: French Guiana.



Discussion. The species is conservative in its morphological characters over the wide distribution area. The long projecting sacculus and the flat cornutus on vesica are specific.

***Tachyphyle allineata* (Warren).**

Dichorda allineata Warren, 1900: 132 (Venezuela).

Tachyphyle allineata Warren: Prout, 1932: 45.

Tachyphyle allineata Warren: Pitkin, 1996: 406.

Distribution: according to Pitkin (1996): Guatemala?, Costa Rica, Colombia?, Venezuela, Trinidad?, Guyana?, French Guiana? Brazil?. New record: Nicaragua; confirmed: Fr. Guiana.



Discussion. The species is similar to *T. acuta* in colour of wings, to be distinguished according to slightly falcate forewings, slenderer white line across the wings and, under magnification, fine darker and paler striation of scaling mentioned in original description. The length of vinculum and aedeagus is covariable in different populations.

***Lophochorista calliope* (Druce).**

Racheospila calliope Druce, 1892: 90, pl. 50 figs 1,2 (Mexico).

Lophochorista calliope Druce: Warren 1904: 22.

Lophochorista calliope Druce: Prout, 1912: 137.

Lophochorista calliope Druce: Ferguson, 1985: 98-100.

Lophochorista calliope Druce: Pitkin, 1996: 361.

Lophochorista calliope: Chacón & Montero, 2007, pl. 199.

Distribution: according to Pitkin (1996): Mexico, Guatemala, Belize. New record: Nicaragua.



Discussion. The fishtail-like distal projection of the last sternite, and long curved harpe in valva are distinctive for *L. calliope*.

***Nemoria pacificaria* (Möschler).**

Racheospila pacificaria Möschler, 1881: 403, pl. 17, fig. 13 (Surinam).

Racheospila pacificaria Möschler: Prout, 1912: 106.

Racheospila pacificaria Möschler: Prout, 1932: 28.

Nemoria pacificaria Möschler: Pitkin, 1993: 81.

Distribution: according to Pitkin (1993): Trinidad, Mexico, Guatemala, Costa Rica; Surinam, French Guiana, Venezuela. New record: Nicaragua.





Discussion. Frons is green. The facies of the species is very similar to that in *N. tutala*, dissection is often needed for exact identification (Pitkin, 1993): the „midrib of valva” (lacinia costae) is distally bifurcate in *N. pacificaria*, and simple in *N. tutala*. The ornamentation of the apex of valva varies. The thin greyish marginal line in wings, associated with two brown or blackish marks on dorsum of abdomen are characteristic, too.

***Nemoria marielosae* Pitkin.**

Nemoria marielosae Pitkin, 1993: 79 (Costa Rica).

Distribution: according to Pitkin (1993): Mexico, Costa Rica. New record: Nicaragua.



Discussion. The frons is brown with four white spots at corners, and abdominal white spots ringed brown in *N. marielosae*. The white postmedial line in forewing is nearly straight, not waved as in other congeneric species from Nicaragua. The strongly

sclerotized basal costal process of valva is seen by descaling the tip of abdomen below; aedeagus with a fine dentate stick-like dorsal process. Abdomen dorsally with three white spots encircled reddish brown.

***Oospila permagna* (Warren).**

Leptolopha permagna Warren, 1909: 79 (Peru).

Leptolopha marginata Schaus, 1912: 292 (Costa Rica) (junior homonym of *marginata* Warren, 1897; synonymized by Cook & Scoble, 1995).

Leptolopha permagna Warren: Prout, 1912: 129.

Leptolopha permagna Warren: Prout, 1932: 51.

Oospila permagna Warren: Cook & Scoble, 1995: 11.

Distribution: according to Cook & Scoble (1995): Costa Rica, Brazil, Peru. New record: Nicaragua.



Description. The species was described according to females (Warren, 1909; Cook & Scoble, 1995). The earlier descriptions are complemented as follows. Wing span 15-16 mm in males, 21-23.5 mm in females. Male antennae pectinate, with length of pectinations reaching 0.7 mm in male; hind tibia without hair pencil and proximal spurs. Male genitalia as figured, with socii large as in other species of the *Oospila flavilimes* group, but valva projecting sclerotized and spiculose, juxta branched. Aedeagus spoon-shaped, cornutus lacking. All *Oospila* species have thick crests of specialized scales dorsally at abdomen. Yellow crests, fringes and comma-shaped discal spots in hind wing are characteristic for *O. permagna*.

***Oospila confundaria* (Möschler).**

Racheospila confundaria Möschler, 1890: 242 (Puerto Rico).

Racheospila coerulea Warren, 1906: 421 (Guyana).

Racheolopha derasa Warren, 1906: 422 (Fr. Guiana).

Oospila sesquiplaga Prout, 1912: 135 (Brazil).

Oospila confundaria (Möschler), *O. coerulea* (Warren), *O. derasa* (Warren): Prout, 1912: 133-134.

Oospila confundaria (Möschler): Prout, 1932: 55.

Distribution: according to Cook & Scoble (1995), universally distributed from Cuba, Jamaica and Guatemala to Brazil, Bolivia and Paraguay. New record: Nicaragua.



Discussion. Simple wing pattern: plain dark green colour of wings with a small brown or pale (sometimes reduced as in this specimen) blotch at tornus of both wings is characteristic, as well as shape of genitalia. However, the distal projections of the male sternite A8 are very short in the single Nicaraguan specimen studied (compare Cook & Scoble, 1995, Fig, 142).

***Synchlora frondaria* Guenée.**

Synchlora frondaria Guenée, 1857: 375 (French Guiana).

Synchlora frondaria Guenée: Prout, 1912: 115.

Synchlora frondaria Guenée: Prout, 1932: 41.

Synchlora frondaria Guenée: Pitkin, 1996: 397.

Distribution: according to Pitkin (1996), nearly universally distributed from southern U.S.A. to Argentina. New record: Nicaragua.





