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CONTENTS

- 1 **WARREN:** A new species of *Atrytonopsis* from Jalisco, Mexico (Lepidoptera, Hesperiiidae, Hesperiiinae, Hesperiiini)
- 7 **WARREN:** A new species of *Dalla* from Chiapas, Mexico (Lepidoptera, Hesperiiidae, Heteropterinae)
- 13 **LARSEN & COCK:** A new species of *Eretis* (Lepidoptera; Hesperiiidae) from Kenya, Uganda and Rwanda
- 17 **DAVENPORT & RAWLINS:** The true identity of '*Delias sacha gilolensis*' Rothschild, 1925 (Lepidoptera, Pieridae)
- 20 **FRANCINI, DE PROENÇA BARBOSA & FREITAS:** Immature stages of the butterfly *Actinote zikani* (Nymphalidae: Heliconiinae: Acraeini), a critically endangered butterfly from southeastern Brazil
- 21 **BOLAÑOS MARTINEZ, GONZALEZ & WILLMOTT:** Descripción de los estados inmaduros de *Pteronymia zerlina zerlina*, *P. zerlina machay*, *P. veia florea* y *P. medellina* de Colombia y del Ecuador (Lepidoptera: Nymphalidae: Ithomiini)
- 34 **NÚÑEZ BUSTOS, FAVRE, BERTOLINI, TURNER & SOURAKOV:** Mariposas diurnas (Lepidoptera: Papilionoidea y Hesperioidea) de la reserva privada Osununú - parque provincial Teyú Cuaré y alrededores de San Ignacio, provincia de Misiones, Argentina
- Scientific notes:**
- 43 **MATTHEWS, MILLER & RAZOWSKI:** *Mictopsichia cubae* recorded from Honduras (Lepidoptera: Tortricidae)

FRONT COVER - *Charaxes protoclea* (Nymphalidae); Back cover - *Cethosia hypsea* (Nymphalidae) ©Andrei Sourakov.

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A NEW SPECIES OF *ATRYTONOPSIS* FROM JALISCO, MEXICO (LEPIDOPTERA, HESPERIIDAE, HESPERIINAE, HESPERIINI)

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Abstract - A new species of *Atrytonopsis* is described from southwestern Jalisco, Mexico. Based on wing phenotype and morphology of the male genitalia, the new species appears closest to *A. cestus*, a taxon known from southern Arizona, United States, to central Sonora, Mexico. Notes on the circumstances behind the collection and discovery of this new species are provided, as well as a detailed comparison of the new species to other *Atrytonopsis* taxa.

Key words: Distribution, endemism, genitalia, insect collection, skipper butterfly

Mexico is home to an extraordinarily rich fauna of HesperIIDae, commonly known as skipper butterflies, with over 740 species recorded from the country to date (Warren in prep.). Many skipper genera are highly diverse in Mexico, and various genera are rich in endemic species, especially among monocot-feeding Heteropterinae and HesperIinae, or grass skippers. The most noteworthy of these are *Dalla* Mabille, 1904, *Piruna* Evans, 1955, and *Paratrytone* Godman, 1900, although when genera whose distributions also extend into the southwestern United States are considered, *Megathymus* Scudder, 1872, *Agathymus* H. Freeman, 1959, *Amblyscirtes* Scudder, 1872, and *Atrytonopsis* Godman, 1900 are additional examples (Warren 2000, in prep.).

Atrytonopsis is comprised of about thirteen described species, all but three of which are confined to Mexico and the southwestern United States (Arizona, Utah, Colorado, New Mexico, W Oklahoma and W Texas; see Mielke 2005, Brock and Kaufmann 2006, Pelham 2008, Warren 2009, in prep., Warren *et al.* 2011). While there has been no recent comprehensive revision of the genus, detailed discussions of relationships among species and species groups were provided by Burns (1982, 1983) and Warren (2009), the latter author naming a new species from western Mexico. Below, another new species of *Atrytonopsis* is described from western Mexico, collected by Anna T. and Edward J. Austin in 1967, but apparently not recognized as an undescribed species until late in 2009 (see discussion).

Atrytonopsis austinorum A. Warren, sp. nov.

(Figs. 1a,b, 2a-g)

Description. Male (Fig. 1a,b)- forewing length = 14.4 mm, forewing apex somewhat pointed, termen evenly convex (though straight between CuA2 and 1A+2A), no stigma or brand; hindwing nearly evenly convex, slightly produced at end of Rs and slightly lobed at tornus. Dorsal forewing brown, very sparse overscaling of short, flat, golden-brown scales, distributed mainly in basal half of costa, cell CuA2 and cell 1A+2A; a few pale golden-brown setiform scales in base of cell CuA2 and more extensively in cell 1A+2A. Opaque whitish macules as follows: subapical in mid-R3-R4 and near bases of R4-R5 and R5-M1, more or less quadrate, forming a nearly straight line perpendicular to costa, mostly overlapping

except distal end of macule in R5-M1 extends distad of other apical macules, and basal margin of macule in R3-R4 offset distad with respect to basal margin of other apical macules; postmedial in basal half of M3-CuA1, larger, roughly quadrate (distal edge slightly concave, produced somewhat distad along M3); in basal half of CuA1-CuA2, under origin of CuA1 (vein junction just proximad of center of macule), largest, roughly square but produced distad along CuA2; mid-CuA2-1A+2A, semi-opaque, small, nearly round; finally, roughly hourglass-shaped opaque macule spanning width of discal cell at proximal section of distal third of cell, mostly overlapping macule in CuA1-CuA2. Small spot of yellowish scales in lower half of CuA2-1A+2A, just proximad of mid-cell. Wing fringe brown proximad, beige distad, subtly darkened at vein ends, overall palest in CuA2-1A+2A.

Dorsal hindwing same ground color as forewing; prominent overscaling of pale golden-brown setiform scales in 1A+2A-3A, extending almost to termen, CuA2-1A+2A, CuA1-CuA2 and discal cell (basal half). Whitish, opaque, mostly overlapping macules as follows: bottom half of Rs-M1 distal of mid-cell, very small point overlapping proximal base of following macule; mid-M1-M2, larger, roughly rectangular, produced distad from others in series along M1, continuous (not separated by brown scaling along M2) with following macule; basal third of M2-M3, roughly rectangular, produced distad along M2; mid-M3-CuA1, roughly rectangular, completely overlapped by macule in M2-M3; mid-CuA1-CuA2, rectangular, offset slightly proximad from proximal edges of macules in M2-M3, M3-CuA1 and distal edge of macule in M2-M3; finally, slender, white, semi-opaque macule spanning discal cell, just proximad of cell end. Wing fringe brown proximad, beige distad, subtly darkened at vein ends.

Ventral forewing pale brown with short, flat, ochreous scales along costa to R3, a few ochreous setiform scales in base of discal cell; opaque macules repeated from dorsal surface; distal border of whitish macule in CuA2-1A+2A blurred by yellowish overscaling, which extends distad in cell nearly to margin; prominent overscaling of short, flat, lilac-colored scales concentrated along termen from apex to CuA2 and between M1 and M3 proximad of termen to distal edges of macules in R5-M1 and M3-CuA1; fringes as on dorsal surface.

Ventral hindwing appearing rusty brown with lilac highlighting, opaque and semi-opaque macules repeated from

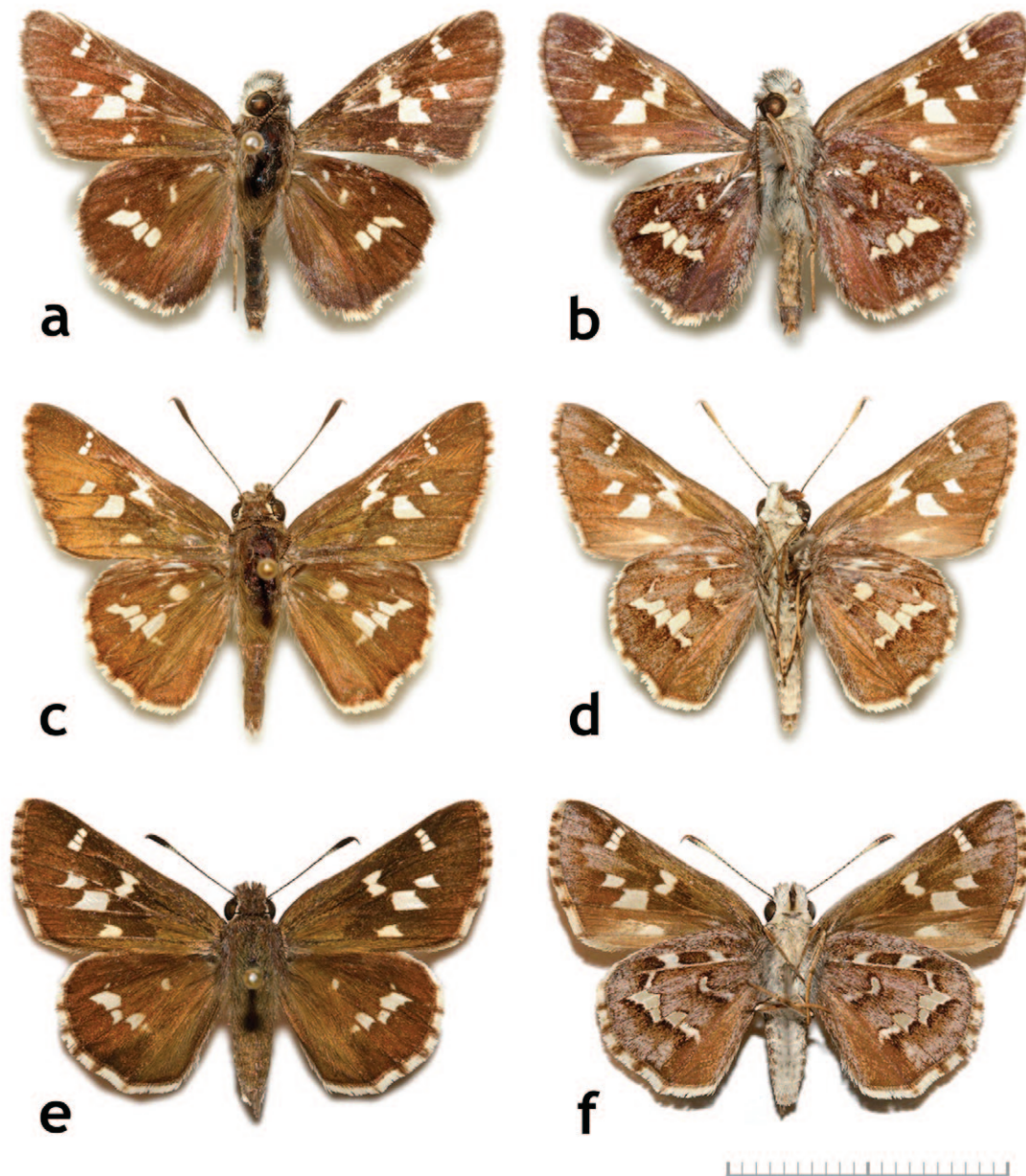


Figure 1. Adults of *Atrytonopsis austinatorum* and *A. cestus*; a) dorsal and b) ventral views of holotype male of *A. austinatorum*, data in text; c) dorsal and d) ventral views of male *A. cestus* from MEXICO: SONORA: Santa Rosa – Yecora Rd., 4.1 – 7.3 mi SE Santa Rosa, 7-VIII-1986, J. P. Brock [MGCL]; e) dorsal and f) ventral views of female *A. cestus* from MEXICO: SONORA: Ruta 16, 20 km E Rio Yaqui (Agua Amarilla), ex larva 7-VIII-1990, emg. 2-IX-1990; host: *Muhlenbergia dumosa*, J. P. Brock. Scale = 20 mm.

dorsal surface; two triangular whitish macules in Sc+R1-Rs, one proximad of mid-cell, the other just distad of mid-cell; two slender whitish macules in CuA2-1A+2A, one post-medial, overlapped entirely by macule in cell CuA1-CuA2, produced somewhat along 1A+2A for a lopsided triangular appearance, the other post-basal, proximad of inner margin of opaque macule in discal cell. Prominent overscaling of short, flat, lilac-colored scales along costa and margin to 1A+2A, proximad of opaque post-median macules, near base of wing (proximad of macule in discal cell), and along inner margin; sparse overscaling of short, flat, ochreous scales over entire wing surface, concentrated somewhat along Rs and distal half of M1; scattered whitish setiform scales at wing base, especially in lower half of discal cell and along inner margin; fringes as on dorsal surface.

Dorsal head brown with brown and whitish setiform scales, whitish above, behind and beneath eye; dorsal labial palpus with mix of brown and whitish setiform scales, grading towards whitish laterally, ventral surface of palpus white with scattered black setiform scales; inner surface gray; third segment brown, correct, barely extending beyond distal scales of second segment. Antennal shaft and club (missing on left antenna) black on dorsum, mostly black on venter with white between segments; nudum dark brown, 9 segments. Dorsal thorax partly rubbed, brown with scattered whitish and beige setiform scales, ventral thorax whitish with scattered dark brown setiform scales, pale gray ventrad, with whitish and dark brown setiform scales along ventral edge of femur; fore-tibia not spined, grayish epiphysis short (0.5 mm), extending to distal

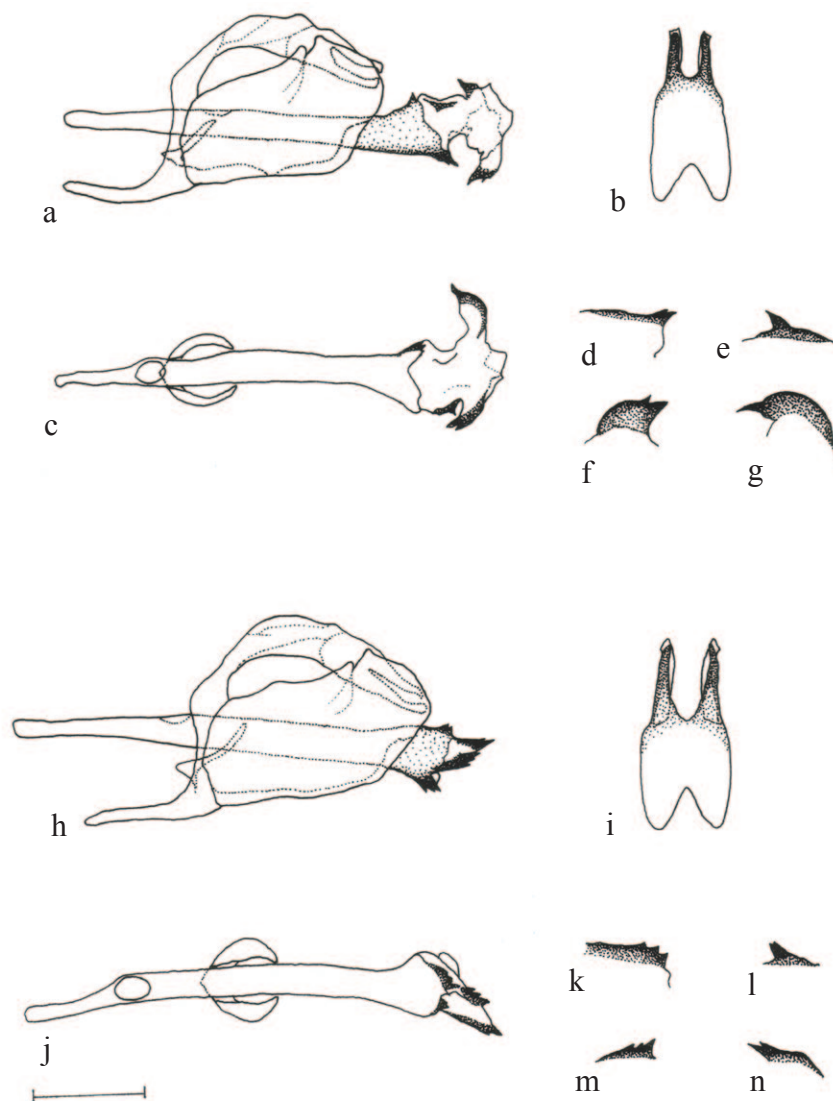


Figure 2. Male genitalia of *Atrytonopsis austinatorum* holotype (a-g), genitalia vial #11-03, Andrew D. Warren, complete data in text, and *A. cestus* (h-n), genitalia vial #11-02, Andrew D. Warren, from USA, ARIZONA: Pima Co., Sta. Catalina Mts., Sabino Canyon, 9-V-1981, J. P. Brock [MGCL]; a, h) Left lateral view of left valva, aedeagus (vesica extended in a), uncus, gnathos, tegumen, saccus, and juxta; b, i) dorsal view of tegumen, uncus and gnathos; c, j) dorsal view of aedeagus (vesica extended in a); d, k) right lobe of distal end of aedeagus; e, l) smallest cornutus; f, m) larger cornutus; g, n) largest cornutus. Scale = 1.0 mm.

end of tibia; mid-tibia unspined, pair of spurs distad, outer spurs about 4/5 length of inner; hind-tibia unspined, two pairs of spurs, in each pair, outer spurs about 2/3 length of inner; tarsus with three longitudinal rows of short spines. Dorsal abdomen dark brown, with long beige setiform scales cephalad (especially segments 1-4); ventral abdomen stained, appears whitish with scattered brownish setiform scales, especially caudad.

