AMERICAN MUSEUM
Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK, N.Y. 10024
Number 3118, 10 pp., 11 figures January 27, 1995

Additions to the Geometridae (Lepidoptera) of the Galápagos Islands, Ecuador, Including a New Species of *Eupithecia*

BERNARD LANDRY[1] AND FREDERICK H. RINDGE[2]

ABSTRACT

One species of Geometridae, *Eupithecia galapagosata,* is described as new from the Galápagos Islands. *Pleuroprucha* sp., ?*insulsaria* (Guenée) is mentioned from the archipelago for the first time. Also, 20 new island records are given for species already known from the archipelago.

RESUMEN

Se describen una especies nueva de Geometridae (*Eupithecia galapagosata*), para las islas Galápagos. *Pleuroprucha* sp., ?*insulsaria* (Guenée) se cita por primera vez para el archipiélago. Se presentan 20 nuevos registros de distribución dentro del archipiélago, por especies previamente mencionadas.

INTRODUCTION

The Geometridae of the Galápagos Islands were revised by Rindge (1973). Thirteen species and subspecies were then recognized to occur on the archipelago.

Subsequent to Rindge's (1973) revision, there has been little mention of Geometridae from the Galápagos in the literature. Rindge (1983) revised the New World genera of Nacophorini, a tribe that includes the genus *Thyrinteina,* containing two Galápagos endemics. Silberglied (1978) mentioned the occurrence of *Disclisioprocta stellata* (Guenée)

[1] Curator of Pyralidae, Centre for Land and Biological Resources Reseach, Agriculture Canada, C. E. F., Neatby Bldg., Ottawa, Ontario K1A 0C6 Canada.

[2] Curator Emeritus, Department of Entomology, American Museum of Natural History.

ISSN 0003-0082 / Price $1.70

at lights of a tour boat, suggesting the transport of this species and others among islands and from the continent to the archipelago. Brown et al. (1991) gave some insight into the phylogenetic relationships of *Oxydia* species, including *O. lignata* (Warren), endemic to the Galápagos, and commented on the lack of relationships between the Galápagos and Cocos Island faunas of Geometridae. Finally, McMullen (1993) summarized all known observations of flower-visiting insects in the Galápagos, reporting *D. stellata* at flowers of *Cordia leucophlyctis* Hooker *f.* (Boraginaceae).

This paper reports new information on the faunistics of Galápagos Geometridae. These new data were gathered by the first author during two field trips to the archipelago in 1989 and 1992. With the description of one new species and the newly reported occurrence of *Pleuroprucha* sp., *?insulsaria* (Guenée) in the archipelago, the geometrid fauna now includes 15 species, 11 of which are presumed to be endemic. In addition to these, a photograph of a striking black-and-white moth on flowers of *Conocarpus erecta* L. (Combretaceae) was sent to the first author for examination by Conley K. McMullen of West Liberty State College, West Virginia. The photograph was taken on 17 June 1990 on Santa Crúz Island, on the roadside between the Charles Darwin Research Station and Puerto Ayora. The species was identified as *Thersana vidrierata* Dognin (Geometridae) by Douglas C. Ferguson, of the Systematic Entomology Laboratory of the U.S. Department of Agriculture in Washington, D.C. It was not collected or seen in the archipelago by the first author in 1989 and 1992. The establishment in the Galápagos of this day-flying species, described from the Loja area, Ecuador, will only be confirmed or refuted when additional material is found.

MATERIAL AND METHODS

In 1989, from January to March, and in 1992, from March to June, the first author collected specimens of Geometridae with a mercury-vapor lamp on the islands of Española, Floreana, Genovesa, Isabela, Marchena, Pinta, Rábida, San Cristóbal, Santa Crúz, Santa Fé, Santiago and Seymour Norte (see Landry and Gielis, 1992, and B. Landry, 1993, for further details).

Smaller species of Geometridae were collected in small vials and kept alive until the next day, when they were killed, pinned with minutens, and properly mounted (J.-F. Landry, 1991, and Landry and Landry, 1994). Selected specimens of the larger species were killed with ammonia and pinned, usually the next day.

The type of the new species described in the following pages is deposited in the Canadian National Collection, Ottawa. Some of the other specimens collected in 1989 and 1992 are deposited in the following collections: the first author's personal collection (BLC); the Canadian National Collection (CNC), Ottawa, the American Museum of Natural History (AMNH), New York, the Charles Darwin Research Station (CDRS), Isla Santa Crúz, and the Museo Ecuatoriano de Ciencias Naturales (MECN), Quito, Ecuador.