Discussion. A small (wing span 12-14 mm), intense green species with dentate white lines, carmine brown frons and green fringes; without blackish discal spots and reddish marginal line; abdomen with middorsal line white. The length of pectinations in male antenna 0.5 mm, length of the 3rd palpal segment in female 0.4 mm; distal projection of hind tibia 0.6-0.7 mm long, longer than the basal tarsal segment. Male genitalia indistinguishable from those of *aerata* (Ferguson, 1985). Socii triangular, straight-edged, cochlear short, pointed, valve costa concave, relative length of aedeagus base and branches as 1:1. Coremata attached to valva bases, eversible, long.

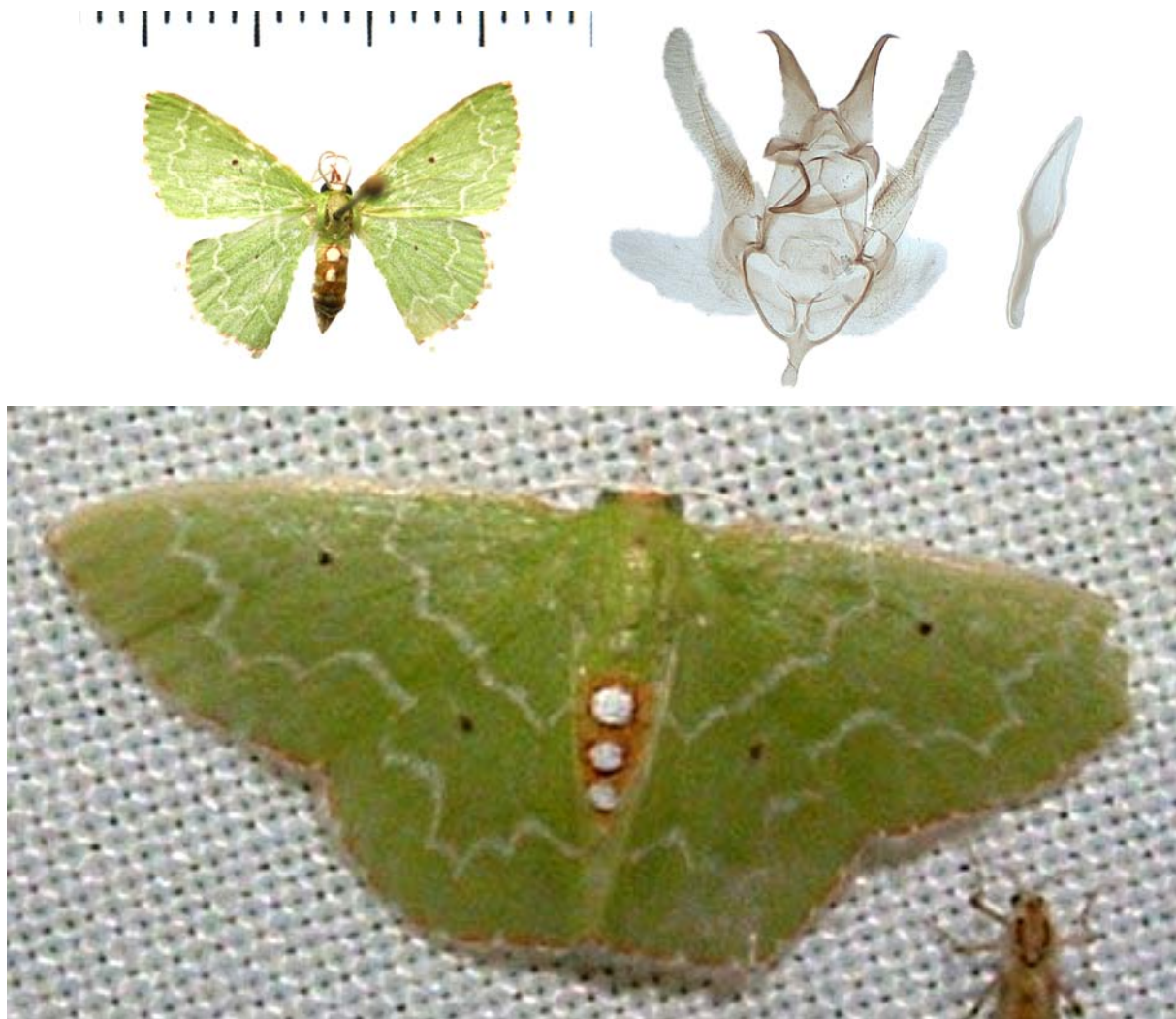
***Synchlora irregularia* (Barnes & McDunnough).**

Racheospila irregularia Barnes & McDunnough, 1918: 134 (U.S.A.: Texas).

Synchlora irregularia Barnes & McDunnough: Ferguson, 1985: 90.

Synchlora irregularia Barnes & McDunnough: Pitkin, 1996: 398.

Distribution: according to Ferguson (1985): U.S.A.: Texas; Nicaragua.



Discussion. *S. irregularia* is larger than *S. frondaria*: wing span 13 mm in male, 15-18 mm in females. Frons brown, white spots at tergites t2 and t3 not confluent, ringed red on green background. Male antennal pectinations 0.75 mm long, distal projection of hind tibia 0.5 mm long, or one-half length of the basal tarsal segment. 3rd palpal segment 0.45-0.5 mm long in female. Wings apple green with thin red terminal line, postmedial line displaced distad at veins M_3 - CuA_2 ; dark discal spots present; socii with tips fine, outcurved, tegumen rectangular, not trapezoidal as in *frondaria*, cochlear weaker, long, saccus long, finger-shaped.