Male genitalia (Fig. 2a-g). Uncus in lateral view (Fig. 2a) narrow, slightly convex, somewhat pointed caudad and slightly downturned at caudal end; in dorsal view (Fig. 2b) fairly broad cephalad, divided, two narrow, parallel prongs caudad, the space between them about two times the width of a prong, prongs evenly rounded at distal end; gnathos barely longer than uncus, formed by two divided, essentially parallel prongs spaced as

for uncus, narrow in lateral view, slightly convex, distal end somewhat produced dorsad, prongs in dorsal view slightly broader than those of uncus, somewhat squared off at caudal end, slightly but evenly curved outward, mostly overlapped by prongs of uncus, except central part of inner margins and caudal ends; tegumen fairly broad cephalad, divided into two lobes separated by a deep notch (Fig. 2b), narrowing caudad to junction with uncus; combined ventral arm of tegumen and dorsal arm of saccus essentially straight, cephalic arm of saccus fairly long, 2/3 length of valva, narrow and slightly convex in lateral view, narrow in dorsal view, somewhat pointed at cephalic end; valvae (Fig. 2a) symmetrical, length about two times width, costa convex to ampulla; ampulla short, length about 1.3 times width, angled slightly dorsad, caudal end

evenly rounded; harpe pointed dorsad, evenly rounded caudad, cephalic end slightly overlapping caudal edge of ampulla; juxta-transtilla prominent, narrow, pointed dorso-caudad in lateral view with ventral edge strongly bent caudad, broad in ventral view; aedeagus (Fig. 2a, c) long, about 1.6 times length valva, straight in lateral view, straight but right side slightly swollen in dorsal view (Fig. 2c), cylindrical, narrowed slightly cephalad with rounded end, broader caudad, terminal end divided in dorsal view, left lobe produced but rounded at caudal end, right lobe produced into two very small spines (Fig. 2d); vesica of highly irregular shape, with three small, sclerotized cornuti as follows: smallest (Fig. 2e), single thorn on slightly sclerotized base, cephalad to following two; larger (Fig. 2f), double spine on a curved, sclerotized base; last (Fig. 2g), similar to preceding, but with single spine on a curved, sclerotized base.

Specimens examined. Holotype male with the following labels: white, handprinted in pencil: / Mex: Jalisco / Mex Rt 80 / km 1050 / 20 Aug 1967 /; white, printed: / G. T. Austin colln. / MGCL Accession / # 2004-5 /; white, printed and handprinted: / Genitalia Vial / # 11-03 / Andrew D. Warren /; red, printed: / HOLOTYPE / *Atrytonopsis austinorum* / A. Warren /. The holotype is deposited at the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville (MGCL).

Type locality. MEXICO: JALISCO: Mex. Rte. 80, Km. 1050. While the exact location of km. 1050 on Mexican Highway 80 has not been determined, the site is apparently between Autlán de Navarro and the junction with Mexican Hwy. 200 near the Pacific Coast; that is to say, between the north end of the Sierra de Manantlán and the Pacific Coast. Vegetation in this area ranges from cloud forest at higher elevations (ca. 1400m), to deciduous semi-evergreen forest at lower elevations, with a pronounced dry season between December and May or June. The butterfly fauna of the Sierra de Manantlán region and coastal western Jalisco was studied in detail by Llorente *et al.* (1996), Vargas *et al.* (1996, 1999), Warren *et al.* (1996) and Warren and Llorente (1999).

According to data on labels from other specimens from the G. T. Austin collection, accessioned into the MGCL collection in 2004, the following butterflies were also collected at km. 1050 on August 20, 1967, by the Austins: *Parides erithalion trichopus* (Rothschild & Jordan, 1906), *Eurema m. mexicana* (Boisduval, 1836), *E. दौरα sidonia* (R. Felder, 1869), *Pyrisitia proterpia* (Fabricius, 1775), *Pteronymia rufocincta* (Salvin, 1869), *Euptoieta hegesia meridiania* Stichel, 1938, *Marpesia chiron* (Fabricius, 1775), *Anartia fatima colima* Lamas, 1995, *A. jatrophae luteipicta* (Fruhstorfer, 1907), *Anthanassa ardys* (Hewitson, 1864), *Euptychia fetna* Butler, 1870, *Hermeuptychia hermes* (Fabricius, 1775), *Pindis squamistriga* R. Felder, 1869, *Urbanus d. dorantes* (Stoll, 1790), *Amblyscirtes patriciae* (E. Bell, 1950) and *A. novimaculatus* A. Warren, 1998. Given this composition of taxa, the site was probably well below 800m, perhaps as low as 200-300m or so, although this would be by far the lowest known elevation for *A. novimaculatus* (see Warren 1998).

Etymology. *Atrytonopsis austinorum* is named in memory of the late Lepidopterists of the Austin family, including Anna T. Austin and Edward J. Austin, the collectors of the holotype, and their son George T. Austin, a prolific skipper systematist, colleague, and close friend of the author.

Distribution and phenology. This species is currently known only from southwestern Jalisco, Mexico. The single known specimen was collected in August. Until the larval foodplant is known, it will be impossible to speculate on the overall distribution of *A. austinorum*. However, *A. austinorum* should be sought at least in Colima, as well as in similar habitats in Nayarit, Sinaloa, Michoacán, Guerrero and Oaxaca. The southernmost known record for *A. cestus* (W. H. Edwards, 1884), which appears to be *A. austinorum*'s closest relative (as detailed below), is from along Hwy. 16 in east-central Sonora (J. P. Brock, pers. comm. 2011), although its larval foodplant, *Muhlenbergia dumosa* Scriben. ex Vasey., occurs at least as far south as Colima (SEINet 2011).

Diagnosis and discussion. In overall wing morphology, *A. austinorum* (Figs. 1a-b) is closest to *A. cestus* (Figs. 1c-f), the single known male of the former appearing almost identical to some females (Fig. 1e-f) of the latter. Spot size is rather variable in *A. cestus* (35 males and 4 females examined in MGCL), although in general, compared to *A. cestus* males, forewing opaque spots are more rounded in *A. austinorum*, especially in the discal cell; in addition, the ground color of *A. austinorum* is darker above and below and the forewing shape is considerably more rounded at the apex than in *A. cestus*. In *A. cestus* males (and most females), the distal edge of the opaque macule in the forewing discal cell rarely overlaps the proximal edge of the macule in CuA1-CuA2, whereas the macules clearly overlap on *A. austinorum*. Finally, all males examined of *A. cestus* have a relatively prominent, long, slender forewing stigma spanning from the base of vein CuA1 to 1A+2A, in three parts, of which there is no trace on *A. austinorum*.

Compared to other species of *Atrytonopsis*, *A. austinorum* differs from most in the presence of a prominent opaque macule in the hindwing discal cell, a feature shared with *A. cestus*, although *A. pittacus* (W. H. Edwards, 1882), *A. edwardsii* W. Barnes & McDunnough, 1916 and *A. ovinia* (Hewitson, 1866) usually have a very small semi-opaque spot in the hindwing discal cell. Unlike *A. cestus*, *A. austinorum* lacks a forewing stigma, as do *A. lunus* (W. H. Edwards, 1884), *A. zweifeli* H. Freeman, 1969, *A. frappenda* (Dyar, 1920), many individuals of *A. deva* (W. H. Edwards, 1877), as well as very rare individuals of *A. pittacus* (see Burns 1982). The ventral hindwing spot pattern of *A. austinorum* is also very similar to some individuals of *A. python* (W. H. Edwards, 1882), although none of the hindwing spots on *A. python* are truly opaque (contra Warren 2009), and males of *A. python* have a forewing stigma. The ventral patterns of *A. pittacus*, *A. edwardsii* and *A. ovinia* are less likely to be confused with *A. austinorum*, with their smaller, white or semi-opaque spots against a more uniform background, and males of all three of those species almost always have a forewing stigma. In *Atrytonopsis*, the small, yellowish dorsal forewing spot in CuA2-1A+2A is found only

on *A. austinorum*. Images of pinned specimens of all described *Atrytonopsis* species are provided by Warren *et al.* (2011).

The male genitalia of *A. austinorum* (Fig. 2a-g) are of the typical *Atrytonopsis* form, as discussed and illustrated by Burns (1982, 1983) and Warren (2009). Compared to other *Atrytonopsis* species (pers. obs.), the genitalia of *A. austinorum* are most similar to those of *A. cestus* (Fig. 2h-n). Similarities include the general shape of the uncus, gnathos, valva, saccus, juxta and aedeagus, including the spined right lobe of the end of the aedeagus, and three sclerotized cornuti. However, the genitalia of *A. austinorum* differ from those of *A. cestus* in many details, including the narrower gap between the slightly shorter arms of the uncus and gnathos (in dorsal view; Figs. 2b vs. 2i), the less bulbous, somewhat narrower tegumen (Figs. 2b vs. 2i), slightly shorter and broader valva (in lateral view; Figs. 1a, h), and the slightly smaller juxta (Figs. 2a, h). The right lobe of the distal end of the aedeagus supports two spines in *A. austinorum* (Fig. 2d) but three in *A. cestus* (Fig. 2k). The smallest, single-spined cornutus in *A. austinorum* (Fig. 2e) supports two short spines in *A. cestus* (Fig. 2l); the larger, double-spined cornutus in *A. austinorum* (Fig. 2f) has three short spines in *A. cestus* (Fig. 2m); and the final, single-spined cornutus in *A. austinorum* (Fig. 2g) has two short spines in *A. cestus* (Fig. 2n).

Anna T. and Edward J. Austin were serious amateur Naturalists who developed a special interest in Lepidoptera in 1952, after constructing a butterfly net for their son George, who was nine years old at the time. Through the mid- and late-1950's, the Austin family accumulated a significant collection of Lepidoptera from Connecticut (their home base at the time), surrounding states, and the eastern coast of the USA south to Florida. In 1960, on a trip to Big Bend, Texas, the Austin family detoured south and spent a single day collecting butterflies at Horsetail Falls in Nuevo León, Mexico. They found this experience so rewarding that they spent most of August, 1962, collecting butterflies in eastern Mexico, along the Gulf Coast as far as Mérida, Yucatán, where they met Eduardo Welling. Details of this trip are preserved in E. J. Austin's correspondence files, in the George T. Austin archives at the MGCL. Edward and Anna made at least one additional trip to Mexico collecting butterflies, in 1967, about which no details have been found in the G. T. Austin archives.

George T. Austin became seriously interested in the systematics of the butterflies of the southwestern United States, Mexico and Central America in the late 1970's, after growing up collecting butterflies on a regular basis with his family as a hobby, and at some point began maintaining his parents' butterfly collection. While he integrated much of his parents' collection with his own material over time, some of the Mexican material his parents collected in 1967 remained incompletely integrated and unidentified. Stored in oversize wooden Schmitt boxes, this material moved from Las Vegas, Nevada to Gainesville, Florida, in 2003, when George relocated to work at the MGCL. Some of this material remained in these boxes until George's passing on June, 30, 2009.

The story behind Anna and Edward's trip to Mexico in 1967 first became known to this author in late 2006, when organizing various skippers among unsorted, recently-accessioned Hesperinae at the MGCL, and encountering a

series of *Amblyscirtes novimaculatus*, labeled from "Mex: Jalisco, Mex Rt 80, km 1050, 20 Aug 1967" in pencil, in George's handwriting, but with no collector's name on the labels. When asked, George stated that his parents collected the specimens, but did not elaborate further. However, Edward and Anna's collection of skippers from Jalisco in 1967 is actually very significant, since they had collected several males and the only known female of *A. novimaculatus*, apparently not far from its subsequently designated type locality in the Sierra de Manantlán, Jalisco (based on males collected in the 1990's; see Warren 1998). They also collected a single male of *Amblyscirtes patriciae* (E. Bell, 1959), which predates other known Mexican specimens (Warren 1996). One more major surprise from km. 1050 would surface three years later.

In October 2009, while organizing George's personal study material, four months after his passing, the author came across a Schmitt box with various *Atrytonopsis*, apparently unreferenced since George's departure from Las Vegas in 2003, including *A. deva*, *A. pittacus*, *A. python*, *A. cestus*, and the unusual male *Atrytonopsis* from Jalisco, km. 1050, Rt. 80. While some of the specimens in this box had been dissected (George was usually quick to dissect the genitalia of interesting specimens), the unusual *Atrytonopsis* had not been dissected, and had no identification label associated with it. Subsequent study has revealed that it undoubtedly represents an undescribed species, apparently most closely related to *A. cestus*. Given that systematic fieldwork in the 1990's in southwestern Jalisco (as cited above) failed to generate additional specimens of this species, it seems best to name this new species now, based on the single individual collected by the Austins, as opposed to waiting for additional material to surface. The overall good condition of the specimen and its completely unique appearance leave no doubt that it represents an undescribed species.

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A NEW SPECIES OF *DALLA* FROM CHIAPAS, MEXICO (LEPIDOPTERA, HESPERIIDAE, HETEROPTERINAE)

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Abstract - A new species of *Dalla* is described from montane cloud forest habitats in southern Chiapas, Mexico. Based on male genitalia and characters of the wings and body, the new species appears to be closest to *Dalla steinhauseri*, a taxon known from montane cloud forest in eastern Oaxaca, Mexico, although it has been confused with *Dalla freemani* in the literature.

Key words: Endemism, genitalia, Mesoamerica, morphology, skipper butterfly.

Heteropterine skippers (Hesperiidae: Heteropterinae) are the basal group of monocot-feeding hesperiids, being distributed from the Himalayas to Japan and Europe, Africa and Madagascar, and North and South America (Warren *et al.* 2009). Seven genera of Heteropterinae fly in the New World, and by far the most diverse of these is *Dalla* Mabille, 1904, with 96 currently recognized species (Mielke 2005, Vilorio *et al.* 2008).