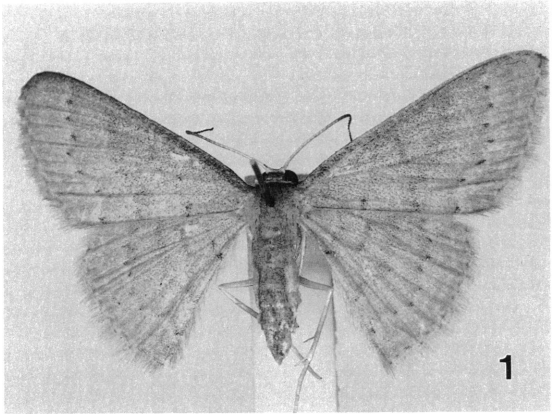
Except for the new species of *Eupithecia,* for *Pleuroprucha* sp., *?insulsaria* (Guenée), mentioned here from the archipelago for the first time, and for *Perizoma* (?) *perryi* Rindge, not mentioned because it was not collected by the first author, we make additions to Rindge (1973). We mention new island records and months of capture. No additional information on the food plants and early stages is available.

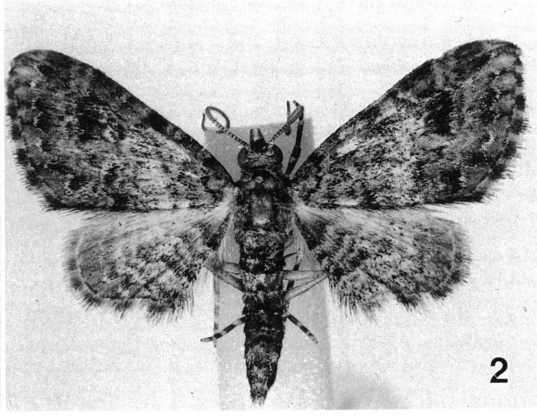
STERRHINAE

Cyclophora impudens (Warren)

Perixera impudens Warren, 1904: 487.
Cyclophora impudens: Rindge, 1973: 9, figs. 8, 24, 39.

This endemic species is widespread in the Galápagos. It has previously been recorded from Española, Floreana, Gardner, Genovesa, Isabela, Pinzón, San Cristóbal, San Salvador, Santa Crúz, and Santa Fé. Additional islands now include the following: Baltra, Pinta, Marchena, Rábida, and Seymour Norte. Adults have been captured in January, February, March, April, May, June, August, September, and October.





Figs. 1, 2. Adults. **1.** *Pleuroprucha* sp., *?insulsaria* (Guenée), female, San Cristóbal Island, base of Cerro Pelado, February 22, 1989 (B. Landry; CNC), wingspan = 16 mm. **2.** *Eupithecia galapagosata,* new species, holotype, male, Isabela Island, Volcan Darwin, 630 m elev., May 16, 1992 (B. Landry; CNC), wingspan = 15 mm.

Pleuroprucha sp., *?insulsaria* (Guenée)
Figures 1, 3, 4, 9

This species was not included in Rindge (1973); a photograph of a male was not received until after that paper had gone to press. That specimen, deposited in the California Academy of Sciences (CAS), San Francisco, was found on Santa Crúz Island. In addition, the first author found it to occur rather commonly on several islands (see below).

The identity of this species will remain questionable until a revision of the Neotropical members of this genus makes it more definite. In general facies these moths are certainly similar to others of the widespread species *insulsaria.*

ADULTS (fig. 1): Males have pectinate antennae; those of females are simple. This small species has pointed forewings, 7.5–8.0 mm long. Upper surface of all wings is a pale brown with a faint pinkish cast; maculation is faint, with veins of forewings having some darker scaling, and with a row of small, black venular dots in outer portion of all wings. Under surface is a unicolorous pinkish white, with maculation of the upper surface faintly indicated.

MALE GENITALIA (figs. 3, 4): With elongate valves, and with a spine-tipped costal arm shorter than the valves.

FEMALE GENITALIA (fig. 9): A short, broad sterigma, a very short ductus bursae, and an elongate, membranous corpus bursae, weakly enlarged posteriorly; signum absent.

In Rindge's (1973) keys, the adults run to couplet 2, the male genitalia to couplet 6, and the female genitalia to couplet 10. The characters given above, especially the wing color and maculation, will distinguish this species from the others treated here.

Locations and collection months are as follows: Genovesa, March; Isabela, March; Marchena, March; San Cristóbal, February; Santa Crúz, April (CAS); Santiago, April.