***Synchlora pulchrifimbria* (Warren).**

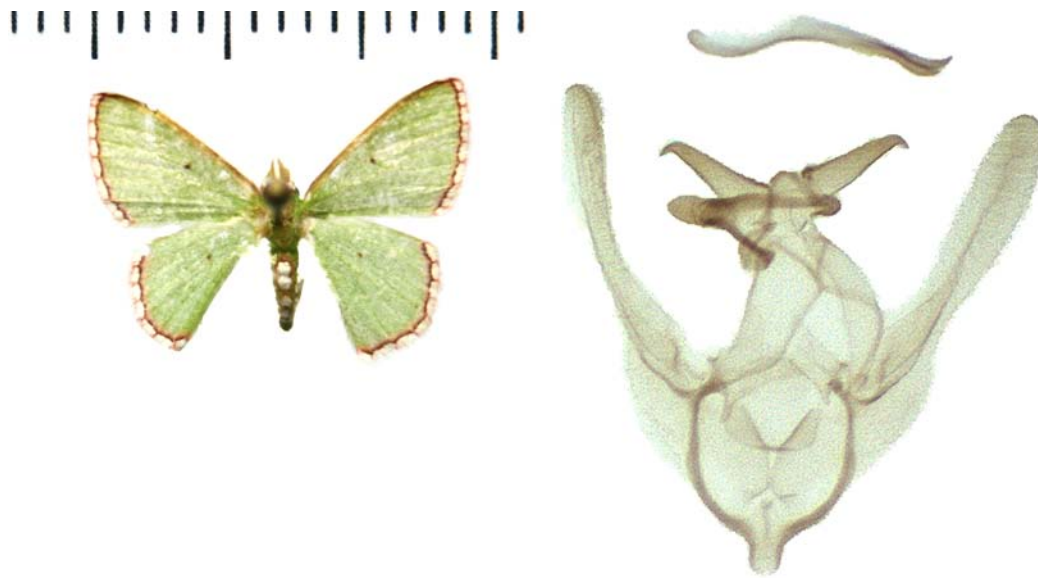
Racheospila pulchrifimbria Warren, 1907: 209 (Surinam).

Racheospila pulchrifimbria Warren: Prout, 1912: 110.

Racheospila pulchrifimbria Warren: Prout, 1932: 39.

Synchlora pulchrifimbria Warren: Pitkin, 1996: 400.

Distribution: according to Pitkin (1996). Honduras?, Costa Rica, Colombia?, Venezuela, Trinidad, Surinam, French Guiana, Ecuador?, Brazil, Peru. New record: Nicaragua.



Discussion. Wing span 14 mm. Wings with much slenderer reddish marginal line than in *S. expulsata atrapoides* Prout, which is projecting onto white fringes at vein ends, and with broken white line along base of fringes. Abdomen dorsally green, white spots at tergites edged red, those on first tergites fused. Male antennal pectinations 0.75 mm long, hindtibial distal projection 0.6 mm long. There are only some slight differences in facies between the specimen of *S. pulchrifimbria* from Domitila (smaller, marginal line brownish red and more wavy) and *S. superaddita* Prout from Bartola (slightly larger, marginal line smoother and more reddish), but male genitalia are different and, in both cases, comparable with those from Fr. Guiana. The genus is in need of throughout revision, therefore the current identification of the species is tentative.

***Synchlora gerularia* (Hübner).**

Phalaena Geometra ocellata Stoll, 1790: 156, pl. 34.

Comibaena gerularia Hübner, 1823: 284.

Geometra? stollaria Guenée, 1858: 370.

Racheospila marginiplaga Walker, 1861: 583 (Brazil).

Racheospila rufidorsaria Snellen, 1874: 41, pl. 3 (Colombia).

Racheospila jucunda Felder & Rogenhofer, 1875: pl. 127 (Brazil).

Synchlora gerularia Hübner: Ferguson 1985: 88.

Synchlora gerularia Hübner: Pitkin 1996: 397-398.

Distribution: according to Pitkin (1996): U.S.A.: Texas; Mexico, Guatemala, Honduras, Costa Rica, Panama, Colombia, Venezuela, Trinidad, Guyana, Surinam,

French Guiana, Ecuador?, Brazil, Peru, Bolivia, Paraguay, Argentina. New record: Nicaragua.



Discussion. Maculation of wings varies between brown and blackish. A very common roadside species (J.V., pers. obs.) in Nicaragua and also in French Guiana.

***Chlorochlamys appellaria* Pearsall.**

Chlorochlamys appellaria Pearsall, 1911: 206 (U.S.A.: Arizona).

Chlorochlamys rubromediaria Cassino & Swett, 1925: 36 (U.S.A.: Utah).

Chlorochlamys hesperia Sperry, 1951: 51 (U.S.A.: California).

Chlorochlamys appellaria Pearsall: Ferguson, 1985: 107.

Distribution: according to Ferguson (1985): U.S.A.: California, Arizona, Texas; Mexico. New record: Nicaragua.



Discussion. *C. appellaria* is to be distinguished according to straight, yellowish antemedial and postmedial transverse lines on matt bluish green ground of forewing; the color of frons is grey. The gnathos is reduced and socii are curved and truncated, not pointed. The Sc and Rs in hind wing are merely touching in one point (a hemitheine character), not fused shortly near the base of wing as in apple-green *Synchlorini*.

***Chloropteryx jalapata* Dyar.**

Chloropteryx jalapata Dyar, 1916: 31 (Mexico).

Chloropteryx jalapata Dyar: Prout, 1933: 63.

Chloropteryx jalapata Dyar: Pitkin, 1996: 338.

Distribution: according to Pitkin, 1996: Mexico, Guatemala, Ecuador? New record: Nicaragua.





Discussion. A small and delicate, olive-grey species with whitish ante- and postmedial lines jagged and shadowed darker, as diagnosed in the original description. Wings below pale greyish without ochreous hue and without dark suffusion at forewing tornus and apex of hind wing. Slender valvae, socii and projecting saccus characterize the species. The determination is tentative as the genus needs in throughout revision.

***Chloroptery nordicaria* (Schaus).**

Gelasma nordicaria Schaus, 1901: 253 (Mexico).

Chloropteryx nordicaria (Schaus): Pitkin, 1996: 339.

Distribution: according to Ferguson (1985) and Pitkin (1996): U.S.A.: Texas; Mexico, Belize?, Honduras?, Costa Rica?. New record: Nicaragua.



Discussion. Wings greyish-green above with tiny discal spots and postmedial line reduced to some whitish spots, but shadowed darker proximally. Fringe with yellow basal line, chequered yellow and grey. Wings below pale grey without darker blotches at forewing tornus and hind wing apex. Male antennal pectinations 0.36 mm long, 3rd segment of palpus slender, 0.16-0.18 mm long. Hindtarsus 1/3 length of tibia, tibial projection 0.45 mm long, or just as long as the basal tarsomere. Uncus tapering fine, socii slightly broader subapically; valva with a dark basal ridge.