Most *Dalla* species fly in the Andes Mountains of South America, although eighteen described species are known from Central America and Mexico (Warren *et al.* 2011), eight of these being endemic to Mexico (Warren in prep.). Most species of *Dalla* occur in highly limited geographic ranges, generally at elevations above 900m, and often above 2500m (Vilorio *et al.* 2008). *Dalla* males are most frequently encountered at damp ground, whereas females of *Dalla* are very rarely seen (Steinhauser 2002, pers. obs.), and remain unknown for a large percentage of species. Larval foodplants have been confirmed only for a few South American *Dalla* species, as noted by Vilorio *et al.* (2008), which are *Chusquea* Kunth (Poaceae) bamboos.

Below, we describe a distinctive new species of *Dalla* from montane cloud forests of southern Chiapas, Mexico, based on two male specimens collected by the junior author on two different volcanoes.

***Dalla austini* A. Warren & R. G. De la Maza, sp. nov.**
(Figs. 1a-d, 2a-e).

Description. Male (Fig. 1a-d)- forewing length = 14.6 mm (holotype), 16.4 mm (paratype); forewing apex fairly pointed, termen evenly convex though nearly straight between CuA2 and 1A+2A, no stigma or brand; hindwing slightly produced at apex, termen convex to CuA1, then concave to tornus at 1A+2A, inner margin convex. Dorsal forewing brown, scattered pale golden setiform scales over most of wing, densest on basal half of wing, especially along costa, inner margin and CuA2-1A+2A. Opaque pale ochreous macules as follows: subapical in R3-R4 to R5-M1, quadrate, completely overlapping, forming a nearly straight line perpendicular to the costa; postmedial in mid-M3-CuA1, larger, roughly quadrate with margin along CuA1 produced distad; mid-CuA1-CuA2, larger, roughly

quadrate; basal part of CuA1-CuA2, similarly sized, triangular; finally, roughly hourglass-shaped (roughly heart-shaped in paratype) spanning width of discal cell at proximal section of distal fourth of cell, centered between the two macules in CuA1-CuA2, similar in size to them. Wing fringe brown.

Dorsal hindwing same ground color as forewing; prominent overscaling of semi-iridescent olive setiform scales over basal 2/3 of wing, somewhat paler yellow-olive in discal cell and M3 to CuA2, most concentrated in basal half of discal cell and along inner margin to tornus. Pale ochreous, semi-opaque macules as follows: M1-M3, large, semi-rectangular, continuous across M2 with longest part in M1-M2, occupying distal end of discal cell and basal half of cells M1 and M2; basal end M3-CuA1, very small, roughly triangular, mostly overlapping macule in M1-M3 though distal end produced somewhat distad; CuA1-CuA2, centered just past mid-cell, larger, roughly half the size of macule in M1-M3, roughly rectangular, overlapping basal part of macules in M3-CuA1 and M1-M3; paratype with additional tiny macule at base of Rs-M1, over M1 and macule in M1-M3; finally, small but prominent, rounded macule in discal cell just proximad of midpoint. Wing fringe brown proximad, pale ochreous distad, fringes somewhat darkened at vein ends.

Ventral forewing with macules repeated from the dorsal surface, each outlined with a narrow band of golden scales, which also extend as a broad dash from M1, across Sc-R1 and R1-R2 to just before the costa, and, as somewhat paler golden scales, below the macules in CuA2-1A+2A, forming a smudge spanning the central 2/3 of the cell, with pale golden scales densest (and richest in color) immediately below the macules; ground color dark brown, with dense, cinnamon-brown overscaling concentrated along the costa (caudad to M1) and apex (to about M3), and sparsely distributed in adjacent cells; few pale creamy cells at ends of cells M1-M2 and M2-M3; base of discal cell and cells CuA2 and 1A+2A shiny grayish; wing fringes dark at vein ends, areas between vein ends pale creamy proximad, especially from R5 to CuA1 (most pronounced on paratype), darker distad, brown on holotype, cinnamon brown on paratype.

Ventral hindwing with semi-opaque macules repeated from dorsal surface; additional pale ochreous (not semi-opaque) macules in mid-Rs-M1, roughly triangular, and CuA2-1A+2A, roughly circular, both arranged in a straight line with respect



Fig. 1. Adults of *Dalla austini*, *D. freemani* and *D. steinhauseri*; a) dorsal and b) ventral views of holotype male of *D. austini* from Chiapas, Mexico, complete data in text; c) dorsal and d) ventral views of paratype male of *D. austini* from Chiapas, Mexico, complete data in text; e) dorsal and f) ventral views of holotype male of *D. freemani* from GUATEMALA: Dept. Sololá: Olas de Moka, 3000, September 1808 [probably September 1908], Geo. P. Englehardt, Genitalia Vial #96-2, Andrew D. Warren [AMNH]; g) dorsal and h) ventral views of holotype male of *D. steinhauseri* from MEXICO, OAXACA, Sierra Juárez, km. 95, La Esperanza-Cerro Pelón, 7000', 28 May 1990, John Kemner, Genitalia Vial SRS-3737 [MGCL].

to macules in M1-M3 and CuA1-CuA2; Sc+R1-Rs, roughly quadrate, borders somewhat indistinct; middle 1/5 of costal cell, roughly quadrate (distal border ill-defined on paratype); paratype with streak of pale scales basad of macule in M1-M3, along M1, overlapping pale macule in Sc+R1-Rs; scattered pale creamy scales at base of costal cell, Sc+R1-Rs, discal cell, and CuA2-1A+2A, as well as in margin, especially between M1 and CuA1, and on paratype at tornus in CuA2 to 3A; wing fringes dark at vein ends, much paler between vein ends, creamy proximad (paler on paratype), pale cinnamon distad.

Dorsal head black with scattered dark brown, tan, and olive setiform scales, paler below eyes; dorsal labial palpus with mix of brown and pale golden setiform scales, paler laterally and ventrally, inner surface dark brown; third segment dark brown, porrect, barely extending beyond distal scales of second segment. Antennal shaft and club black on dorsum, mostly pale golden on venter with some black between segments; nudum brown, 14 (holotype) or 13 (paratype) segments. Dorsal thorax black with semi-iridescent, olive, setiform scales, ventral thorax with beige setiform scales, continuing onto ventral edge

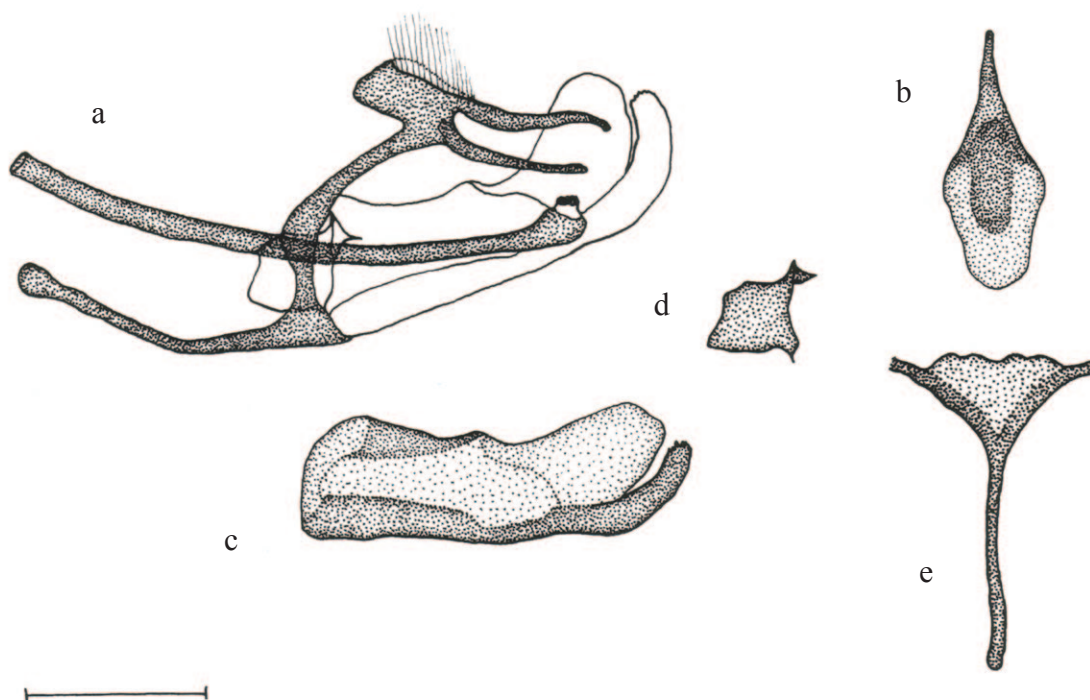


Fig. 2. Male genitalia of *Dalla austini* holotype, genitalic vial GTA-14147, complete data in text; a) left lateral view of uncus, gnathos, tegumen, saccus, right valva, aedeagus and juxta; b) dorsal view of tegumen and uncus (hair tuft not shown); c) left lateral (exterior) view of left valva; d) left lateral view of juxta; e) ventral view of saccus. Scale = 1.0 mm.

of femur; fore-tibia not spined, brownish epiphysis relatively short, extending to distal end of tibia; mid-tibia with longitudinal row of 6 spines on inner surface, pair of spurs distad, outer spur about 2/3 length of inner; hind-tibia with longitudinal row of about 6 spines, two pairs of spurs, in each pair, outer spurs about 4/5 length of inner; tarsus with three longitudinal rows of short spines. Dorsal abdomen dark brown, with long, semi-iridescent olive and pale golden setiform scales, somewhat paler caudad; ventral abdomen paler, with beige and yellowish setiform scales.

Male genitalia (Fig. 2a-e). Uncus in lateral view (Fig. 2a) narrow, concave and slightly uplifted caudad of middle, caudal end tapering to rounded point, slightly downturned; in dorsal view (Fig. 2b) caudal end narrow, rounded point, then broadening gradually cephalad towards junction with tegumen, then narrowing slightly cephalad to overlap large portion of tegumen as oval plate possessing dense pale brown hair tuft (removed in Fig. 2b); gnathos (Fig. 2a) slightly shorter than uncus, narrow in lateral view, tapering slightly caudad to narrow somewhat rounded caudal end; in ventral view relatively broad proximad, narrowing gradually to narrow rounded end; tegumen in dorsal view (Fig. 2b) broadly curved cephalad, broadening slightly to junction with uncus; combined ventral arm of tegumen and dorsal arm of saccus fairly evenly curved (Fig. 2a), somewhat swollen cephalad near midpoint; cephalic arm of saccus (Fig. 2a, e) very long, nearly the length of valva, thin, roughly cylindrical, angled about 20 degrees above horizontal in lateral view, cephalic end slightly swollen and rounded in lateral and dorsal views; valvae (Figs. 2a, c) symmetrical, long (1.4x length of tegumen and uncus), length

about 3x width, costa shallowly concave on dorsal edge toward caudal end, ampulla elongate, roughly length of costa, relatively broad (length about 2x length), angled slightly dorsad, caudal end generally rounded but caudal end appearing somewhat squared off in lateral view, setose on both surfaces, especially caudad, harpe curved dorsad to blunt caudal end, exceeding and not overlapping caudal extent of ampulla, dorsal edge weakly grooved; juxta-transtilla (Fig. 2a, d) prominent with pointed dorso-caudal edge and spine pointed caudad in lateral view, subquadrate in ventral view; aedeagus (Fig. 2a) unadorned, shallowly sinuate in lateral view, straight in dorsal view, caudal end slightly expanded, vesica with single, sclerotized, roughly rounded cornutus.

Specimens examined. Holotype male with the following labels: white, printed: / CHIAPAS / VN. HUIITEPEC / NE. B. MESOFILO / 2700M. 2 AGO 87 / R. DE LA MAZA E. /; white, printed and handprinted: / Genitalic Vial / GTA-14147 /; red, printed: / HOLOTYPE / *Dalla austini* / A. Warren & R. G. De la Maza /. One male paratype from MEXICO: CHIAPAS: Volcán Tacaná, 2800m, 18 April 2000, R. De la Maza E., Genitalic Vial GTA-14148. The holotype is deposited at the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville (MGCL); the paratype is deposited in the De la Maza Family Collection, Mexico City, Mexico.

Type locality. MEXICO: CHIAPAS: Volcán Huitepec, NE Bosque Mesófilo, 2700m. This site is comprised of dense montane cloud forest, dominated by *Quercus acatenanguensis*

Trel., *Bomarea acutifolia* (Link & Otto) Herb., *Crataegus pubescens* C. Presl., *Salvia chiapensis* Fernald, *Ternstroemia tepezapote* Schltdl. & Cham., *Viburnum jucundum* Morton, *Xylosoma flexiosum* (Kunth) Hemsl., *Litsea glaucescens* Kunth, *Oreopanax xalapensis* (Kunth) Decne. & Planch., *Ostrya virginiana* (P. Mill) K. Koch., *Sambucus mexicana* Presl., and some *Alsophila* R. Br. and *Cyathea* J. E. Smith arborescent ferns. Along the rocky creeks in the area, scattered colonies of the bamboo *Chusquea foliosa* L. G. Clark are found (Cortés 2005). This locality is strongly influenced by polar air masses (nortes) during the winter, and is exceptional for its general scarcity of butterfly species throughout the year, even during periods of favorable weather. Other butterfly taxa found in the habitat include *Colias philodice guatemalena* Röber, 1909, *Iophanus phirrias* (Godman & Salvin, 1887) and possibly new subspecies of *Oxeoschistus hilaria* (H. Bates, 1865) and *Pedaliodes napaea* (H. Bates, 1865); remarkably, no species of *Cylopsis* R. Felder, 1869 has yet been found here to date.

Volcán Tacaná, where the paratype was collected, is ecologically distinct from Volcán Huitepec in facing the Pacific Ocean, and is therefore protected from cold polar air masses during the winter. While overall similar, the vegetation on Volcán Tacaná includes additional tree species, such as *Chiranthodendron pentadactylon* Larreat., and a greater diversity of bamboos in the genera *Chusquea* and *Rhipidocladum* McClure. A more impressive diversity of butterflies occur on Volcán Tacaná than on Volcán Huitepec, including *Eretris maria* (Schaus, 1920), *Drucina championi* Godman & Salvin, 1881, three species of *Pedaliodes* Butler, 1867, four species of *Cylopsis*, and many others, including *Iophanus phirrias*.

Etymology. *Dalla austini* is named in honor of the late George T. Austin, Lepidoptera systematist, in recognition of his myriad contributions to our science.

Distribution and phenology. To date, *Dalla austini* is known only from cloud forest habitats on Volcán Huitepec and Volcán Tacaná, in the southern part of the Mexican state of Chiapas. It seems likely that *D. austini* occurs in similar habitats in Guatemala, and it is hoped that future fieldwork can confirm this hypothesis. Given that *D. austini* is apparently replaced in similar habitats in Oaxaca by *D. steinhauseri*, the former is not likely to range north of Chiapas. Confirmation of the larval foodplant, likely a bamboo as noted above, will enable targeted searches for *D. austini* in additional sites.

Diagnosis and discussion. The two known specimens of *Dalla austini* show considerable individual variation, which might in part be seasonal, with the holotype from August and the paratype from April. Forewing and hindwing macules on the holotype are slightly paler than those on the paratype, above and below, and the ventral forewing of the holotype has increased cinnamon overscaling compared to the paratype. On the hindwing, the paratype has an extra, very small, semi-hyaline macule in Rs-M1, and in ventral view has an extra dash of pale scales basad of macule in M1-M3, along M1, and overlapping pale macule in Sc+R1-Rs. The forewings of the paratype are about 1.8 mm longer than those of the holotype.