LARENTIINAE

Disclisioprocta stellata (Guenée)

Scotosia stellata Guenée, 1857: 443.
Disclisioprocta stellata: Rindge, 1973: 13, figs. 9, 25, 40.

This widespread Neotropical species is a conspicuous component of the moth fauna of most, if not all, islands of the archipelago. It is particularly abundant at lower elevations. It has been reported before from Baltra, Española, Fernandina, Floreana, Genovesa, Isabela, Pinta, Santa Crúz, Santa Fé, and Santiago. Additional island records are Marchena, San Cristóbal (Puerto Baquerizo Moreno and pampa zone), and Seymour Norte. Moths have been collected in all months of the year except December.

Hydria affirmata (Guenée)

Scotosia affirmata Guenée, 1857: 447, pl. 9, fig. 2.
Hydria affirmata: Rindge, 1973: 14, figs. 23, 26, 41.

Hydria affirmata is similar in wing shape, color, and maculation to *D. stellata* but it is about twice the size of that species and its hindwing margin is more deeply scalloped. Generally found at higher elevations in the Galápagos, this Neotropical species was reported before from only four females taken on Isabela (April) and Santa Crúz (June and August). The following data are for an additional 20 specimens collected by the first author. Isabela: Sierra Negra (1♂, 1 sex undetermined [sent to CDRS in 1991]) March 12, 1989; ≃15 km N Puerto Villamil (1♂) May 25, 1992. San Cristóbal: 1 km S El Progreso (2♂) February 14, 1989. Santa Crúz: 4 km N Puerto Ayora (1 sex undetermined [sent to CDRS in 1991]) January 20, 1989; Media Luna, pampa zone, (1♂, 1♀) January 21, 1989. Santiago: Bahía Espumilla (1♂) April 4, 1992; 200 m elev. (1♂) April 5, 1992; Aguacate, 520 m elev. (1♂) April 7, 1992 (3♀) April 12, 1992; Jaboncillo, ≃850 m elev. (2♂, 1♀) April 8, 1992; Central, 700 m elev. (1♂, 1♀) April 9, 1992 (1♀) April 10, 1992.

Eupithecia leleupi Herbulot

Eupithecia leleupi Herbulot, 1970: 19, fig. 3; 1971: 12. Rindge, 1973: 15, figs. 1, 2, 27, 28, 42.

This endemic species is the smallest of the Galápagos *Eupithecia,* with the length of the forewings ranging from 4.5 to 5.6 mm in the males (n = 26), and from 5.0 to 6.9 mm in the females (n = 47). This species has very long palpi in both sexes, extending beyond the eye by more than the eye diameter. Wings are paler on the upper surface than those of other members of the genus in the islands, and usually have distinct cross lines, a pale median area, and a brownish suffusion in the outer part of forewing upper surface.

With more material now at hand, it appears that the amount of variation in color and maculation reported in Rindge (1973) may reflect a fair amount of individual rather than geographic variation. As with many species of *Eupithecia,* flown specimens tend to lose their scales rather easily, and so the maculation and color are reduced.

This species has heretofore been known from the islands of Pinta, Rábida, Santiago, and Santa Crúz. The following records are new: Isabela, Marchena, San Cristóbal, and Seymour Norte. The moths have been caught in January–April, July, August, October, and November.