The series fits well with the characterization by Ferguson (1985), except the larger harpe at valva base. The determination is tentative as far as the genus is in need of throughout revision.

***Hydata subfenestraria* Walker.**

Hydata subfenestraria Walker, 1863: 1622 (Venezuela).

Hydata subfenestraria Walker: Prout, 1912: 188.

Hydata subfenestraria Walker: Prout, 1933: 67.

Hydata subfenestraria Walker: Pitkin, 1996: 356.

Distribution: according to Pitkin (1996): Mexico?, Colombia? Venezuela, Brazil?, Peru?. New record: Nicaragua.



Discussion. The uncus is slightly longer in the Nicaraguan specimen than in the type specimen (compare Fig. 103 by Pitkin, 1996), otherwise the specimens fits with descriptions in literature.

Part III. Subfamily Geometrinae, Emerald moths from Selva Negra estate (Prov. Matagalpa).

Mountainous area of Sierra Madre de Chiapas extends from Mexico to Honduras, its southern ranges reaching North Nicaragua. Mountains are covered with rich tropical forest and cloud forests with pine and oak reaching Matagalpa district from North and supporting an interesting fauna of butterflies and moths.

Selva Negra coffee estate was founded late in XIXth century by German immigrants and is now exporting gurmee coffee. About one-half of the territory of the estate is kept as primary forest at elevation of 1300-1500 m on southward slopes of a mountain ridge. A mild and constant climate, with temperatures around 20-22° by day and night during the collecting period was characteristic. The area was collected daily and at night using light trapping in several places, during 10.-16.xi.2009. Altogether 35 species of emerald geometrid moths were collected, 26 of them first time in Nicaragua. Species new to science will be described in another publication.

Nemoria pacificaria (Möschler).

For cites, see the list of species of the site Domitila.



Wing span 22-24 mm in males, 25-29 in females. Frons slender, green. Abdomen dorsally green with a small blackish spot at anterior end (tergite A1) and two spots at tergites A3 and A4 which are slenderer in male and broader in female. Wings green, white postmedial and antemedial line thin, slightly irregular in forewing, dentate and accentuated at veins in hindwing. Marginal line slender, reddish, darker than in *N.*

tutala according to Pitkin (1993), disrupted by white spots at vein ends; fringe creamy, faintly spotted darker at vein ends.



***Nemoria erina* (Dognin).**

Achlora erina Dognin, 1896: 143 (Ecuador).

Racheospila erina Dognin: Prout, 1912: 107 (S. America).

Racheospila erina Dognin: Prout, 1932: 29 (Costa Rica – Bolivia).

Nemoria erina Dognin: Pitkin, 1993: 68 (Mexico – Brazil).

Distribution: from Mexico to southern Brazil and Bolivia. New country record: Nicaragua.





Wing span 35-36 mm in male, 39 mm in female. One of largest species of the genus, with a black, characteristic zigzag line at forewing apex. Lines on wings are replaced by pairs of tiny blackish and white spots at veins. Frons broad, brown, darker above, fillet green, darker behind. Abdomen green, tergite A1 with a large brown patch edged black, tergite A4 with a small black spot. Apically indented uncus and broad, distally truncate valvae are specific.

***Nemoria punctilinea* (Dognin).**

See the cites and discussion of the species in the Part I (Bartola) above. Another relatively large species, with thin, waved dark brown transverse lines which are enlarged into oblong spots at veins; the conspicuous zigzag line to forewing apex which characterizes *N. erina* is absent.

The informal *Nemoria erina* group of large species comprises four or five taxa (Pitkin 1993): *N. punctilinea* (described from Venezuela and ranging from Mexico to Brazil), *N. parcipuncta* (Dognin, 1908) from French Guiana, and *N. unipunctata* (Prout, 1912) from Argentina to South Brazil are similar one to another externally, and *N. spatha* (Debauche, 1937) (Brazil) is supposed conspecific with *parcipuncta* by Pitkin, 1993. Male genitalia of these species are similar to *N. erina* (Pitkin, 1993: 68) in large armatures with valva broad and truncate apically. *N. erina* has uncus slender, in Nicaraguan specimen indented apically, spade-shaped dilated in other species, less so in *N. unipunctata*, the broadest distally in *N. punctilinea*. The postmedial row of spots in forewing at apex is parallel to distal margin of wing in *N. punctilinea*, in *N. parcipuncta* it is curved inward in subcostal area (near to fore margin), and in *N. unipunctata* – outcurved towards wing apex.



***Nemoria rectilinea* (Warren).**

Miantonota rectilinea Warren, 1906: 420 (Cuba).

Racheospila rectilinea Warren: Prout, 1912: 107.

Racheospila rectilinea Warren: Prout, 1932: 28 (Dominica).

Nemoria rectilinea Warren: Pitkin, 1993: 94 (Mexico – Dominica).

Distribution: Mexico, Guatemala, Costa Rica, Panama, Dominica. New country record: Nicaragua.



Wing span 20.5-23 mm in male, 23-26 mm in female. Frons small, brown with 4 whitish spots at corners, fillet thin white, vertex green, 2 times broader than fillet. Abdomen dorsally green, with a black blotch at metathorax and tergite A1 and another, smaller spot at tergite A4-6 or A5-6 in male; female with smaller black spot at tergite A1 and larger at tergites A3-6. White transverse lines straight in forewing, elbowed at vein M3 in hindwing. Marginal line thin in male, greyish in forewing, reddish in hind wing, but stronger in female, reddish, proximally paler. Male hind tibia

with distal projection 0.75-1.0 mm long, longer than in other similar species with straight white lines. Male genitalia specific in distal sclerotization of valva. Valval coremata (androconial structures) consisting of thick and black hairs basally and thin brown hairs on the eversible part.

Nemoria* sp. cf. *strigaria (Schaus, 1912).

Wing span 24 mm. Frons light green, fillet white, vertex light greenish, colour of abdomen not specified. Male antenna with pectinations up to 0.55 mm long (about two times longer than in most similar species in Nicaragua), hind tibia with distal projection 0.8-1.0 mm long. Male genitalia similar to those of North American *N. rubrifrontaria* (Packard, 1839) or southern *N. strigaria* species group especially in shape of distal projection of valve costa and long slender, tapering dorsobasal valval projection, but the specimen differs in green colour of frons and in plain ground colour of wings with white transverse lines, resembling also *N. saryae* in shape of tergite A8. Fresh specimens are needed for detailed description of this species.