The genitalia of the two specimens of *D. austini*, however, are remarkably similar, differing slightly only in size, with overall proportions of the genitalia of the paratype slightly larger than those of the holotype, apparently corresponding with the slightly longer wing length of the paratype. Given the nearly identical genitalia, similar habitats and altitudes of origin, and considering the range of variation seen in many other species of *Dalla* (pers. obs.), these two specimens most likely represent the same species. Hopefully, future field studies will be able to clarify the range of phenotypic variation in *D. austini*.

At first glance, wing markings on *D. austini* appear closest to those on *D. freemani* A. Warren, 1997, a species which to date is known only from the unique holotype male from Guatemala (Figs. 1e-f). However, several differences between *D. austini* and *D. freemani* exist. *Dalla austini* is larger (forewing length 14.6, 16.4mm) than *D. freemani* (forewing length 12.7mm), with considerably paler dorsal hindwing spots. The small, rounded, deep ochreous dorsal forewing spot in CuA2-1A+2A on *D. freemani* (also shared with *D. bubobon* as shown by Warren and González 1996 and Warren *et al.* 2011) is absent on *D. austini*, while the small, roughly triangular, semi-hyaline macule in M3-CuA1 on the hindwing of *D. austini* is absent on *D. freemani*. In addition, forewing macules, especially the three apical spots and the macule in M3-CuA1, are considerably larger on *D. austini* than on *D. freemani*.

The male genitalia of *D. austini* differ from those of *D. freemani* in several ways, as illustrated by Warren (1997). The uncus tapers to a much finer point at its caudal end in *D. austini* than in *D. freemani*, while the proximal end of the tegumen (in dorsal view) in *D. austini* is noticeably broader than that of *D. freemani*. The valva of *D. austini* is longer and proportionally narrower than that of *D. freemani*; the harpe and ampulla narrowly overlap in lateral view in *D. freemani*, but do not overlap, and are separated by a small gap in *D. austini*. The ventral arm of the saccus is proportionally longer in *D. austini* than in *D. freemani*. Finally (since the caudal end of the aedeagus is missing from the holotype of *D. freemani*), while overall rather similar, the shape of the juxta-transtilla is more irregular in *D. austini* than in *D. freemani*.

In essentially all genitalic characters, *D. austini* is most similar to *D. steinhauseri* H. Freeman, 1991, a taxon known from cloud forest habitat in eastern Oaxaca, Mexico (Figs. 1g-h). As illustrated by Steinhauser in Freeman (1991), the genitalia of the holotype male of *D. steinhauseri* are remarkably similar to those of *D. austini*, including the shape of the long, relatively narrow valva, long saccus, similar tegumen and very similar juxta and transtilla; the aedeagus of the two taxa is virtually identical, and no obvious differences were noted in the cornutus. The upturned gnathos illustrated for *D. steinhauseri* (Freeman 1991) represents an artifact of the dissection technique- the gnathos on that taxon is actually very similar in shape, length, and orientation to that of *D. austini* (Fig. 2a). There are, however, a couple subtle differences between the genitalia of the two taxa. The most prominent difference is in the valva, where the harpe and ampulla overlap slightly in lateral view in *D. steinhauseri*, whereas there is no overlap in *D. austini*, which shows a small gap between the harpe and ampulla in lateral view. In addition, in dorsal view,

the caudal end of the tegumen is produced laterally to a greater extent in *D. austini* than in *D. steinhauseri*. Despite the overall darker ventral ground color of *D. steinhauseri*, and its paler forewing and hindwing macules, compared to *D. austini*, the size and position of macules on the two taxa is very similar, especially on the forewing, where the spot patterns are virtually identical. Hindwing spots on the two species differ mainly in the absence of the macules in the discal cell and in M3-CuA1 on *D. steinhauseri*, above and below, and in minor details of ventral pattern and coloration. Thus considering all characters of the three taxa, including size (holotype of *D. steinhauseri* has a forewing length of 14.0 mm), *D. austini* appears perhaps slightly closer to *D. steinhauseri* than to *D. freemani*, although the three taxa are clearly closely related.

While *Dalla austini* has remained undescribed until now, it has been reported in the literature as *D. freemani*. Glassberg (2007, 2008) figured dorsal and ventral views of a live male of *D. austini* from Chiapas (as *D. freemani*), but did not provide detailed locality information for the images. The live individual is virtually identical to the holotype of *D. austini* in dorsal and ventral views. Thus, reports by Glassberg (2007, 2008) of *D. freemani* from Mexico are in error, and represent *D. austini*.

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A NEW SPECIES OF *ERETIS* (LEPIDOPTERA: HESPERIIDAE) FROM KENYA, UGANDA AND RWANDA

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Abstract- *Eretis artorius* sp.nov. is described as new from Kakamega Forest, western Kenya, and other specimens are reported from Uganda and Rwanda. It is compared with other species of the genus that co-occur or are likely to co-occur within this range. Living and pinned adults are illustrated. The male genitalia are illustrated and compared with those of *Eretis vaga* Evans and *E. rotundimacula* Evans.

Key words: Hesperioidea, Pyrginae, Celaenorrhini, Kakamega Forest, *Eretis artorius* sp. nov., *Eretis vaga*, *E. herewardi*, *E. rotundimacula*, *E. melania*, *E. mitiana*, *E. cameroni*, *E. lugens*, *Justicia flava*, abdominal ventral hair fringe.

The genus *Eretis* Mabille, 1891 was described with *E. melania* Mabille, 1891 as the type species and only member of the genus. In his overview of all the African HesperIIDae, Holland (1896) placed six species in the genus, one of which is now considered a junior synonym of *E. melania* and two of which were subsequently removed to *Sarangesa*. Aurivillius (1925) did not accept the genus but included all the species in the genus *Sarangesa* Moore.

Evans (1937) did accept the genus, stating that it “differs from *Sarangesa* only in the irregular wing outline, but the genitalia indicate a natural group”. *Eretis* is now placed in the tribe Celaenorrhini of the subfamily Pyrginae (Warren *et al.* 2009; Cock & Congdon 2011b). Evans included ten species, five of which he described in his book. Later he raised *E. djaelaelae mixta* Evans, 1937 to species rank (Evans 1951), making 11 species of *Eretis*. He further recognized that “many species are difficult to determine without examination of the genitalia” (Evans 1937).

One of the species listed by Evans (1937) was *E. rotundimacula* Mabille & Boulet 1916, which is an invalid infrasubspecific name according to the present Code of Zoological Nomenclature and therefore takes the authorship of Evans, 1937. He also included the taxon *E. herewardi* Riley, 1921 as a *Zambian* subspecies of *E. rotundimacula*. Whether or not *E. rotundimacula* and *E. herewardi* are the same species, two subspecies of a single species, or two distinct species remains to be seen, but *herewardi* is certainly senior to the validation of the name *rotundimacula* by Evans in 1937.

An *Eretis* from Kenya has been listed as *Eretis rotundimacula herewardi* (Larsen 1991), as *E. herewardi herewardi* (Ackery *et al.* 1995), or as *E. herewardi* (Collins 2004). However, neither of these taxa, in whatever combination, is actually known from Kenya. The species referred to is an undescribed species that is described below.

Eretis artorius Larsen & Cock, sp. nov.

(Figs. 1, 2a & 2b (left), 3)

Diagnosis. Forewing: male 13.4-15.0 mm, average of 9 = 14.3 mm, one exceptionally small male 12.3 mm (not included in average); female 14.4-15.4 mm, average of 3 = 15.0 mm – usually smaller than *E. herewardi* and *E. rotundimacula*. The

upperside ground-colour is warmer brown than most members of the genus. The wing shape is even more irregular than usual. The forewing always has a hyaline costal spot and an almost perfectly rounded spot in space 2. The dark markings on the underside are modest. This combination of features is usually sufficient for identification on its own.

The outer side of the forelegs and the underside of the head are dull white, not brilliantly white as in some members of the genus. The hind tibia of *artorius* are fringed, i.e. there are long hairs along its length, rather than bunched into a pencil from the top.

The wing shape is as in other members the genus but even more irregular than usual. The margin of the forewing bulges outward in spaces 2 and 3, continuing straight or even slightly concave to the apex. The brown colour has a scattering of white scales, mainly visible under magnification. The forewing has three irregular, subapical spots in addition to the costal spot above the end of the cell. There is a tiny spot in space 3. The spot in space 2 is round and usually quite large – ironically more circular in shape than usual in *E. [herewardi] rotundimacula*. There may be a small upper cell spot as well as one or two spots in 1b below the spot in space 2, especially in the females.

The black markings comprise a large, well-defined quadrate spot across the cell just before its end, which in one specimen incorporates a narrow upper cell spot near its distal margin. There is another black patch bordered by the end of the cell and the subapical spots, not reaching the costa and extending to vein 4, not encircling the hyaline spot in space 3. Well beyond the subapical spots is another black patch, separated from margin except at the very apex. This continues as a diffuse band to the tornus, very variable in extent and not as dark. Below the defined black spot in the cell is a somewhat diffuse dark patch covering the middle of spaces 2 and 1b, again not as black. Close to the base of space 1b is a firm black streak, at least twice as tall as it is wide.

The hindwing has the same overall colour and texture as the forewing with dark sub-basal blotching. There is a somewhat diffuse discal band, though often almost complete from vein 8 to vein 1b. There is a rather large dark apical patch, weakly continued along the margin as discrete spots, and some small spots may be present between these and the discal band.

The underside has a more grey tone than the upperside. Only



Fig. 1. Top: The holotype of *Eretis artorius* from Kakamega, Kenya (recto and verso); Below: A female paratype also from Kakamega (recto and verso).

the darkest upperside markings are fully visible and are mostly reduced in size.

The female hardly differs from the male. The presence of an upper cell-spot and one or two spots in 1b is more frequent. The tone of forewing is slightly lighter and the darkest markings somewhat less accentuated.

Similar species. *E. artorius* is sympatric with six rather similar species. These have been confused with each other as well as with the new species, and many literature references may be wrong. Evans placed the few specimens of *E. artorius* in the Natural History Museum (BNHM), London, amongst the series of *E. vaga*. As noted above, the forewing costa always has a hyaline costal spot and there is an almost perfectly rounded spot in space 2. Some additional characters for discrimination between *artorius* and the five sympatric species are given below. Although occasional worn specimens can probably not be identified by wing markings, the male genitalia are always quite clear.

Eretis vaga Evans is the species with which confusion is most likely, since its forewing may be distorted in an almost similar manner. The upperside ground-colour is more grey in tone, lacking the warmer tinge of brown. The hyaline spotting is reduced; the spot in space 2 is usually small, taller than it is wide, and never rounded. The large dark area in spaces 2 and 1b below the quadrate cell-spot is usually much reduced. The black patch reaching the apex is usually reduced or absent. The genitalia are very different (see fig. 2).

Eretis melania Mabille has a light bar closing the forewing cell, immediately edging the black, quadrate cell-spot. The forewing is more regular. The ground-colour is more greyish

without the brown tone.

Eretis mitiana Evans in both sexes has a clear overlay of blueish scales on the upperside, sometimes not that obvious in worn specimens, though still clear under magnification.

Eretis cameroni Evans males have brilliant white forelegs. The black spotting of the hindwing upperside, and especially the underside, is larger and much more prominent. The forewing spot in 2 is always small and never rounded. Usually only one or two defined subapical spots are present.

Eretis lugens Rogenhofer also has brilliant white forelegs and is generally more blackish than any other species. The forewing spot in space 2 is usually well developed in the female and there is a costal spot. The dark underside has a chestnut tinge.

Eretis h. herewardi or *E. h. rotundimacula* have not yet been shown to be sympatric with *E. artorius*. Males have white forelegs as *lugens*. Both sexes usually have a reddish patch at the end of the underside forewing cell. There is never a hyaline costal spot on the forewing. The wing shape is much more regular. The genitalia are very different (see fig. 2).

Of these species, *E. vaga* seems closest to *E. artorius*. They are the only two to share all the following characters: legs that are not brilliant white, very irregular wing margins, undersides without trace of red markings, lack of lateral processes along the uncus in the male genitalia, and valves with longer distal processes than usual in the genus.

Male genitalia (Fig. 2a & 2b, left). The various species of *Eretis* are often well differentiated by the male genitalia and fall into several different groups. Both *E. herewardi rotundimacula* and *E. h. herewardi* have genitalia that are closely related to



Fig. 2a. The male genitalia of three *Eretis* species in lateral view: A) *Eretis artorius* (SCC 573 ABRI: Uganda, Bwindi). B) *Eretis vaga* (Royal Africa Museum MRAC H.40 DRC, Paulis (now Isiro)). C) *Eretis rotundimacula* (1728 HEC: Zambia, High Plateau).

those of *E. djaelaelae* (Wallengren); the genitalia of *E. artorius* differ very strongly. The chief characteristic is the valve with two long, recurved processes, both ending in a point directed straight up. The valve has a poorly developed ventral/basal lobe that, as usual in the genus, ends in a sharp posteriorly-facing thorn. The uncus/tegumen is short with a small, narrow bifid tip and is without the lateral processes that are found in many species. There are just two chitinized, rounded triangles on the tegumen, which widens strongly in comparison with the narrow uncus. *E. artorius* has no posteriorly-pointing central process from the furca (see *E. h. rotundimacula* for the largest of such structures, to which Riley (1921) drew attention; the preparations are from the Hope Entomological Collections (HEC), University of Oxford Museum).

The genitalia of its probably closest relative, *E. vaga*, differ considerably. The valve also has two well-developed processes but these are shorter and less recurved. However, as already pointed out by Evans (1937) in his description the “uncus ends in two widely separated in-curving horns”, very different from the two narrow, smaller, barely separate uncus tip of *E. artorius*. The small ventral/basal lobe is present, but not posteriorly pointed. The penis is larger and longer. However, *E. vaga* does have a small fragile posteriorly-facing process from the furca (just visible in Figs. 2a and 2b).

The valves of all other known species have much shorter valve processes as in the *E. h. rotundimacula* figured. The furca of the latter has an exceptionally long, posteriorly sloping extension. *E. h. rotundimacula* also has a fully developed basal/ventral lobe and the uncus is flanked by lateral processes.

The genitalia from a Kakamega paratype (Fig. 2b) do not differ from a Ugandan male from Bwindi (Fig. 2a).

Type material. Male holotype: Kenya, Kakamega Dist., Kakamega Forest, D257 at Ikuywa Stream, 18.vi.1991, photo 91.9.34, M.J.W. Cock (ex coll. T.B. Larsen) (NHM).

Paratypes: All from Kenya: Kakamega Forest: 24♂♂, 10♀♀ (14♂♂, 6♀♀ ABRI; 2♂♂, 1♀ coll. M.J.W. Cock; 3♂♂, 1♀ NHM; 5♂♂, 2♀♀ NMK); Yala River [≈Kakamega], ♂ (NHM); Kakamega, 2♂♂ (coll. J. Morrall); Mau Forest, 2♂♂, 2♀♀

(ABRI); Nandi Hills, 2♂♂ (coll. J. Stewart).

Etymology. The species is given the Latin version of Cock’s cat, Arthur, who like *E. artorius* is small, dark mottled brown and black, irregular around the edges, has no tail, and two large round eyes. Larsen considers this to be a case of English eccentricity. Arthur is a very nice neutered female cat with a male name – a tongue-in-cheek comment on the value of gender agreement in scientific names.

Distribution, habitats, and habits. We have only included Kenyan material as types, though we have no doubt whatever that material from the neighboring countries of Uganda and Rwanda is the same species (also supported by the Uganda male genitalia being identical). It will certainly occur also in northwestern Tanzania and in parts of the Democratic Republic of Congo; one Rwanda specimen was collected in the Bugoie Forest just a few kilometres from the DRC border and a specimen from the Impenetrable Forest in Uganda is also not far from the DRC. This is a typical example of a species endemic to the Albertine Rift, though rather few of such species reach western Kenya.