Eupithecia perryvriesi Herbulot
Figure 10

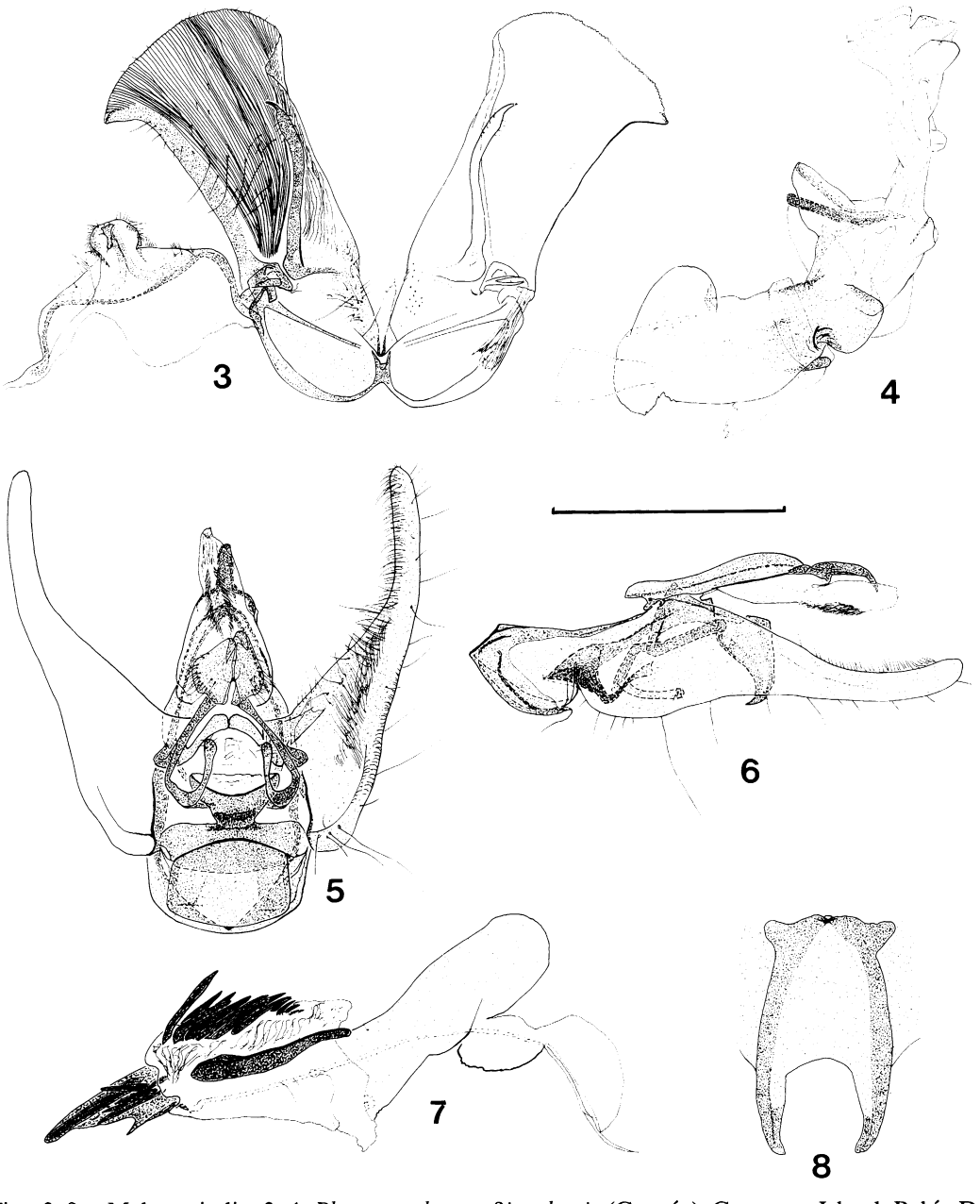
Eupithecia perryvriesi Herbulot, 1971: 13, figs. 1–3. Rindge, 1973: 16, figs. 3, 4, 29, 30.

This endemic species is larger and darker than *E. leleupi.* The length of the forewings is 6.0 mm in the males (n = 3), and in the females it ranges from 6.0 to 9.0 mm (n = 15). The palpi are shorter than in the preceding species, not extending beyond the eye by more than the diameter of the eye. The males have an elongate hair pencil near the base of the underside of the forewing. The upper surface of all wings is generally broadly suffused with blackish brown, reddish brown, grayish brown, or green scales, often suffusing the maculation.