***Nemoria defectiva* (Prout).**

Racheospila dentilinea defectiva Prout, 1932: 27 (Peru).

Nemoria defectiva Prout: Pitkin, 1993: 87.

For cites, see the list of species of the site Bartola. Wing span 24-26 mm. Frons dark green, slender; fillet white, vertex green; thorax and abdomen green dorsally, without ornamentation (with blackish spots in most species with green frons, except *N. venezueale* with white pattern). Wings green, forewing postmedial line white, continuous, stronger at veins; marginal line slightly denser green, thin reddish grey, or absent, disrupted by white spots at vein ends; fringe pale creamy. Hind tibia distal projection flat, triangular, 0.5-0.6 mm long.



***Nemoria acutularia* (Schaus).**

Racheospila acutularia Schaus, 1912: 289 (Costa Rica).

Racheospila acutularia Schaus: Prout, 1932: 28.

Racheospila thymele Prout, 1932: 25 (Costa Rica)(synonymized by Pitkin, 1993).

Nemoria acutularia Schaus: Pitkin, 1993: 83 (Costa Rica).

Hitherto known from Costa Rica only. New country record: Nicaragua.



Wing span 20-22 mm. Male hind tibia distal projection oval apically, 0.45-0.55 mm long (or one-half length of the basal tarsomere). Frons warm brown with 4 whitish spots at corners, in one specimen with dark green hue dorsally. Fillet white, vertex green, rosy or tan line between, of variable width. Thorax and abdomen dorsally green, tergites 1, 3 and 4 with white spots, edged brown. Wings green, discal spots dark grey, forewing costa greyish, slightly reddish basally; transverse lines continuous, slightly waved, fringe whitish in forewing, more yellowish in hind wing, slightly spotted brownish at vein ends. Marginal line reddish, paler proximally. Very similar *N. marielosae* Pitkin has the distal projection to hindtibia 0.75 mm long; see part 1, Bartola.

***Nemoria aturia* (Druce).**

Geometra aturia Druce, 1892: 84 (Mexico).

Racheospila puntillada Dognin, 1893: 81 (Ecuador) (synonymized by Pitkin, 1993).

Blechroma nigricincta Warren, 1904: 503 (Peru) (synonymized by Prout, 1912).

Blechroma tisstigmaria Dyar, 1912: 91 (Mexico) (synonymized by Pitkin, 1993).

Racheospila magnidiscata Prout, 1912: 108 (Guatemala) (Synonymized by Prout, 1913).

Racheospila puntillada Dognin: Prout, 1912: 108 (Ecuador, Peru).

Racheospila aturia Druce: Prout, 1912: 108 (Mexico to Panama).

Racheospila aturia Druce: Prout, 1932: 34.

Nemoria aturia (Druce, 1892): Pitkin, 1993: 70 (Mexico to Ecuador).

Distribution: Mexico, Guatemala, Costa Rica, Panama, Colombia, Ecuador. New country record: Nicaragua.



Wing span 25-26 mm. Frons light brown with whitish spots at lower corners, fillet white, vertex green. Dorsum green, meso- and metathorax and tergite 1 each with a blackish spot. Wings green, discal spot grey, large and complex in forewing, a green line in hindwing accompanied by a greyish patch near anal margin. Three rows of suffused greyish spots on wings are distinctive. Male hind ibia with distal projection 0.75 mm long.. Male genitalia with costa projecting dorsodistally and uncus thicker distally; resembling the informal *N. erina* group of species, but smaller, socii keel-shaped triangular and sternite A8 incised deep.

***Nemoria astraea* (Druce).**

Racheospila astraea Druce, 1892: 90 (Mexico).

Racheospila astraea Druce: Prout, 1912.

Racheospila astraea Druce: Prout, 1932.

Nemoria astraea (Druce, 1892): Pitkin, 1993: 85 (Mexico to North Peru).

Distribution: (according to Pitkin, 1993): Mexico, Guatemala, Costa Rica, Panama, Colombia, Ecuador, Peru. New country record: Nicaragua.





The species is well distinguished from similar Mexican species by the shape of brown and yellow spot at abdomen and hindwing inner margin, by entire absence of marginal line in wings. Similar *Synchlora* species (*S. astraeoides et al.*) have wings with contrasting marginal line.

***Nemoria isabelae* Pitkin.**

Nemoria isabelae Pitkin, 1993: 85 (Mexico to North Peru).



Wing span, 22 mm, Frons slender, carmine brown with 4 white marks at corners; male antennal pectinations 0.3-0.35 mm, hind tibia with pencil and posterior projection about 0.65-0.7 mm. Fillet white, vertex tan, collar pale green. Wings light green with delicate white antemedial and postmedial lines nearly straight, elbowed at lower cell end in hind wing; discal spots small, blackish. Marginal line contrasting dark brown, but enlightened basally, slightly broader at tornus of both wings, divided by whitish spots at vein ends; fringe creme basally, indistinctly darker apically and against vein ends. Metathorax and dorsum of first two abdominal segments brown,

tergites 3-6 blackish brown; large white mark at t1 edged brown, large spot at T2 cream-coloured, edged by slender brown line; white marks at t3 and t4 white, large. Other *Nemoria* species in Nicaragua have the tergite A2 without any ornamentation and the marginal line much less contrasting. Male genitalia similar to *N. isabelae* Pitkin, 1993 from Central Costa Rica. Both species have characteristically shaped saccus and prominent distal costal projection of valva, which is bicornute in *N. isabelae* type (Pitkin, 1993). The Nicaraguan specimen differs in distal costal projection simpler and receiving distal, curved end of lacinia costae, also in basal costal projection of valva flat, tapering thin apically (not stick-like parallel-sided) and strongly elbowed basally. *M. isabelae* differs also in colour of vertex (with reddish brown band), in green dorsum of abdomen with three white spots ringed brown and by less contrasting brown marginal line in wings. The creme spot at tergite 2 is highly distinctive.