Most available material of the species is from Kakamega Forest in Kenya, the easternmost outpost of the main African rainforest zone, and almost the last surviving substantial such habitat in Kenya, but there are records also from the Nandi Hills and the Mau Forest. The species is clearly limited to submontane rainforest habitats in reasonable condition, though flying mainly in somewhat open areas within or adjacent to the forest. The edges of the many roads and paths inside Kakamega Forest are typical places. Cock found the species on most of his numerous visits to the forest and found it to be fairly common (Cock & Congdon 2011b). They fly about quickly, usually rather low down, often settling with wings flat on green leaves and freely come to small flowers for nectaring. Unfortunately no ovipositing was observed nor any caterpillars found. However, all known host-plants for the genus are Acanthaceae.

Study of museum collections gives the impression that the species is quite rare anywhere but in Kakamega. The dearth of Kakamega material from before the 1980s suggests that it may have become more common since then. Larsen (1991) traced

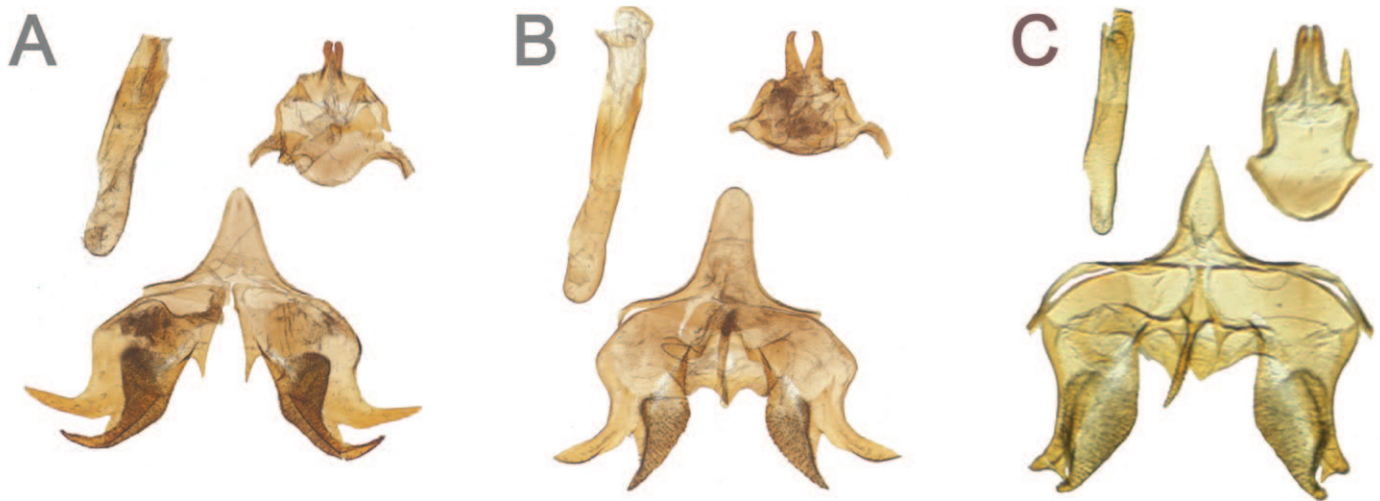


Fig 2b. The male genitalia of three *Eretis* species in dorsal or ventral view (flattened): A) *Eretis artorius* paratype (NHM: Kenya, Kakamega Dist., Kakamega Forest, D257 at Ikuywa Stream, 19.viii.1989, M.J.W. Cock (BMNH genitalia 32022). B) *Eretis vaga* (NHM: Kenya, Kakamega For., ex coll. M.J.W. Cock) (BMNH genitalia 32023). C) *Eretis rotundimacula* (1734 HEC: Zambia, High Plateau).

just a few in the NHM and none in the National Museums of Kenya (NMK), although Cock subsequently deposited a pair. The NHM has very few from Kenya or elsewhere, but a small series was recently taken in the Nyungwe Forest, an important conservation area in Rwanda (ABRI). In Uganda it is known from the Kigezi area and the Impenetrable Forest at Bwindi. However, about 90% of all specimens seen are from Kenya (mostly Kakamega).

DISCUSSION

While studying *E. artorius* we found that males of some *Eretis* spp. have a ventral hair fringe on the first abdominal segment, which has not been reported before. Thus, in *E. artorius*, ventrally on the abdomen, there is a transverse fringe of pale brown hairs, 1.2-1.5 mm long, directed downwards and posteriorly, arising from the first visible sternite of the abdomen. The anterior portion of the abdomen is concave ventrally, apart from a slight ventral ridge – the fringe of hairs probably normally rests here. The last visible sternite of the thorax and the concave area of the abdomen are covered with weakly iridescent blue scales. The feature seems to vary from species to species. It is present in most species, but absent in, for example, *E. mitiana*. It is sometimes linked with blue scales, but these are lacking in, for example, *E. vaga*. This character seems worth further study as work on the genus continues.

Larsen is currently working on a monograph of the African Hesperiiidae and decided to publish new species as the project progressed, not least those with multiple authors, in order to avoid the book being overloaded with new descriptions and to allow time for more feedback and information on new taxa to come to light before the monograph is published. *Gorgyra stewarti* has already been described (Larsen 2010). Other descriptions will follow. Cock will continue his project of documenting the early stages of African Hesperiiidae in full colour (Cock 2010, Cock & Congdon 2011a, 2011b). This will, as before, be done in full consultation with Larsen.

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Fig. 3. Two males of *Eretis artorius* feeding on *Justicia flava* (Acanthaceae) in Kakamega Forest. It is quite unusual to see either sex sitting with the wings folded as in the picture, which fortuitously is the actual holotype.

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THE TRUE IDENTITY OF '*DELIAS SACHA GILOLENSIS*' ROTHSCHILD, 1925 (LEPIDOPTERA, PIERIDAE)

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Abstract- *Delias sacha gilolensis* Rothschild, 1925 is found to be a synonym of *Delias poecilea poecilea* Vollenhoven, 1865. *Delias sacha* Grose Smith, 1895, is therefore endemic to Obi.

Keywords: Lepidoptera, Pieridae, *Delias*, *sacha*, *gilolensis*, *poecilea*, *candida*, Indonesia, Halmahera, Obi.

INTRODUCTION

Delias sacha was described by Grose Smith in 1895 from two male specimens captured on Obi island in North Maluku, Indonesia. In 1925 Walter Rothschild described a second race, *D. sacha gilolensis*, based on single specimens of both sexes obtained by H. Waterstradt from Halmahera. The nearest part of this island is approximately 80km north of Obi. As far as we can establish, the types are the only known examples of the 'subspecies'.

Since publication of Grose Smith's and Rothschild's descriptions, the female of nominate *D. sacha* has been discovered on Obi. It bears little resemblance to the supposed female of subspecies *gilolensis* from Halmahera. Intrigued by the uncertain status of the taxon, we have examined the type specimens held in the Natural History Museum, London (BMNH) and compared them with examples of allied species and the original descriptions. We find that Rothschild mistakenly described *D. sacha gilolensis* based on a male specimen of *Delias poecilea poecilea* Vollenhoven, 1865, and a female of *Delias candida herodias* Vollenhoven, 1865.

ORIGINAL DESCRIPTION OF *DELIAS SACHA* *GILOLENSIS*

Quoted from Rothschild's 1925 paper:

'Delias sacha gilolensis, subsp. n.

♂. Above differs on fore wing from *s. sacha* in the much larger coalescent subapical spots almost obliterating the black apex, and on the hind wing in the absence of the broad black margin, it being only indicated by slightly thinner white scaling than on the disc.

Below it differs in the hind wing being on the disc, instead of entirely clear yellow with orange suffusion in tornal region, pale lemon-yellow on basal three-fifths with a broad outer white patch between veins 3 and 7 and a larger deep orange patch running in from tornus to basal one-fifth of wing; the black outer area is much broader and the lunate submarginal spots are much reduced, very narrow, and brilliant scarlet, not orange as in *s. sacha*.

♀. The female of *s. sacha* is unknown, so I cannot give a comparative description of that sex of *gilolensis*.

Above sooty-black, basal half more or less suffused with whitish scaling, on the fore wings a row of six white subapical spots and on the hind wings five white quadrate marginal spots.

Below basal half obliquely of fore wing whitish grey, basal quarter and median nervure greenish yellow, rest brownish black; an apical- submarginal row of seven spots, the first two sulphur-yellow, the rest white; hind wing basal one-third greenish yellow, outer two-thirds brownish black, a row of six large wedge-shaped orange submarginal patches.

Hab. 1 ♂, 1 ♀, Halmahera (*Waterstradt coll.*). (♂ type.)

Types

The holotype (Fig. 1) has a wingspan of 55mm, somewhat smaller than the typical 64-68mm of male *D. poecilea*, however it possesses the following characteristics that distinguish this species from the male of *D. sacha* (Fig. 3):

The upperside fore wing white apical spots are more extensive and conjoined. On the upperside hind wing there is a narrow black marginal band shading to grey at inner edge which is divided by white marginal spots. The underside hind wing has a white patch between veins 3 and 7, is indented along the inner edge of the black marginal band, and the submarginal spots are scarlet red rather than deep orange in *sacha*. Importantly, the inner edge of these spots are convex, a diagnostic feature of the *hyparete* group of *Delias* as defined by Talbot (1937), to which *D. poecilea* belongs. In *Delias sacha* and other members of the *isse* group, including *D. candida* Vollenhoven, 1865, these spots are chevron shaped with an indented (concave) inner edge.

We therefore consider that the *gilolensis* holotype is a small specimen of *D. p. poecilea*, rather than a subspecies of *D. sacha*.

Nominate *D. poecilea* (Fig. 5) is found on Halmahera and the adjacent islands of Bacan, Kasiruta and Mandioli. *D. poecilea makikoe* Yagishita, 1993 occurs on Morotai. The species is closely related to the Obi endemic *D. edela*, Fruhstorfer, 1910 (Figs. 7 & 8), originally described as a subspecies of *D. poecilea*.

The female paratype of *gilolensis* (Fig. 2) is clearly unrelated to the female of *D. sacha* (Fig. 4) and is considered to be a slightly atypical female of *Delias candida herodias* (Fig. 6). It differs from typical females of this taxon in the absence of a small white discocellular spot on the underside of the hind wing, a characteristic that is known to be variable. *Delias candida* Vollenhoven, 1865 is a relatively common *Delias* from North Maluku with the subspecies *herodias* occurring on Halmahera.

Labels attached to the *gilolensis* holotype (Fig. 1) include a note, apparently in the handwriting of G. Talbot, stating "*D. sacha gilolensis* Type Rothschild."



Fig. 1. *D. sacha gilolensis* HT male (Halmahera)



Fig. 2. *D. sacha gilolensis* PT female (Halmahera)



Fig. 3. *D. sacha* male (Obi)



Fig. 4. *D. sacha* female (Obi)

Both *gilolensis* holotype and paratype (Figs. 1 & 2) have handwritten labels stating “det. R. I. Vane-Wright 1970” with “Holotype” on the male and “Paratype” on the female. Richard (Dick) Vane-Wright was in charge of the BMNH Rhopalocera collections from 1967-1984.

DISCUSSION

It is curious that Rothschild, in his publication of 1925, did not compare *gilolensis* with *D. poecilea* or *D. candida*, both of which were described in 1865 and represented in his own collection.

Rothschild also possessed the two male syntypes of *D. sacha sacha*, although the female was unknown during his lifetime.

Talbot (1937) includes the subspecies in his monograph, quoting the description without further comment or comparison with allied species, a surprising omission when he had evidently inspected the types.

Yagishita, Nakano & Morita (1993) include *D. sacha gilolensis* in their list of recognised taxa, noting its occurrence on Halmahera without illustrating the taxon. A. Yagishita (pers. comm. to second author) has indicated that the type material was not available for study by his co-author at the time of publication.

Peggie, Vane-Wright & Yata (1995) also list *D. sacha gilolensis* in their checklist of pierid butterflies of North and Central Maluku and state the range as Halmahera and Morotai.

This unique record from Morotai is not substantiated in the text and has not been confirmed by any other sources (including Vane-Wright, pers. comm.). They illustrate a female ‘*Delias sacha gilolensis*’ that is clearly the female paratype (Fig. 4), now assigned to *D. candida herodias*.

D’Abrera (1990) lists *D. sacha gilolensis* in the text, noting its range as Halmahera, but does not illustrate the taxon. His comments about the appearance apply only to the male specimen.

CONCLUSION

We find that the taxon *Delias sacha gilolensis* Rothschild, 1925, as represented by the holotype male, is synonymous with *D. poecilea poecilea* Vollenhoven, 1865. The female paratype of *gilolensis* is a specimen of *D. candida herodias* Vollenhoven, 1865.

Delias sacha is therefore confirmed to be endemic to Obi, as is *Delias edela*.

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Fig. 5. *D. poecilea poecilea* male (Halmahera)Fig. 6. *D. candida herodias* female (Halmahera)Fig. 7. *D. edela* male (Obi)Fig. 8. *D. edela* female (Obi)

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IMMATURE STAGES OF *ACTINOTE ZIKANI* (NYMPHALIDAE: HELICONIINAE), A CRITICALLY ENDANGERED BUTTERFLY FROM SOUTHEASTERN BRAZIL

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Abstract – The early stages, food plant, and behavior of the endangered species *Actinote zikani* D’Almeida, 1951, are described from southeastern Brazil, Paranapiacaba, São Paulo. The only recorded host plant is a liana, *Mikania obsoleta* (Asteraceae). Eggs and larvae are grouped, and general morphology and behavior are similar to those of other species of *Actinote*. All immature stages are described in detail and compared with other *Actinote* species.

Resumo – Os estágios imaturos, a planta hospedeira e o comportamento da espécie ameaçada *Actinote zikani* D’Almeida, 1951, são descritos de material proveniente de Paranapiacaba, São Paulo, Sudeste do Brasil. A única planta hospedeira registrada é a trepadeira *Mikania obsoleta* (Asteraceae). Os ovos e as larvas são agrupados, e a morfologia geral e comportamento são muito similares aos de outras espécies conhecidas de *Actinote*. Todos os estágios imaturos são descritos em detalhes e comparados àqueles de outras espécies conhecidas de *Actinote*.

Key words: Acraeini, life history, *Mikania obsoleta*, conservation biology

Butterflies in the genus *Actinote* Hübner, [1819] (*sensu* Silva-Brandão *et al.* 2008) are usually associated with open habitats and forest edges, with several species being locally abundant in secondary forests and other anthropic environments (Francini 1989, 1992; Paluch 2006; Francini & Freitas 2010). However, there are some species which are rare and local, e.g., in southern Brazil there are at least two endangered species, namely *Actinote quadra* (Schaus, 1902) and *A. zikani* D’Almeida, 1951 (MMA 2003; Francini *et al.* 2005; Freitas & Brown 2008a, 2008b; Freitas *et al.* 2009b). *Actinote zikani* (Fig. 1F) has been recorded from only three localities of high altitude forests on the slopes of Serra do Mar, São Paulo State, southeastern Brazil (Francini *et al.* 2005). The species was described based on material collected in 1941–1942 from two forest sites at the summits of the Serra do Mar mountain range (D’Almeida 1951) and remained unrecorded for almost 50 years until being rediscovered in 1991 at a third location near the type localities (Francini *et al.* 2005).