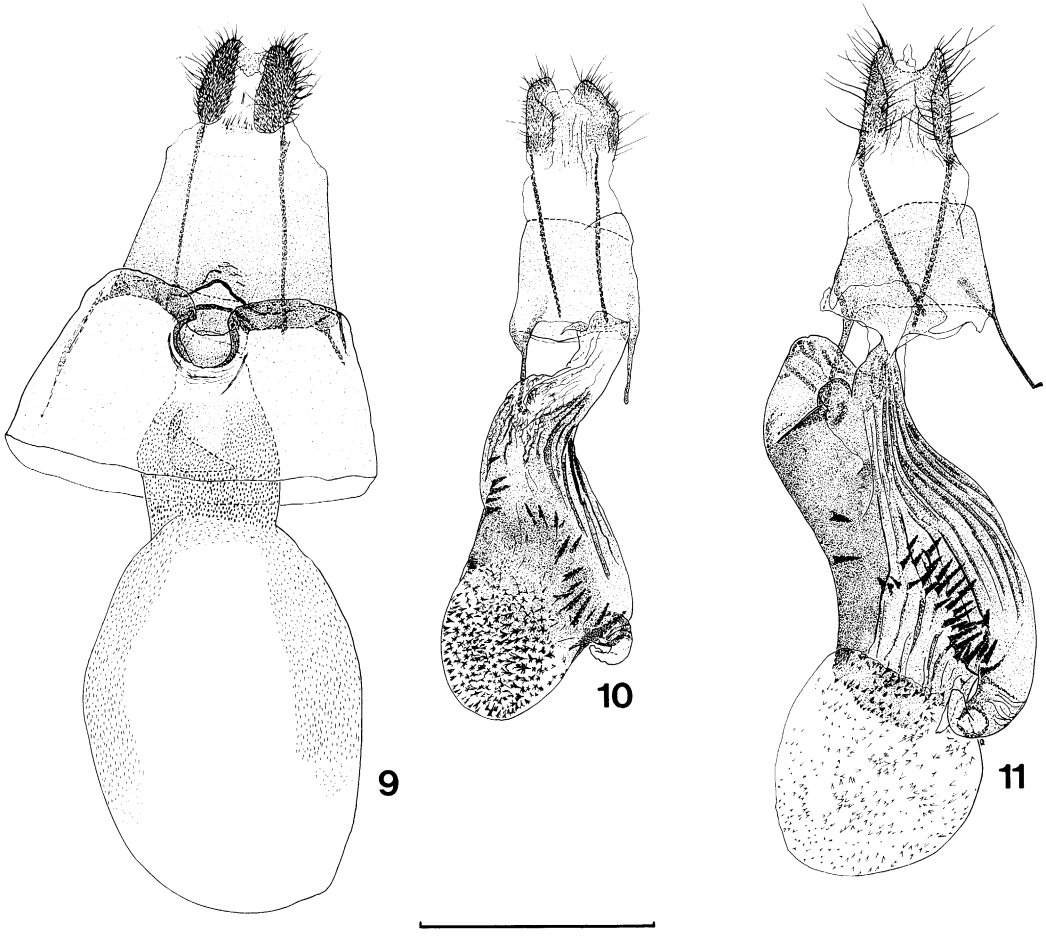
Redescription of female genitalia (fig. 10): Ductus bursae short. Corpus bursae with posterior half sclerotized, weakly curved, broad, with a few longitudinal striations; right side enlarged, terminating in lightly sclerotized appendix bursae, its curved end with ductus seminalis; centrally with a curved row of several medium-sized-to-short, thick spines, and usually with a short row of small spines on left side; anterior half of corpus bursae a large, membranous, swollen, strongly stellate diverticulum.

Because of the confusion of sexes of this species and the following one by earlier authors (see Note below), previous distribution records based on females are dubious. Based on males, the known distribution included the islands of Santa Crúz (the type locality), Isabela, and Pinta (Rindge, 1973). There are no new island records. The adults have been collected in January, February, March, April, May, and November.

Note: We believe that the female described as *perryvriesi* by Herbulot (1971) should not have been associated with the male holotype of that species, and that it belongs to the new species described below. We base this affir-



Figs. 3–8. Male genitalia. 3, 4. *Pleuroprucha* sp., ?*insulsaria* (Guenée), Genovesa Island, Bahía Darwin, March 10, 1992 (B. Landry; CNC), slide BL 506. **3.** Genitalia, with tegumen detached on left side. **4.** Aedeagus with vesica mostly everted. 5-8. *Eupithecia galapagosata,* new species, holotype, Isabela Island, Volcan Darwin, 630 m elev., May 16, 1992 (B. Landry; CNC), slide BL 549. **5.** Genitalia in ventral view without the aedeagus. **6.** Same in side view. **7.** Aedeagus in side view with vesica everted. **8.** Ventral plate. Scale bar = 1 mm.



Figs. 9–11. Female genitalia in ventral view. **9.** *Pleuroprucha* sp., *?insulsaria* (Guenée), Marchena Island, March 12, 1992 (B. Landry; CNC), slide BL 507. **10.** *Eupithecia perryvriesi* Herbulot, Santa Crúz Island, Media Luna, January 21, 1989 (B. Landry; CNC), slide BL 550. **11.** *Eupithecia galapagosata,* new species, paratype, San Cristóbal Island, pampa zone, February 15, 1989 (B. Landry; CNC), slide BL 551. Scale bar = 1 mm.

mation on two reasons: 1—The male genitalia of *perryvriesi* were found to be smaller than those of the new species, even though the specimens were of the same size; therefore, it would be logical to find smaller female genitalia in *perryvriesi,* but, rather, we were finding the opposite situation. 2—The median piece of the vesica of male *perryvriesi* was found to be consistently smaller (see diagnosis of *galapagosata,* n. sp. below) than that of the new species. Using prepared genitalia of these two species, if one superimposes a male everted vesica over the bursa of a female, the longer median piece of male *galapagosata* fits better with the enlargement of the sclerotized part of the corpus bursae on the left side posteriorly, beside the ductus bursae, of the female described as *perryvriesi* by Herbulot (1971).