***Lissochlora albociliaria* (Herrich-Schäffer).**

Geometra albociliaria Herrich-Schäffer, 1855: pl. 61, Fig. 344 (Venezuela).

Racheospila albociliaria Guenée, 1857: 373.

Racheospila dubiaria Oberthür, 1916: 90, Fig. 3241 (Venezuela).

Distribution: (according to Pitkin, 1993): Costa Rica, Panama, Venezuela. New country record: Nicaragua.



Wing span 22 mm in male, 24 mm in female. Frons brown, paler below, fillet white, reddish behind. Dorsum green, white spot at tergite 1 edged black (anteriorly) and brown, white spots at tergite A3 in male and at tergites A3-A5 in female ringed brown. Male antenna with pectinations up to 0.75 mm long. Forewing costal edge lined white with broad grey shadow, transverse lines as rows of grey marks at veins, that at vein M2 shifted basad; marginal line thin, dark reddish, disrupted by white spots at veins; fringe creamy, spotted brownish at vein ends. Male genitalia with uncus dorsally dentate and bearing a tuft of hair-like scales.

***Lissochlora* sp.**

The description of the new species will be published elsewhere. It is distinguished from other nemoriine taxa in Matagalpa prov. by bifid uncus, rosy line demarcating fillet and vertex, round white spots at tergites A1 and A3 ringed brown, and distal border of wings more dense scaled green, without brown or grey. Transverse lines on wings replaced by rows of grey spots with attached tiny white distal points, these at forewing veins M1-M3 in a straight row.



***Lissochlora ronaldi* Pitkin.**

Lissochlora ronaldi Pitkin 1993: 61 (Costa Rica).

Distribution: (according to the original description): Costa Rica, Panama. New country record: Nicaragua.





A small-sized species, wing span 18-19 mm. Wings green, ante- and postmedial lines reduced to rows of white spots at veins. Frons green, fillet white, vertex green, tan line between. Male antennal pectinations 0.5 mm long. Dorsum of abdomen green, tergite A1 with a black spot and tergites A2-A7 with small plain white spots. Male hindtibia distal projection 0.5 mm long.

***Lissochlora pectinifera* (Prout).**

Racheospila pectinifera Prout, 1916: 158 (Peru).

Racheospila pectinifera Prout, 1932.

Lissochlora pectinifera (Prout): Pitkin, 1993: 102 (Peru).

Distribution: (according to Prout, 1932): Panama, Peru. New country records: Nicaragua, Ecuador.



Wing span 22 mm. Frons slender, brown, fillet white, vertex green, rosy line between. Male antennal pectinations up to 0.75 mm long, 3rd segment of palpus dark brown, 0.25 mm long, hind tibia with distal projection 0.7 mm long. Dorsum green, tergite 1 with large round, tergite 3 with triangular white blotch ringed brown. Wings light green, discal spots (obliquely positioned in forewings) and subcostal spots at ante- and postmedial line of forewing grey (white color not visible), the spot at M2 shifted out of row. Spots in hind wing white, sometimes accentuated with grey basally. Marginal line thin, greyish in forewing, reddish in hind wing. Male genitalia occasionally everted in current specimen, observable without preparation (pictured from a specimen from Ecuador). Male antenna with long pectinations are characteristic.

***Phrudocentra mitigata* Prout.**

Phrudocentra mitigata Prout, 1912: 120 (Panama).

Phrudocentra mitigata Prout, 1932: (Panama, Costa Rica).

Phrudocentra mitigata Prout: Pitkin, 1996: 383 (Costa Rica?, Panama).

First time recorded for Nicaragua, confirmed for fauna of Costa Rica (Salsipuedes, 2751m; Trinidad, 2470 m).



Wing span 21.5 mm. While externally similar *P. pupillata* was quite common at Bartola collecting site, only one superficially similar specimen was taken at light in Selva Negra. During mounting of the moth differences in wing shape (more acute apically, even slightly falcate) and colour (gradually tending pale in submarginal area of both wings) were noticed.

White fillet and light green vertex, light brown spot at whitish frons, green abdominal tergites without white spots, length of antennal pectinations (0.6-0.62 mm) and hindtibial projection (1.2 mm) also allow discriminate between this species and similar *P. pupillata* and *P. vivida*. Considering *P. leuconyssa* Prout, 1932 from Guatemala, *P. mitigata* from Nicaragua and Costa Rica differs in the postmedial line darker green than the ground colour, with a slight whitish distal edging, and reaching the anal margin of hind wing in equal distance from grey basal spot and tornus of wing. Long dorsal projections from juxta, and deeply notched sternite A8 are also characteristic.

***Hyalochlora splendens* (Druce).**

Racheolopha splendens Druce, 1898, Biologia Centrali-Americana, Insects 2: 535 (Mexico).

Hyalochlora splendens Druce: Prout 1912, Genera Insectorum 192: 21, 125.

Hyalochlora splendens Druce: Prout, 1932 in Seitz 8: 50.

Hyalochlora splendens Druce: Pitkin, 1996: 350 (Mexico, Costa Rica).

Distribution: (according to Pitkin, 1993): Mexico, Costa Rica. New country record: Nicaragua.

There are two semidiaphanous *Hyalochlora* species found in Costa Rica. *H. splendens* is distinctive in its wing markings, e.g. the presence of a brownish, triangular or trapezoidal blotch at inner margin of hind wing (which is absent in *H. antolodoxa* Prout, 1932). Genitalia are figured by Pitkin (1996). Male genitalia are similar to those in *Lissochlora*.



***Oospila concinna* Warren.**

See cites and discussion of the moth from Part 1, Bartola above. *O. concinna* is similar to *O. albicoma* F.& R. but with wings almost two times larger.



***Oospila athena* (Druce).**

Racheolopha athena Druce, 1892: 89 (Panama).

Progonodes athena Druce: Prout, 1912: 135.

Progonodes athena Druce: Prout, 1932: 60 (Costa Rica to Peru).

Oospila athena Druce: Cook & Scoble, 1995: 33.

Distribution: Costa Rica, Panama, Venezuela, Colombia, Ecuador, Peru. New country record: Nicaragua.