The species is bivoltine with adults flying in March and November. The only known larval host plant is a liana, *Mikania obsoleta* (Vell.) G. M. Barroso (Asteraceae) (Figs. 1D, E). Some data on population biology and basic natural history of *A. zikani* were described by Francini *et al.* (2005) from southeastern Brazil, Paranapiacaba, São Paulo; however, the immature stages were only very briefly described. Field studies showed that population size can strongly fluctuate from year to year, with the species being extremely common in some years and then virtually absent for several years (Francini *et al.* 2005). In fact, after being common from 1991 to 1994 in Paranapiacaba (Francini *et al.* 2005), *A. zikani* was not observed in the field from 1997 to 2005, being recorded again in March 2006.

Based on the combination of 1) restricted area of occupancy, 2) few known populations and sites, 3) small total population size, and 4) extreme fluctuations in number of individuals

through time, *A. zikani* was classified as ‘critically endangered’ in the most recent Brazilian list of endangered species (Freitas & Brown 2008b).

The present paper provides a detailed description of the early stages, as well as larval and adult behavior of *A. zikani*, comparing them with those of other *Actinote* species.

STUDY AREA AND METHODS

Adults and immature stages of *A. zikani* were studied from material collected in Santo André Municipality, São Paulo State, near the village of Paranapiacaba. The study site is located east of Paranapiacaba along a 2500 m long road in the region where the peak reaches 1200 m (46°18’16”W, 23°47’18”S) (Figs. 1A–C). A detailed description of the study area with a map can be found in Francini *et al.* (2005).

Field work was carried out between 1991 and 1994 with 48 field trips to the study area and a total of 161 hours of fieldwork. Adults were observed using binoculars and various aspects of their behavior were photographed. When necessary, they were collected by insect nets. Eggs (Fig. 2B) were collected and brought to laboratory. Larvae were reared in glass jars with the top covered by nylon screens. A piece of cotton moistened with rain water was used to maintain adequate humidity. Head capsules and pupal shells were conserved, and eggs, larvae and pupae were fixed in Kahle solution (Triplehorn & Johnson 2005). Specimens were deposited in the Museu de Zoologia da Universidade de São Paulo and Museu de Zoologia da Unicamp, Campinas, São Paulo State, Brazil. All measurements were made using a stereomicroscope fitted with a calibrated micrometric ocular. Egg measurements consisted of height and diameter, and for the head capsule the distance between the most external ocelli of stemmata, as in Freitas *et al.* (2009a, 2009b). Scanning electron microscopy (SEM) was conducted using a

JEOL® JSM-5800 microscope, and samples were prepared in accordance with the following protocol: critical point drying using Bal-tec® - CPD030 equipment, with the sample attached

with double-sided tape to aluminum stubs, followed by gold/palladium coating with a Bal-tec® - SCD050 sputter coater.



Fig. 1: Habitat, host plant and natural history of *Actinote zikani*. A) General view of the study site. Arrows pointing at specific study site of higher mountains; B) General view of the habitat at Paranapiacaba showing one of the two groups of towers; C) Habitat at Paranapiacaba; D) Young individual (sapling) of *Mikania obsoleta*; E) Flowering individual of *M. obsoleta*; F) Male visiting on flowers.

RESULTS

Host plant and oviposition. We recorded 13 species of *Mikania* in the study site. Some species were abundant and some were less abundant or rare. We were able to locate the host plant, *Mikania obsoleta*, on the eighth trip (April 1st 1991) by observing two females in oviposition around noon. Contrary to most species of *Mikania*, which grow in open gaps and forest edges, *M. obsoleta* was observed growing only inside the forest, mainly in areas of wet soil near and at the edges of small creeks (being partially covered by the stream in the rainy season). However, the plant is easily recognized by its halberd-shaped leaves. It grows around tree trunks climbing up to 6 m high. In 1991 and 1993 *M. obsoleta* flowered between October and November, coinciding with the flight period of *A. zikani*,

but no *A. zikani* was observed visiting its flowers. The growth of *M. obsoleta*, as measured by the number of new leaves, was relatively slow when compared with other *Mikania* species in the area (e.g. *M. hirsutissima*) (R. B. Francini unpublished results).

The oviposition of *A. zikani* is much like that observed for other *Actinote* species. Prior to oviposition, the female flew around the host plant and landed briefly several times on several leaves. Later she landed on the underside of a leaf and remained inactive for about 1 to 5 minutes and then started to oviposit (Fig. 2A). The oviposition lasted up to one hour (n = 2 observations). We collected three egg masses on April 1st containing 269, 273, and 520 (mean = 354; SD = 143.77) eggs respectively, with egg density varying from 11 to 21.5 eggs per cm². In total, five oviposition events were observed in April

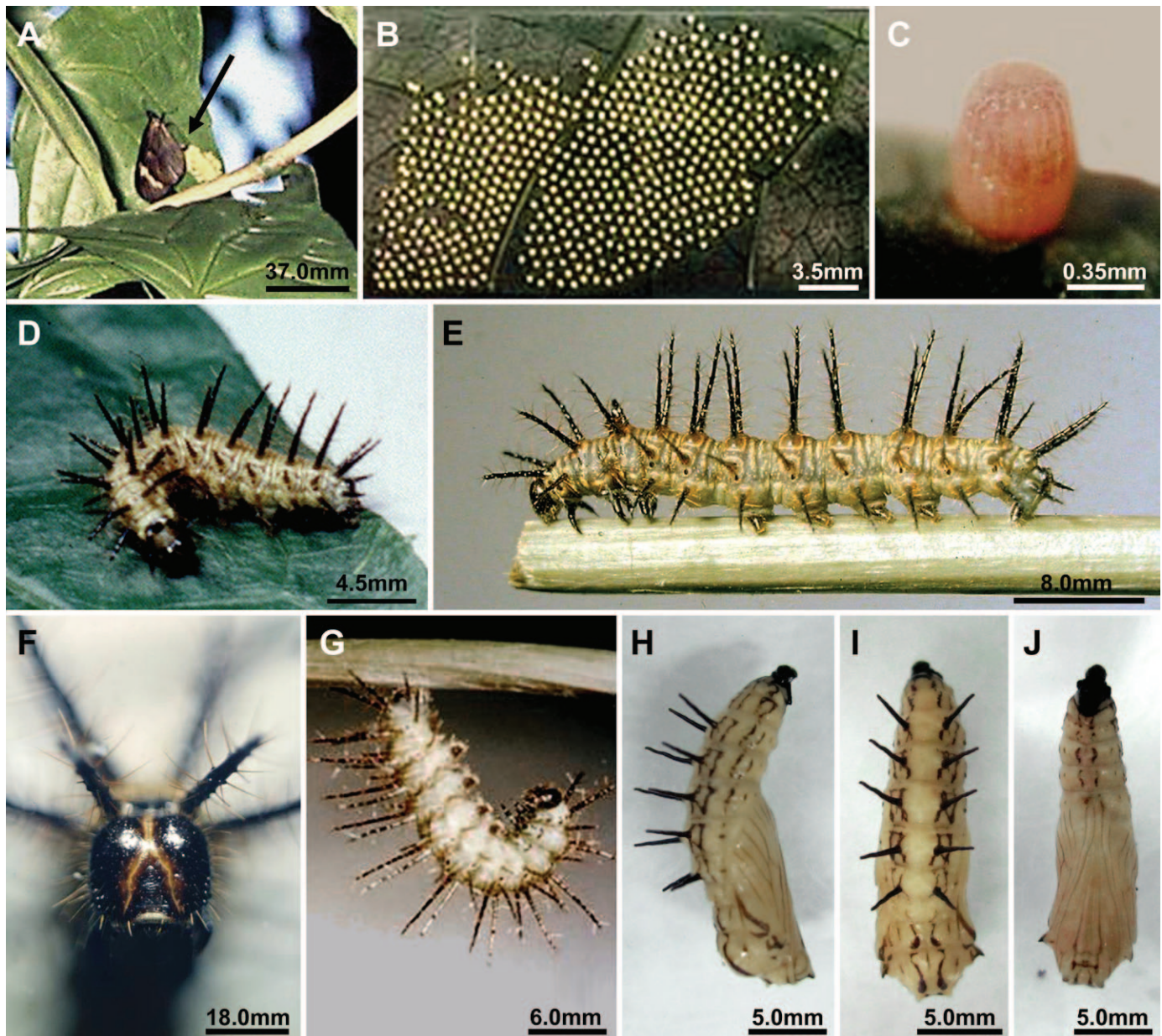


Fig. 2: Immature stages of *Actinote zikani*. A) Female laying eggs on the underside of the host plant (dark arrow); B) An egg mass consisting of 520 eggs; C) Close-up of an egg (latero-dorsal view); D) Penultimate instar (latero-dorsal view); E) Last instar (lateral view); F) Head of last instar (frontal view); G) Prepupa (lateral view); H–J) Pupa (H, lateral; I, dorsal, ventral view).

1991, two of which occurred on a single leaf, i.e., two females were ovipositing together at the same time (female voucher #F-2337 and F-2338 in the RBF collection).

On November 16th 1991, a field-collected female was submitted to stress conditions in the laboratory by putting her in a one liter glass jar with a piece of the host plant under a 150 W incandescent lamp. Generally this situation elicits oviposition behavior as described in Francini (1989). Under these conditions oviposition took a little over five hours. The

female vibrated her wings during the entire ovipositional process. On November 30th, the eggs (voucher #F-2361) with larvae on the point of hatching (black head capsules formed) were found dead, probably due to dehydration. In 1993 only one egg mass was observed; however, later the entire mass disappeared, probably due to predation. Despite the search conducted in the study area in 1994 no eggs were found and no ovipositing females observed.

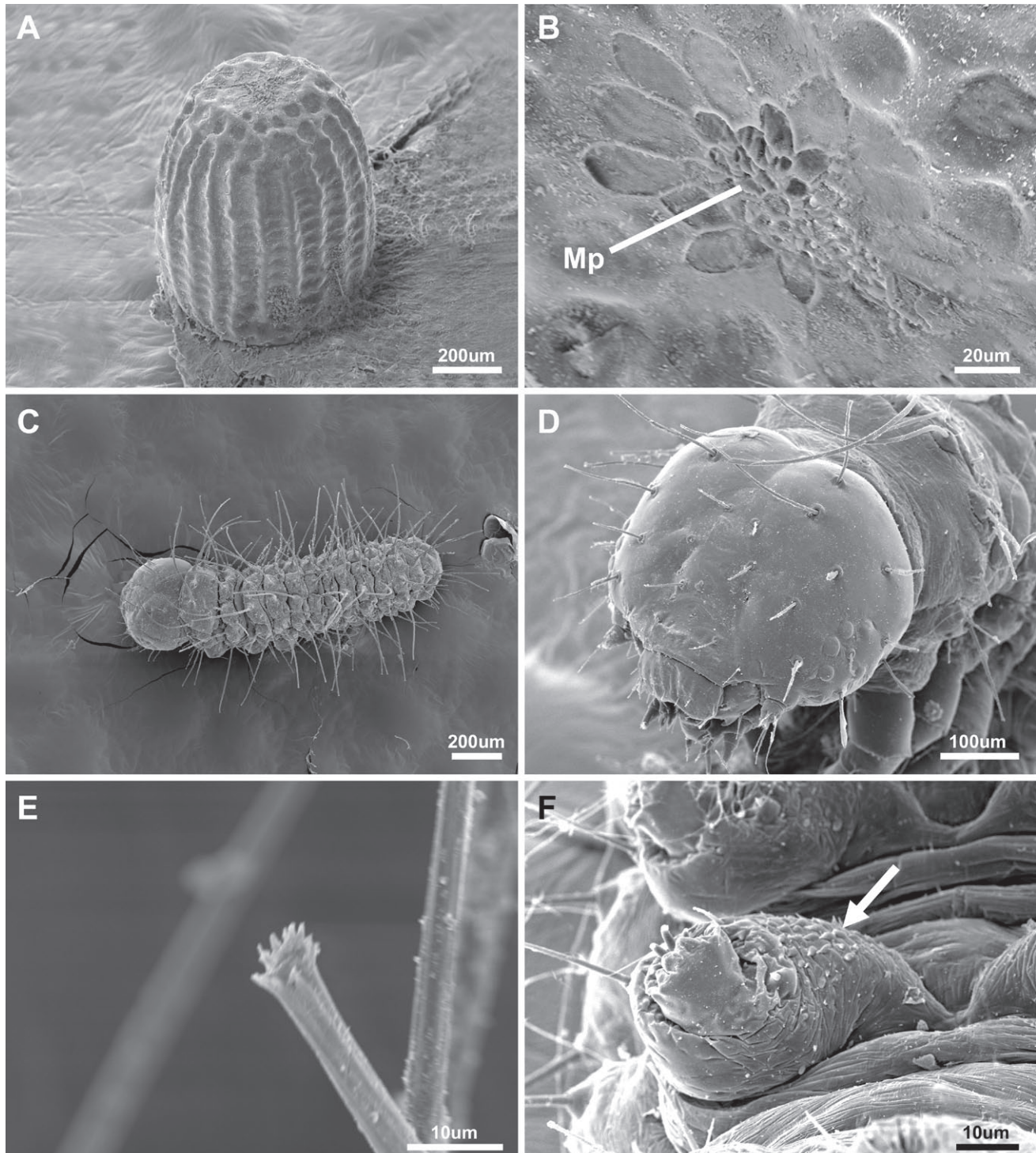


Fig. 3: Scanning electron microscopy of egg and first instar of *Actinote zikani*. A) Egg (latero-dorsal view); B) Egg, detail of micropyle region; C) First instar (dorsal view); D) Head (latero-frontal view); E) Setal apex in detail; F) Microtrichia on proleg ventral region (arrow). Mp = micropyle region.

Larval behavior and natural history: Newly hatched larvae first consumed the chorion, and then began to feed on leaf tissue after 3–5 hours. The first instar fed on the underside leaf tissue by scraping the leaf surface while later instars fed on the entire leaf. Frass pellets were glued onto the leaf by silk, not falling to the ground. Larvae were consistently gregarious and all activities occurred at the same time, such as feeding, resting, or moving between leaves. The egg stage duration was 15 days. The larval stage of the individuals reared from field-collected eggs in April 1991 lasted 73 days, with no significant difference between the mean duration of the larval periods for males (72.5 days, SD = 2.76, n = 16) and females (73.6 days, SD = 2.68, n = 12) ($t = -1.0414$, $p = 0.30$, DF = 26). The duration of the pupal stage was 17.2 days for males (SD = 1.41; n = 16) and 16.9 days for females (SD = 0.94; n = 12) (differences not significant, $H = 0.002$; $p > 0.95$; DF = 1). The mean total duration of the immature stage under laboratory conditions was 106 days (SD = 3.92 days, n = 28).

Descriptions of Immature stages:

Egg (Figs. 2C, 3A–B). Light yellow when first laid, changing to red after ca. two hours (Fig. 2C); barrel shaped, with 19–21 vertical ribs and ca. 16–17 weakly marked horizontal ribs; rosette cells elongated surrounding the micropyle, aeropyles seldom observed and restricted to the basal region of the vertical ribs; mean height 0.61 mm (range 0.60–0.62 mm, SD = 0.11, n = 7), mean diameter 0.49 mm (range 0.47–0.51 mm, SD = 0.01, n = 29).