Eupithecia galapagosata, new species
Figures 2, 5–8, 11

Eupithecia perryvriesi nec Herbulot (females only): Herbulot, 1971: 13, fig. 4. Rindge, 1973: 16, figs. 5–7, 43.

DIAGNOSIS: This species can be recognized by its dark color and large size; in those two

characters it differs markedly from *E. leleupi,* but it is very similar to *E. perryvriesi* at first glance. The males of *E. perryvriesi* are easily distinguished by their elongate hair pencil near the base of the underside of the forewing. The male genitalia are very similar in both species but the median piece on the vesica of *E. perryvriesi* is about half as long as the dorsal crest of spines while it is longer than the crest of spines in *E. galapagosata.* The females of the two species can only be separated by their genitalic features. Those of *E. galapagosata* are characterized by an enlargement of the sclerotized part of the corpus bursae on the left side posteriorly, beside the ductus bursae, and by the smaller and much less strongly sclerotized spicules of the anterior membranous part of the corpus bursae (see figs. 10 and 11 for comparison). The shape and location of the pair of pockets in the intersegmental membrane between abdominal sternites VI and VII are also different in both species. Those of *E. perryvriesi* are close to the sides of the abdomen and are not connected by sclerotization, whereas those of *E. galapagosata* are situated about halfway between the sides and the middle longitudinal axis of the abdomen and are connected by a thin sclerotized band.

ADULTS (fig. 2): Wingspan of type series 13.5–16.0 mm (holotype 15 mm). Palpi porrect, about as long as diameter of eye. Antennae of males finely ciliated, with pair of longer setae basally on each side starting from about 12th article; dorsally spotted with pale olive green and dark brown scales on each article from base until about 12th article. Forewings appearing olive green and black: costa dark brown with paler spots; thin dark brown basal line present; basal area mostly olive green interspersed with dark brown scales; antemedial area mostly white, interspersed with dark brown and olive green scales; dark brown discal spot very small, followed with few white scales and large dark brown spot; postmedian area mostly olive green; postmedian line formed by disconnected medium-sized dark brown spots followed by few white scales; fringe spotted with dark brown and pale olive green. Hindwing mostly dark brown with rather well-defined pattern of whitish bands; also with olive green scales in postmedian area, in anal and cubital sectors.

MALE GENITALIA (figs. 5–8): Uncus slender, terminating in elongate point. Valves extending beyond uncus, swollen basally, tapered distally. Aedeagus broad; vesica with thin, more or less L-shaped apical plate with one long spine dorsally and about five shorter spines ventrad to it; with dorsomedian crest of about 20 medium-sized-to-short spines, and a rather thin, apically blunt piece in middle longer than dorsomedian crest of spines. Ventral plate with two slender elongate rods, weakly connected basally, slightly bowed, and with apices curved ventromedially.

FEMALE GENITALIA (fig. 11): Ductus bursae short. Corpus bursae with posterior half sclerotized, weakly curved, broad, with a few longitudinal striations; right side enlarged, terminating in lightly sclerotized appendix bursae, its curved end with ductus seminalis; centrally with curved row of several medium-sized-to-short, thick spines, and usually with short row of small spines on left side; posteriorly enlarged beside ductus bursae on left side; anterior half of corpus bursae a large, membranous, swollen, poorly stellate diverticulum, which in some preparations appears unswollen (compare Herbulot, 1971, fig. 4, and Rindge, 1973, fig. 43).

TYPE SERIES: Holotype male, Galápagos Islands, Isabela:, V[olcan] Darwin, 630 m, May 16, 1992 (B. Landry); the genitalia are mounted on slide BL 549. The holotype has been deposited in the CNC (type no. 21930). Six paratypes, all from the Galápagos Islands and collected by B. Landry with a mercury-vapor lamp (MVL): Isabela: ♀ (genitalia on slide BL 572), V[olcan] Darwin, 630 m elev., May 17, 1992; ♀ (genitalia on slide FHR 20217), 3 km N S[an]to Tómas, Agric[ulture] Zone, March 8, 1989; ♂ (genitalia on slide MIC 2808), 8.5 km N P[uer]to Villamil, March 11, 1989. San Cristóbal: ♀ (genitalia on slide BL 551), pampa zone, February 15, 1989. Santiago: ♀, Bahía Espumilla, April 4, 1992; ♀ (genitalia on slide FHR 21411), Central, 700 m elev., April 9, 1992.

ETYMOLOGY: The Latin suffix-*ata* has been added to the name of the archipelago.