Wing pattern is distinctive in arrangement of white area and green speckling. Male genitalia of specimens from Nicaragua and Ecuador are slightly different, the costa of valva stouter and provided with stronger apical spine in Nicaragua; further studies must show if the difference is clinal or not. The shape of solid projections of the sternite A8 is distinctive for the species.





***Oospila venezuelata* (Walker).**

Comibaena venezuelata Walker, 1861: 570 (Venezuela).

Comibaena invasata Walker, 1866: 1611 (Colombia).

Comibaena belisama Druce, 1892: 87 (Panama).

Comibaena venezuelata Walker: Druce, 1892: 87.

Auophylla ambusta Warren, 1900: 131 (Venezuela).

Auophyllodes venezuelata Walker: Prout, 1912: 131 (Nicaragua to Trinidad).

Auophyllodes partita Prout, 1912: 131 (Panama).

Auophyllodes venezuelata cellata Prout, 1932: 53 (Mexico).

Oospila venezuelata Walker: Cook & Scoble, 1995: 64 (Central and South America).

Wing span 23-24 mm in concrete specimens. *O. venezuelata* is very variable in wing pattern especially in distribution of dark pigmentation in distal area of forewing; therefore the long list of synonyms described. Genitalic structures are not variable (Fig.).



***Synchlora indecora* (Prout, 1916).**

Racheospila pomposa Dognin, 1898: Prout, 1912: 110 (Mexico to Peru).

Racheospila pomposa ssp. *indecora* Prout, 1916: 166 (Mexico, Nicaragua).

Racheospila pomposa & ssp. *indecora* Prout, 1932: 38 (Ecuador, Peru, Mexico, Nicaragua).

Wing span of the Selva Negra female, 21 mm; 3rd segment of palpus rosy with white apex, length 0.55 mm. Frons slender, tan brown, paler below. Fillet white, broad, vertex dark rosy, lighter and mixed green behind. Thorax dorsally light green, dorsum of abdomen brownish, with a small white spot basally and large round, high white spots at tergites 2 to 4 ringed dark brown.

Dognin characterizes the species as semi-transparent green with jagged white postmedial line and marginal line yellow and slender rose. Prout (1916, 1932) described the northern subspecies as smaller in size, with discal spots smaller and marginal line more even.

The females from Nicaragua, compared to series from Ecuador, have marginal line slenderer, although slightly dilated in interspaces, more reddish; 3rd segment of palpus 2x longer (0.25 mm in Ecuador, n=3) and frons tan, not red. The marginal line is slightly broader towards apex and tornus of hind wings in both populations, more brownish in Ecuador. Fitting in characters of wing pattern, this female is recognized as *indecora* Prout.

***Synchlora irregularia* Barnes & McDunnough.**

See the cites and discussion of the moth in Part 2, Domitila, above. Wing span, 13-14 mm.

Light green wings with jagged white ante- and postmedial line and a row of white marginal spots are characteristic. Tergites A1 and A5 with small white spots, A3 and A4 with large white spots surrounded brown.

***Synchlora expulsata atrapoides* (Prout).**

Racheospila expulsata atrapoides Prout, 1932: 39 (Central America).

See cites and discussion of the moth in Part 1, Bartola, above. A widespread species, recorded for all localities collected by us in Nicaragua.



***Synchlora astraeoides* (Warren).**

Racheospila astraeoides Warren, 1901: 448 (Panama to Peru).

Racheospila astraeoides Warren, 1898: Prout, 1912: 110.

Racheospila astraeoides Warren: Prout, 1932: 40 (Ecuador; Costa Rica to Bolivia).

Synchlora astraeoides Warren: Pitkin, 1993: 87.

Synchlora astraeoides Warren: Pitkin, 1996: 394 (Costa Rica to Brazil).

New country record: Nicaragua.

Wing span 17-18 mm in males, 22-24 mm in females. Similar to *N. astraea* in hindwing maculation but marginal line distinct, red-brown (absent in *astraea*), frons pink and brown, whitish below, vertex reddish with some green scales (green in *astraea*). Third segment of palpus rosy, white-tipped, 0.12 mm long in male, 0.58-0.6 mm in female. Male antennae pectinate, pectinations' length reaching 0.75 mm; distal projection of hind tibia 0.6 mm (as long as the basal tarsomere) in male.

Males from Costa Rica are similar in length of antennal pectinations, palpi and tibial projection, as well as in shape of characteristic dark brown blotch at hindwing, between discal cell, vein CuA2 and anal margin, delimited straight against CuA2.

One series of males from Ecuador (n=7, from localities at 450 – 1820 m on western slope and foothills of Andes) of the same wing span, differs in antennal pectinations not exceeding 0.37-0.4 mm (i.e. one-half shorter than in *S. astraeoides* from Nicaragua), in less compact tibial projection with length of 0.6 mm, frons coloured as said in the original description of *S. astraeoides* (greenish brown above, light greenish spots below centered rosy-brown) and hindwing anal blotch edged along the vein CuA2.



Another series of moths from Andes in Ecuador (1700-2100 m), n= 6 (gen. prep. **8438**) differs in larger wing span (18-21 mm in males, 21-23 mm in females), longer male antennal pectinations (0.8-0.87 mm), in distal projection of hind tibia 0.6 mm long, third segment of palpus 0.68-0.7 mm in female. Most remarkably, the hindwing anal blotch is enlarged on the discal cell basal to the discal spot, and along the anal margin up to the tornus.

According to these data, there are three similar taxa present in the informal *S. astraeoides* group, one with larger wingspan and shorter-pectinated male antennae, from East Ecuador, another (known from Nicaragua to Panama) small in size but with male antennae pectinated long, and the third with pectinations even longer and hindwing anal blotch markedly large.

Warren (1909) has named Panama first in his type series of *S. astraeoides*. Accordingly, the only representative of the species group in Mesoamerica quite possibly belongs to *S. astraeoides*. Herbulot (1991) has characterized *amplimaculata* in comparison to „*astraeoides*” as having longer antennal pectinations and shorter distal tibial projection in males, as well as the characteristic blotch at anal margin of hindwing, two times longer than in *S. astraeoides*.

Accordingly, a true *S. astraeoides* seems absent in Ecuador; there exists, aside of *S. amplimaculata*, an unnamed species with short-pectinated male antennae.