First instar (Figs. 3C–F, 4, 5A). Head brown, smooth, without scoli, mean width 3.12 mm (range 3.00–3.20 mm, SD = 0.101 mm, n = 11); body pale cream, without scoli and with long pale setae (especially the dorsal and sub-dorsal setae, which are longer than the segment height) (Fig. 3E) arising from slightly sclerotized pinacula; prothoracic and anal plates weakly sclerotized; prolegs brown, with microtrichia on ventral region (Fig. 3F). Microscopic detail of head in Fig. 3D and head chaetotaxy as in Fig. 4. Body chaetotaxy as in Fig. 5A. D2 is missing on the prothoracic shield, and in the sub-dorsal setae, most individuals presented only two setae, although a very few individuals presented one additional SD, usually on only one side of the body. The same occurred in the sub-ventral group on segment T1, with most individuals presenting three setae but a few others presenting only two sub-ventral setae. The ventral setae are not present on segments A7, A8 and A9, but are present from segments A1 to A6, although they are not shown in Fig. 5A.

Intermediate instars (Fig. 2D). The intermediate instars (2 to 4) have a strong yellowish background color contrasting with black scoli, giving a strong aposematic appearance. Head capsule width: 3rd instar 0.90 mm (n = 1); 4th instar 1.50 mm (n = 2).

Last instar (Figs. 2E–G, 5B). Head pale black and pilose, without scoli, spines or chalazae; width 2.50 mm (n = 1); body greenish yellow, pale ventrally, covered with long, dark brown scoli bearing brown setae; a conspicuous dark plate on prothorax; legs black, prolegs with a conspicuous brown lateral plate; anal plate black with pale areas. Length: 35 mm (n = 1). Scoli distribution as in Fig. 5B. Prepupa pale yellow with more homogeneous coloration (Fig. 2G).

Pupa (Figs. 2H–J). General profile elongated; pale greenish-yellow after molting, turning white with dark brown markings on wing cases and abdomen after a few hours; abdominal segments A5 to A8 mobile, with a series of five pairs of long subdorsal black spines from segments A2 to A6. Length 18–20 mm (n = 4).

DISCUSSION

Natural History and Immature stages

The immature stages of *A. zikani* are in most respects quite similar in morphology and behavior to those described of other species of *Actinote* (Francini 1989, 1992; Paluch *et al.* 1999, 2001; Freitas *et al.* 2009a, 2009b, 2010; Francini & Freitas 2010). Eggs are laid in large clusters which are larger than those reported for *A. quadra*, but not as large as those reported for *Actinote pellenea*, which has some clutches exceeding 1000 eggs (Francini 1989; Freitas *et al.* 2009b, 2010; Francini & Freitas 2010). The observation of two oviposition events on the same leaf is an apparently common pattern among certain species of *Actinote*, being observed in *A. quadra*, *A. pellenea*, *A. paraphelus*, *A. carycina*, *A. brylla*, *A. pyrrha* and *A. melanisans* (Francini 1989; Francini & Freitas 2010; Freitas *et al.* 2010 and personal observations of the authors).

The absence of D2 on the prothoracic shield in the first instar differs from other known *Actinote* species (Paluch *et al.* 1999, 2001; Freitas *et al.* 2010), while the presence of usually two sub-dorsal setae is found in other *Actinote*.

The last instar of *A. zikani* has long scoli compared with other species of *Actinote* where immature stages are known and it is similar to those of *A. melanisans* Oberthür, 1917 and *A. discrepans* D’Almeida, 1935 (RBF, unpublished data). The pupa has no marked differences in general coloration and shape when compared to other *Actinote* species.

The larvae reared in the laboratory completed their life cycles in about three and half months, what can be considered exceptionally short for an *Actinote* species (except for *A. pellenea pellenea* that can complete its life cycle in about two

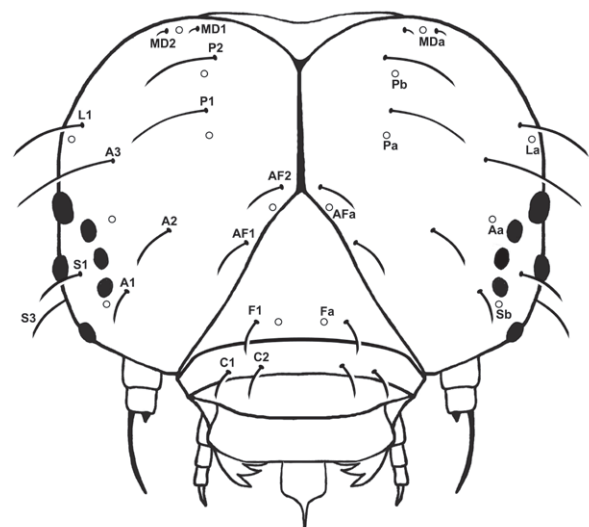


Fig 4: Head chaetotaxy of first instar *Actinote zikani*.

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DESCRIPCIÓN DE LOS ESTADOS INMADUROS DE *PTERONYMIA ZERLINA ZERLINA*, *P. ZERLINA MACHAY*, *P. VEIA FLOREA* Y *P. MEDELLINA* DE COLOMBIA Y DEL ECUADOR (LEPIDOPTERA: NYMPHALIDAE: ITHOMIINI)

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Resumen- A pesar de que la tribu Ithomiini (Lepidoptera: Danainae: Nymphalidae) tiene una amplia distribución a lo largo del Neotrópico y que están envueltos en complejos miméticos bien estudiados, hay poca información de la biología de muchas de las especies que conforman esta tribu, especialmente las que habitan los Andes. Aquí se suministra información sobre los ciclos de vida y la biología de *Pteronymia zerlina zerlina* (Hewitson, 1856), *P. veia florea* Neild, 2008 y *P. medellina* Haensch, 1905, presentes en la Finca Bellavista, Cajibío, Cauca, Colombia. Como un punto de comparación, incluimos una descripción parcial de los estados inmaduros de *P. zerlina machay* Racheli & Racheli, 2003, de la Reserva Arcoiris, San Francisco, Zamora-Chinchipe, Ecuador. La duración de los ciclos de vida fue de 38 días para *P. zerlina zerlina*, de 35 días (instar 2-adulto) para *P. zerlina machay*, de 45 días para *P. veia florea* y de 44 días para *P. medellina*. Se identificó como planta hospedera de *P. zerlina zerlina* y *P. medellina* a *Solanum aphyodendron* Knapp (Solanaceae). Las larvas de ambas especies se encontraron en el envés de las hojas, con larvas gregarias en *P. zerlina zerlina* y solitarias en *P. medellina*. Las posturas gregarias de *P. veia florea* y grupos de larvas gregarias de *P. zerlina machay* se encontraron en dos especies no identificadas y distintas de *Solanum*. En el caso de *P. veia*, la mayoría de las puestas fueron encontradas en las hojas de la parte basal, con mayor madurez de la planta. El fenotipo de la larva de *P. zerlina zerlina* fue bastante diferente al fenotipo de *P. zerlina machay*, y nuestros resultados sugieren que *P. zerlina zerlina*, y probablemente otras subespecies occidentales, son de una especie distinta a los taxones llamada *P. zerlina* de los Andes orientales. Si es así, el nombre *Pteronymia alina* Haensch, 1909 es el más viejo para un taxon de los Andes orientales.

Palabras claves: ciclos de vida, Danainae, Ithomiini, *Pteronymia*, *Solanum*, Solanaceae

Abstract- Although the tribe Ithomiini (Lepidoptera: Danainae: Nymphalidae) is widely distributed throughout the Neotropics and involved in now relatively well-studied mimicry complexes, there is little information on the biology of many species, especially those inhabiting the Andes. This study provides information on the immature life cycle of *Pteronymia zerlina zerlina* (Hewitson, 1856), *P. veia florea* Neild, 2008, and *P. medellina* Haensch, 1905, from Finca Bellavista, Cajibío, Cauca, Colombia. As a point of comparison, we include a partial description of the immature stages of *P. zerlina machay* Racheli & Racheli, 2003, from Reserva Arcoiris, San Francisco, Zamora-Chinchipe, Ecuador. The duration of the life cycle for *P. zerlina zerlina* was 38 days, for *P. z. machay* 35 days (2nd instar-adult), for *P. veia florea* 45 days and for *P. medellina* 44 days. The hostplant of *P. zerlina zerlina* and *P. medellina* was *Solanum aphyodendron* Knapp (Solanaceae). Larvae of both species fed on the underside of leaves, with gregarious larvae in *P. zerlina zerlina* and solitary larvae in *P. medellina*. Immature stages of *P. veia florea* and *P. zerlina machay* were found on two distinct and unidentified species of *Solanum*. In the case of *P. veia*, the majority of clutches were found on more basal leaves of more mature plants. The larval phenotype of *P. zerlina zerlina* is quite different from that of *P. zerlina machay*, and our results suggest that *P. zerlina zerlina*, and probably other western subspecies, are not conspecific with taxa currently called *P. zerlina* in the eastern Andes. If so, the oldest name for an east Andean taxon currently treated under the name *P. zerlina* is *P. alina* Haensch, 1909.

Keywords: life cycles, Danainae, Ithomiini, *Pteronymia*, *Solanum*, Solanaceae

INTRODUCCIÓN

La amplia distribución en el Neotrópico, la belleza de pupas y adultos y los complejos miméticos en los que se envuelven muchas de las mariposas 'ithomiines' (Nymphalidae, Danainae, Ithomiini), los convierten en un material de estudio muy interesante. A pesar de un conocimiento relativamente bueno de los estados inmaduros al nivel del género del grupo (Brown & Freitas, 1994; Willmott & Freitas, 2006), existen muchas especies, especialmente en el región Andina, de los cuales todavía tenemos poca información (Willmott & Lamas, 2008). Los estados inmaduros han proporcionado caracteres morfológicos y ecológicos importantes en estudios de la filogenia del Ithomiini (Willmott & Freitas, 2006). Sin embargo, su uso al nivel de la taxonomía de las especies todavía es poco conocido. Adicionalmente, un conocimiento de los estados inmaduros pueden ser útil en estudios de la evolución y la ecología del mimetismo (Willmott & Mallet, 2004).

El género *Pteronymia* Butler & Druce es uno de los géneros

más grandes del Ithomiini, con 48 especies reconocidos, de los cuales unos 7 todavía faltan para describir (Lamas, 2004). El género es muy característico de los bosques nublados, y tiene su diversidad más alta en los Andes orientales desde Colombia hasta Bolivia. El género es definido por caracteres morfológicos de los estados inmaduros y de los adultos (Willmott & Freitas, 2006), y además de caracteres moleculares (Brower *et al.*, 2006). Parece que hay variación fuerte entre los estados inmaduros de algunos grupos de especies que pueden servir como caracteres filogenéticos útiles (Brown & Freitas, 1994). Por ejemplo, el patrón de la larva y pupa de *Pteronymia lonera* (Butler & Druce, 1872) es muy distintivo, y la especie fue puesto en su propio género por Brown y Freitas (1994). Sin embargo, ahora se conoce que los estados inmaduros de *P. teresita* (Hewitson, 1863) y *P. inania* Haensch, 1903, son bastante similares, proporcionando caracteres importantes en el agrupamiento de estas especies (L. Lima e Mota y Willmott, datos no publicados). Tanto como proporcionar caracteres importantes al nivel de los grupos de especies, existen algunos complejos

de especies en donde los límites de las especies no están claros. Un ejemplo obvio es el grupo de especies relacionadas a *Pteronymia zerlina*, que tiene hasta 7-8 especies que vuelan juntos. Aunque los adultos de las especies son relativamente fáciles identificar en cualquier lugar por diferencias en el color de las alas, no hay caracteres morfológicos para unir poblaciones alopatricas que diferencian en su patrón mimético. En este contexto la información de los estados inmaduros puede servir no solamente para proporcionar nuevos caracteres para la taxonomía, sino también puede informar estudios de la ecología de las comunidades. Sin embargo, hasta la fecha, las publicaciones sobre los estados inmaduros de *Pteronymia* son muy pocas. Actualmente, conocemos solamente una publicación dedicada a la descripción de los estados inmaduros de una especie de *Pteronymia*, *P. picta notilla* Buttler & Druce, 1872 (Young, 1974). Aparecen imágenes de 7 especies en Brown & Freitas (1994), principalmente la quinta larva y pupa, de 2 especies en Janzen & Hallwachs (2009) y de 11 especies en Willmott (2011).

En este artículo se describe la morfología de los estados inmaduros de tres especies de *Pteronymia* que vuelan juntos en los bosques andinos de Colombia: *P. zerlina zerlina* (Hewitson, 1856), *P. veia florea* Neild, 2008, y *P. medellina* Haensch, 1905. Como comparación y para ilustrar la potencial de caracteres de los estados inmaduros en la taxonomía al nivel de las especies, también incluimos una descripción parcial de los estados inmaduros de *P. zerlina machay* Racheli & Racheli, 2003, del oriente del Ecuador.

MATERIALES Y MÉTODOS

Los muestreos en Colombia se realizaron por Bolaños y Zambrano durante los meses de enero, febrero y marzo de 2009 para coleccionar los diferentes estadios de desarrollo, incluyendo adultos, en el área de la Finca Bellavista, Cajibío, Cauca (1870 m, 02°36'40"N, 76°31'28"W). Se realizaron 16 muestreos por mes (día de por medio), y cada muestreo tenía una duración de 6 horas. Las colectas se realizaron en horas de la mañana en los periodos de actividad alta de los ithomiinos. Se buscó en diferentes partes de la vegetación del bosque, principalmente en el envés de las hojas más jóvenes, ya que por lo general estas mariposas depositan sobre estas las posturas (obs. pers.). También, se realizaron capturas manuales de huevos, larvas y pupas, así como también se colectó una muestra de la planta hospedera para su posterior identificación. Se tuvo en cuenta las siguientes características para asegurar que lo encontrado pertenece a la tribu Ithomiini (Brown & Freitas, 1994; Willmott & Freitas, 2006): las principales plantas hospederas, posturas individuales o gregarias, larvas lisas y transparentes en sus primeros instar y pupas brillantes.

En los primeros tres muestreos del mes de enero se realizó seguimiento visual a las mariposas de Ithomiini determinando en qué tipo de plantas se posaban y libaban, acompañado de esto, se revisó cada planta del bosque de altura no mayor a 2m que se identificó como Solanaceae y Gesneriaceae, las familias conocidas como plantas hospederas para la mayoría de los ithomiinos (Beccaloni *et al.*, 2008). El trayecto de muestreo comprendió en su mayoría las orillas de la fuente de

agua, puesto que era el lugar donde había mayor abundancia de ithomiinos, confirmando su asociación a fuentes de agua y a sitios sombreados y húmedos (Brown, 1979; Vasconcellos-Neto, 1991; Gallusser, 2002; pers. obs.). Por tanto se asumió que las plantas hospederas y nutricias estaban muy cerca de allí.

Se revisó la colección de referencia del herbario del Museo de Historia Natural de la Universidad del Cauca, para tener una visión amplia a la hora de realizar el reconocimiento de las especies vegetales de estas familias en campo. Se colectaron muestras botánicas en estado fértil, se llevaron al horno y luego se realizó el correspondiente montaje para su respectiva identificación por Bernardo Ramírez.

Para el estudio de los ciclos de vida, se adecuó un laboratorio para mantener los estadios inmaduros, constandingo de: estantes para colocar recipientes plásticos de diferente tamaño de acuerdo a la sección de la planta hospedera colectada tapados con tulle, un mesón para hacer la respectiva limpieza y esterilización de los recipientes donde se encuentren las muestras y una jaula de empupado. El laboratorio estuvo a temperatura ambiente aislado de posibles depredadores y parasitoides. Algunas muestras fueron llevadas a los laboratorios del Departamento de Biología de la Universidad del Cauca donde se observaron en un estereoscopio (Nikon SM Z 800). Las fotos fueron tomadas con una cámara digital sight DS-2MV sistema de captura y análisis de imágenes NIS elements.