REMARKS: There is some variation in color pattern when specimens are compared with the holotype. One specimen does not have the olive green scales and a discal spot, while others have at least some green scales and a small but well-defined discal spot. Also vari-

able are the number and size of the spines in the sclerotized part of the female corpus bursae.

In the Rindge (1973) keys (see preceding species), *E. galapagosata* comes out at couplet 4, *E. leleupi,* for the adults, at couplet 5, *E. perryvriesi,* for the male genitalia, and at couplet 2, *E. perryvriesi,* for the female genitalia. See above Diagnosis to further separate this species. Six specimens, all of which were dissected, have been studied.

ENNOMINAE

Semiothisa cruciata cruciata Herbulot

Semiothisa cruciata Herbulot, 1970: 21, figs. 4, 5; 1971: 14.
Semiothisa cruciata cruciata: Rindge, 1973: 24, figs. 11, 31, 32, 45.

The endemic species *S. cruciata* can be recognized by the shape and color of the wings, as the forewings have the outer margin excised below the apex, and the hindwings are angulate at vein M3; the upper surface of all wings is brown and gray.

The species occurs as two subspecies, each on its own island. The nominate population has the upper surface of the wings grayish to grayish brown, with the under surface having a broad brown outer band on all wings. It flies on Santa Crúz Island, in the months of January, February, March, June, August, September, October, and November.

Semiothisa cruciata isabelae Rindge

Semiothisa cruciata isabelae Rindge, 1973: 24, fig. 12.

This population differs from the preceding one by having the upper surface of the wings grayish white (females) to pale ocher (males), with the under surface not having the outer brown band.

It is known only from Isabela Island, being captured in January and March.

Semiothisa cerussata Herbulot

Semiothisa cerussata Herbulot, 1970: 23, fig. 1; 1971: 14. Rindge, 1973: 25, figs. 13, 14, 33, 34, 46.

This species is also an endemic, and may be separated from the preceding by having the outer margin of the forewings gently rounded, and with the hindwings weakly extended at vein M3; the upper surface is noticeably darker than that of *cruciata,* being dark gray and gray.

It has heretofore been known only from Santa Crúz Island. Additional collection has shown that it flies on San Cristóbal as well; the moths have been taken in January, February, March, May, and June.

Thyrinteina infans Herbulot

Thyrinteina infans Herbulot, 1970: 24, fig. 2; 1971: 14. Rindge, 1973: 26, figs. 15, 16, 35, 47.

Two species of *Thyrinteina* occur in the Galápagos Islands; both are endemic, and in both the males are smaller than the females. In the present species the color of the upper surface of the wings varies from pale gray or grayish white (females) to a more or less unicolorous grayish white to having the median area of the forewings heavily suffused with black scaling (males). The latter sex is quite variable in coloration, whereas the females are much more uniform. The length of the forewings varies from 7.5 to 11.0 mm in the males (n = 15); in the females, from 10.8 to 16.0 mm (n = 20).

This species has heretofore been recorded from the islands of Fernandina, Floreana, Isabela, Santiago, Santa Crúz, and Santa Fé; additional collecting has added Marchena, Pinta, and San Cristóbal to the list. Adults have been captured in January–July, October, and November.

Thyrinteina umbrosa Herbulot

Thyrinteina infans umbrosa Herbulot, 1971: 14.
Thyrinteina umbrosa: Rindge, 1973: 27, figs. 17, 18, 36, 48.

The moths have much browner wings than are found in *infans*; the males are darker than the females. The length of the forewings varies from 9.1 to 11.2 mm in the males (n = 5); in the females, from 12.1 to 16.7 mm (n = 24).

This moth has been known from Fernandina, Isabela, Santiago, and Santa Crúz Islands. The moths have been caught in January, February, March, April, May, and December.

Sphacelodes vulneraria (Hübner)

Brotis vulneraria Hübner, [1819]–1823: 23.
Sphacelodes vulneraria: Rindge, 1973: 29, figs. 21, 22, 38, 50.

This widespread Neotropical species was known from the Galápagos from only two specimens taken in March and May on Santa Crúz. In 1989, five additional specimens were collected on Santa Crúz by B. Landry: (1♂) Media Luna, pampa zone, January 21; (2♂) Los Gemelos, January 31; (1♂, 1♀) Finca Steve Devine, March 17.

Oxydia lignata (Warren)

Sericosema lignata Warren, 1905: 362.
Oxydia lignata: Rindge, 1973: 30, figs. 19, 20, 37, 49. Brown et al., 1991: 15.