***Synchlora gerularia* (Hübner).**

See cites and discussion of the moth from Part 1, Bartola, above. The species is widespread and common throughout the South America.

***Chloropteryx clemens* (Warren).**

Gelasma clemens Warren, 1905: 317 (Ecuador).

Chloropteryx clemens Warren, 1905: Prout, 1912 in *Genera Insectorum* 129: 128 (Mexico to Ecuador and Guianas).

Chloropteryx clemens Warren: Prout, 1932: 64 (Colombia to Peru and Fr. Guiana).

Chloropteryx clemens Warren, 1905: Pitkin, 1996: 338 (Ecuador, other localities with a „?”).

New country record: Nicaragua. The species possibly belongs to the distribution type reaching from Mesoamerica to western South America.



Frons slender, olive green, paler below, thorax and abdomen dorsally dull green, tergites A1-A6 with small white spots each. Male antenna bipectinate, pectinations up to 0.38 mm long; 3rd segment of palpus short, 0.13 mm, hind tibia distal projection 0.5 mm.

Chloropteryx productaria Herrich-Schäffer from Paraguay (gen. prep. 7625) has measures of palpus, male antennae etc. as in *C.clemens*, but differs in wing shape – forewing costa more straight and distal margin of hindwing less concave between veins R5 and M3, also in hind tibia projection shorter (0.4 mm), and frons light red according to the original description. Male genitalia differ in shape of tegumen and valva; uncus and socii are stouter in *C. clemens*, markedly thinner in *C. productaria*. The latter species has transtilla spectacle-shaped slender but longer than broad and dorsally round in *C. clemens*.

***Chloropteryx nordicaria* (Schaus).**

Cites and description see Part 2 (Domitila). Wing span 13-17 mm in males, 15-18 mm in females. Wings greyish green, more green than in other Nicaraguan *Chloropteryx*, forewing apex and hindwing projection at vein M3 also more acute.



***Chloropteryx diluta* (Dognin).**

Gelasma diluta Dognin, 1911: 160 (Colombia).

Chloropteryx diluta Dognin: Prout, 1912: 179.

Chloropteryx diluta Dognin: Prout, 1932: 39 (West Colombia).

Chloropteryx diluta Dognin: Pitkin, 1996: 338.

Distribution: (according to Pitkin, 1996): Mexico?. Guatemala?, Costa Rica, Colombia, Peru?. New country records: Nicaragua, Ecuador.



Wing span 20-22 mm. Frons slender, light grey; fore margin of fillet and bases of antennae whitish, fillet olive green at middle. Abdomen grey with four to five whitish spots. Male antennae bipectinate with pectinations' length 0.5-0.52 mm, 3rd segment of palpus, 0.2 mm long. Male hind tibia 4.0 mm long. Its distal projection truncate, as long as basal tarsomere, 0.5 mm. Wings grey above, ante- and postmedian lines as rows of white spots at veins, shadowed by broad bands of olive-grey irroration. Marginal line indistinct, olive grey, fringe grey. If faded, similar to the following species, but with hind wings acute angulate at vein M3. Male genitalia: socii long and thin, valva with a row of setae along costa and with a thin projection from base of costa towards juxta. Juxta a plate.

***Chloropteryx opalaria* (Guenée).**

Iodis opalaria Guenée, 1857: 357.

Iodis opalaria Guenée: Prout, 1912: 232.

Chloropteryx opalaria Guenée: Prout, 1932: 63 (Mexico, Brazil).

Chloropteryx opalaria (Guenée): Pitkin, 1996: 339 (Mexico to Bolivia and Paraguay).

New country records: Nicaragua, Fr. Guiana (Kaw Mts.).

There are several names (from different parts of South America) synonymized with *C. opalaria* by Prout, 1932. Here the name is used for the taxon with distinctly H-shaped juxta in male genital armature (as in Fig. 92 by Pitkin, 1996).





Wing span 15-19 and 18-19 mm in males and females, accordingly. Male antennae bipectinate with apical third simple; length of pectinations up to 0.37 mm; 3rd segment of palpus oval, 0.12 mm long in male, stick-shaped 0.5-0.6 mm in female. Male hind tibia with distal projection 0.37 mm long, or 2/3 length of the basal tarsomere. Frons dark greyish, thorax greyish green with a thin white midline, abdominal tergites grey with 5-6 whitish spots.

***Chloropteryx jalapata* Dyar.**

Cites and characteristics see in Part II, Domitila. Small, light grey-green moths with thin, irregular but continuous white ante- and postmedial lines, and smoothly darker medial field.



On the photo, *C. jalapata* (left) and *Psaliodes* sp. (Geometridae: Larentiinae) (right).

***Xerochlora masonaria* (Schaus).**

Nemoria masonaria Schaus, 1897: 161 (Mexico).

Chlorochlamys masonaria (Schaus): Prout, 1933: 62 (Costa Rica).

Xerochlora masonaria (Schaus): Ferguson, 1969: 161 (USA).

Xerochlora masonaria (Schaus): Pitkin, 1996: 412 (USA to Costa Rica).

Distribution (according to Ferguson, 1985 and Pitkin, 1996): southern U.S.A., Mexico, Guatemala, Costa Rica. New country record: Nicaragua.

Wing span 20-22 mm in males, 22-25 mm in females. Hind wing distal margin markedly concave between veins M1 and M3 allows to discriminate between the species of *Xerochlora* and *Chloropteryx*.



Frons slender, dark green, fillet and vertex dull yellowish, collar green. Abdomen dorsally blackish, tergite A1 green, A2-4 light brown, A4-6 posterior margins lined yellow. Forewing costa edged light brown and speckled blackish, ground colour dull green (more greenish than in *Chloropteryx* spp.), transverse lines reduced to rows of white spots at veins, separate in hind wing, connected by a slight pale, undulate line in forewing. Marginal line consists of denser green scales, indistinct. Underneath, forewing greenish, hindwing less so, marginal line conspicuous, green.

***Hydata subfenestraria* Walker.**

For cites and characterization see Part 2 (Domitila). The small series from Selva Negra is darker in maculation than the Domitila male, but otherwise without morphological difference.

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