A quite variable species in coloration and maculation, *Oxydia lignata* is endemic to the Galápagos Islands, and is often commonly encountered at higher elevations in the rainy season. It has been reported before from the islands of Fernandina (February), Isabela (March), San Cristóbal (April), Santa Crúz (February–June), and Santiago (no date). In addition to this, the first author collected the species on Pinta (March), and in January on Santa Crúz.

According to Brown et al. (1991), this species has phylogenetic similarities with *O. hoguei* Brown, Donahue, and Miller (1991), endemic to Cocos Island, and *O. vesulia* (Cramer, 1779). The latter species, as now understood, extends from southern Florida and Texas to southern South America.

ACKNOWLEDGMENTS

We wish to acknowledge the Ecuadorian Ministry of Agriculture, the Galápagos National Park authorities, and the authorities of the Charles Darwin Research Station for allowing fieldwork and providing logistical support in 1989 and 1992. We thank Joyce Cook, Moraima Inca, Ricardo Palma, Stewart B. Peck, Bradley J. Sinclair, and Eduardo Vilema for companionship and help in the field. Fieldwork was supported by an operating grant to Prof. S. B. Peck, Carleton University, Ottawa, from the Natural Sciences and Engineering Research Council of Canada for field research on arthropod evolution.

We would also like to thank B. Lukey and the Biographics Unit of the Research Branch of Agriculture Canada for the photographs, David Moorhouse for assembling the plates, and the Centre for Land and Biological Resources Research of Agriculture Canada, Ottawa, for lab space, equipment, and support.

Douglas C. Ferguson, Systematic Entomology Laboratory, United States Department of Agriculture, Washington, D.C., kindly identified one species on a photograph taken by Dr. Conley K. McMullen, West Liberty State College, West Virginia, whom we thank for allowing us to publish the data regarding the photograph.

Finally, we are indebted to Claude Herbulot and Scott E. Miller for reviewing the manuscript.

REFERENCES

Brown, J. W., J. P. Donahue, and S. E. Miller
1991. Two new species of Geometrid moths (Lepidoptera: Geometridae: Ennominae) from Cocos Island, Costa Rica. Contrib. Sci. 423: 11–18.

Guenée, A.
1857. Histoire naturelle des insectes. Species général des Lépidoptères, X. Uranides et Phalénites, II. Paris, 584 pp.

Herbulot, C.
1970. Lépidoptères Geometridae des Iles Galápagos recueillis par M. et Mme N. Leleup. Lambillionea 69: 17–25.
1971. Deuxième note sur les Lépidoptères Geometridae des Iles Galápagos. Ibid. 71: 11–15.

Hübner, J.
[1819]–1823. Zuträge zur Sammlung exotischer Schmettlinge. Augsburg, Zwentes Hundert, 32 + [8] pp.

Landry, B.
1993. Additions to the knowledge of the Pterophoridae (Lepidoptera) of the Galápagos archipelago, Ecuador, with descriptions of two new species. Zool. Meded. 67:473–485.

Landry, B., and C. Gielis
1992. A synopsis of the Pterophoridae (Lepidoptera) of the Galápagos Islands, Ecuador. Zool. Verh. 276: 1–42.
Landry J.-F.
1991. Récolte et préparation des Microlépidoptères. Fabreries 16: 1–21.
Landry, J.-F., and B. Landry
1994. A technique for setting and mounting Microlepidoptera. J. Lepid. Soc. 48: 205-227.
McMullen, C. K.
1993. Flower-visiting insects of the Galápagos Islands. Pan-Pac. Entomol. 69: 95–106.
Rindge, F. H.
1973. The Geometridae (Lepidoptera) of the Galapagos Islands. Am. Mus. Novitates 2510: 31 pp.
1983. A generic revision of the New World Nacophorini (Lepidoptera, Geometridae). Bull. Am. Mus. Nat. Hist. 175: 147–262.
Silberglied, R. E.
1978. Inter-island transport of insects aboard ships in the Galápagos Islands. Biol. Conserv. 13: 273–278.
Warren, W.
1904. New Thyrididae and Geometridae from the Oriental regions. Novitates Zool. 11: 483–492.
1905. New Thyrididae, Uraniidae and Geometridae. Ibid. 12: 307–379.

Recent issues of the *Novitates* may be purchased from the Museum. Lists of back issues of the *Novitates, Bulletin,* and *Anthropological Papers* published during the last five years are available free of charge. Address orders to: American Museum of Natural History Library, Department D, Central Park West at 79th St., New York, N.Y. 10024. TEL: (212) 769-5545. FAX: (212) 769-5009. E-MAIL: scipubs@amnh.org

⊗ This paper meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).