Se contaron los individuos de cada uno de los estadios. El que presentó mayor dificultad para conteo por el tamaño y distribución fue el estadio de huevo, por esto se trazaron cuadrantes en las fotografías de las posturas gregarias para evitar errores en el conteo. Para la determinación de la duración total de cada estadio y del ciclo de cada especie se calculó el promedio y la desviación estándar.

Las observaciones en Ecuador fueron hechas como parte de un inventario de los estados inmaduros de los ithomiinos de la Reserva Arcoiris, San Francisco, Zamora-Chinchipec (2000-2150 m, 03°59'18"S, 79°05'42"W), por Willmott y Raúl Aldaz en 2002. Los métodos de hallar los estados inmaduros y de su crianza están descritos en Willmott & Lamas (2006, 2008).

RESULTADOS

Pteronymia zerlina zerlina (Fig. 1A-L)

Se identificó a *Solanum aphyodendron* S. Knapp (Fig. 1AC) como la planta hospedera. Es un arbolito de 2-5 m, hojas glabras, lanceoladas, con un olor fuerte, tamaño no mayor a 10cm, hojas simples, peciolo largo, ápice agudo, flores de 1 cm color blanco, con anteras amarillas, floración constante fruto tipo vaya de 1,5 cm, globosa, de color verde. Se ubica en lugares sombreados, a orillas de camino y cerca a fuentes de agua. *Solanum aphyodendron* presenta amplia distribución en el área de estudio, permitiendo un estudio detallado del ciclo de vida y de la biología de las especies que hospeda.

Se calcularon tiempos y longitudes promedio para cada estadio a partir de 435 individuos representando 10 grupos de huevos (Tabla 1).

Huevo: se encontraron posturas gregarias de 40 a 100 huevos en el envés de la hoja, muy juntos uno del otro; la ubicación en la hoja de la postura fue muy variable, algunas en la cima, otras en la base, otras en la parte media de la hoja.

Tabla 1. Tamaño y duración de los estadios inmaduros y capsulas cefálicas de *P. zerlina zerlina*.

Estadio	Longitud promedio (mm)	Duración promedio en días (horas)	Cápsula cefálica (mm)
Huevo	0.2 x 0.7	8.6 (205)	
Instar 1	2-4	5.4 (131)	
Instar 2	4-7	3.4 (82)	19
Instar 3	7-15	2.9 (70)	19.5
Instar 4	15-19	2.9 (70)	25
Instar 5	19-27	5.9 (141)	30
Pupa	10	8.8 (211)	

Sin embargo, nunca se encontró más de una postura gregaria en la misma hoja. Las plantas en las cuales se encontraron posturas presentaron alturas de entre 1 y 2.5m y su distribución en el bosque fue variable; las encontramos en las orillas de la quebrada y a lo largo del camino en medio del bosque. La mayor parte de las posturas fueron encontradas en hojas maduras de la parte media y apical de las plantas a alturas aproximadas de entre 1 y 2 m del suelo. La forma de los huevos es ovalada, un poco alargados, su corión es ornamentado con costillas transversales (Fig. 1B). La base del huevo es un poco aplanada. Los huevos recién ovipositados son de color blanco, días después se tornan perlados con manchas blancas que luego de un tiempo toman la coloración roja en la parte superior, y dos días antes de eclosionar se toman de color café oscuro.

Instar 1 (Fig. 1C): Todos los instars de esta especie, y de todas las especies descritas aquí, son cilindricos, lisos, con una cápsula cefálica redondeada y lisa, y carecen de filamentos subdorsales, como es típico del genero *Pteronymia* (Willmott & Freitas, 2006). La cabeza es de color amarillo castaño. Durante este instar las larvas se mantienen muy unidas. La coloración de las patas y abdomen es claro (blanco) y se mantiene durante todos los instars. Las larvas recién eclosionadas se comen la envoltura del huevo. El comportamiento de eclosión fue similar, y todos los huevos de una misma postura eclosionan simultáneamente.

Instar 2 (Fig. 1D): El cuerpo de las larvas es de coloración verde transparentoso, y aparece una franja blanca muy delgada en el dorso, que atraviesa todo el cuerpo, además de una en disposición transversal en el último segmento del abdomen. La cabeza cambia de color amarillo castaño a negro.

Instar 3 (Fig. 1E): Se observa un verde más oscuro, casi negro, en el cuerpo, la franja de color blanco del dorso está más definida y aparece una franja blanca en cada una de los costados a lo largo del cuerpo y un anillo blanco estrecho transversal en la parte posterior del segmento A9 y la cabeza es de color negro. Las larvas comienzan a desagruparse buscando la mejor disposición de alimento. Durante el cambio de instar las larvas se inmovilizan, quedando sujetas a la hoja durante unos minutos, la cabeza toma una coloración blanca la cual poco a poco va tomando el color negro característico de la cabeza.

Instar 4 (Fig. 1F): El parte dorsal del cuerpo es de color gris-negro, con tres franjas de color blanco, se van haciendo más gruesas a medida que avanza el instar, estas recorren todo el cuerpo desde el primer segmento torácico hasta la placa anal. El segmento A9 tiene una banda blanca estrecha transversal en la parte posterior y se encuentra una línea blanca estrecha subspiracular a lo largo del cuerpo. La cabeza es de color negro, se observa aplanada y más grande que el cuerpo.

Instar 5 (Fig. 1G,H,I): Las larvas crecen rápidamente conservando el patrón de color del instar anterior (Fig. 1F), y aparece un anillo blanco estrecho en la parte anterior del segmento T1. Se distribuyen por grupos en las hojas (Fig. 1G), de acuerdo a la disposición del alimento, y las larvas se caracterizan por comer vorazmente al principio del instar. La etapa de prepupa comienza con la inmovilización de las larvas de quinto instar; éstas dejan de alimentarse, comienzan a aclarar su color y a encogerse un poco. La larva se sujeta por sus pseudopios traseros a la superficie de la hoja creando una pequeña cantidad de seda de color rojo para que se de esta unión (cremaster); una vez sujetas en el envés de la hoja cuelgan hacia abajo y lentamente empiezan a condensar y su cuerpo por medio de movimientos rápidos los primeros 15 minutos, y luego lentamente va tomando la estructura de la pupa; dicho proceso dura aproximadamente 60 min. Casi finalizando el instar 5, las larvas aclaran su color sin perder su patrón de coloración y se encogen hasta 1.7cm (Fig. 1J). La duración de la larva en instar 5 es de 4.9 días hr y 1 día en prepupa.

Pupa (Fig. 1K,L): Las larvas buscan empupar una cerca de la otra; se observan hilos dorados oscuros en las márgenes de la pupa; luego de dos días se toman doradas oscuras (verde petróleo), presentando en las áreas laterales dos manchas pequeñas de color café. Como las otras especies descritas aquí, y como la mayoría del genero (Willmott & Freitas, 2006), la pupa es lisa, con una proyección redondeada dorsal en el torax, con dos pequeños 'cuernos' cerca de la base de las alas y con dos más en la cabeza. Una línea dorada marca el margen anterior de la ala anterior y los cuatro 'cuernos'. La pupa en vista lateral esta angulada, con un angulo de unos 120°.

Pteronymia zerlina machay (Fig. 1M-R)

Se identificó a *Solanum* aff. *youngii* (Carlos Ceron, pers. comm.) (Fig. 1N) como la planta hospedera, una planta también compartida con tres otras especies relacionadas simpátricas de *Pteronymia* (Willmott y Elias, datos no publicados). Esta planta es un arbolito hasta 3 m, con hojas suaves y espinosas, lanceoladas, sin olor fuerte, tamaño no mayor a 30cm, hojas sencillas y alteras. La flor es desconocida a nosotros. Se ubica en lugares sombreados en el sotobosque, tanto que en los bordes de los caminos, y frecuentemente cerca de las quebradas.

Se estimó la duración aproximada de cada estadio a partir de dos grupos de larvas (Tabla 2). Encontramos un grupo de 15 larvas gregarias del segundo instar (KRW-250) el 20 enero de 2002 debajo de una sola hoja, unos 0.2m sobre el suelo al borde de un camino grande al lado de bosque secundario. El segundo grupo de 61 larvas gregarias del segundo instar (KRW-253) fue hallado el mismo día en una posición similar al KRW-250. Las larvas permanecieron gregarias por todos los estadios, mudaron juntas y hicieron las pupas en grupos. Los huevos y el instar 1 son desconocidos para nosotros.

Tabla 2. Duración aproximada de los estadios inmaduros de *P. zerlina machay*.

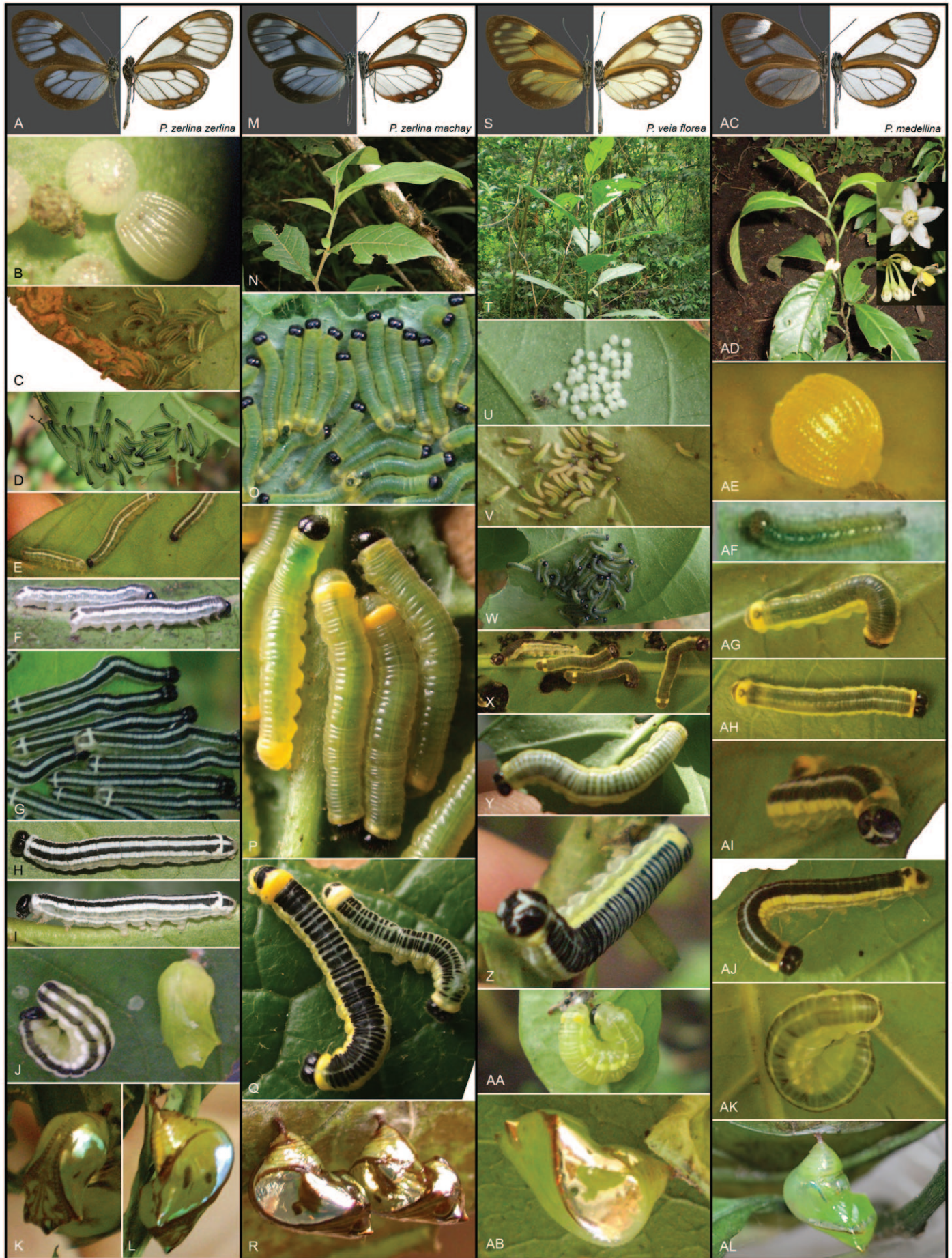
Estadio	Duración aproximada en días (horas)
Instar 3	8 (192)
Instar 4	6 (144)
Instar 5	10 (240)
Pupa	11 (264)

Instar 2 (Fig. 1O): El cuerpo de la larva tiene pequeños pelos y es de coloración verde; hay una banda en disposición transversal en el segmento A9 del abdomen de color amarillo, interrumpido en su medio, y la parte anterior del primer segmento torácico (T1) también tiene el mismo color amarillo. La cabeza es negra.

Instar 3 y 4 (Fig. 1P): Estos instars se parecen mucho al segundo, con excepción de la banda transversal del A9, que ahora está completa; las patas torácicas y abdominales son de color verde claro.

Instar 5 (Fig. 1Q): El último instar inicialmente es parecido a los estadios previos. Sin embargo, después de unos dos días el color dorsal se compone de líneas negras transversales, separadas por líneas transversales de gris claro, y hay una línea dorsal clara, estrecha e indistinta a lo largo del medio del cuerpo; la banda transversal amarilla en A9 está bien marcada y completa, mientras el segmento T1 ahora tiene una banda similar amarilla; hay una banda subdorsal de amarillo claro que divide la parte negra dorsal de la parte verde claro ventral; la cabeza es totalmente negra y los pseudopios son verde claro.

Pupa (Fig. 1R): La pupa es similar a *P. z. zerlina*, y es dorada brillante mezclada con manchas marrón o verde, siendo dorado especialmente en el abdomen y las alas.



Pteronymia veia florea (Fig. 1S-AB)

La planta hospedera de esta especie fue identificada como *Solanum* sp. (Fig. 1T). Es un arbolito de 1-2 m, hojas glabras, lanceoladas, con olor fuerte, hojas simples con disposición alterna, peciolo largo, ápice agudo; se ubica en lugares abiertos, y a orillas de camino. No se encontró floración ni frutos, por tanto no se logró determinar la especie, es de muy baja distribución en el área de estudio.

Los datos mostrados en la Tabla 3 fueron el resultado del análisis de 135 individuos de 3 pupas.

Huevo (Fig. 1U): esta especie presenta postura gregaria, la cantidad de huevos por postura va de 30 a 45 aproximadamente. El huevo es similar en forma a los de las otras especies descritas aquí.

Instar 1 (Fig. 1V): La cabeza es redondeada de color negro, patas y abdomen de color claro (Fig. 3c), el cual se mantiene durante toda la fase larval. Las larvas se mantienen muy unidas siempre en busca de alimento.

Instar 2 (Fig. 1W): Su coloración es verde en la parte dorsal y amarillo crema en la parte ventral, sus cabezas son redondas y de color negro, la piel se observa muy plegada de apariencia transparentosa. Se mantienen agrupadas la gran parte del tiempo.

Instar 3 (Fig. 1X): En este instar se observa aun más plegada la piel, lo que da un aspecto aterciopelado, de color verde oscuro en la parte dorsal, aparece una franja amarilla interrumpida en el segmento A9 del abdomen, además aparecen dos franjas amarillas en los costados, en la región subdorsal a lo largo del cuerpo. La cabeza es redonda de color negro.

Instar 4 (Fig. 1Y): El cuarto instar tiene una coloración verde oscuro en el fondo y franjas amarillas opacas casi blancas que atraviesan el dorso de la larva de manera transversal a lo largo de su cuerpo. Aparece una franja blanca en la región subespiracular, la franja del A9 se torna amarillo opaco.

Instar 5 (Fig. 1Z): El quinto instar presentan una coloración dorsal bastante similar a *P. z. machay* (Fig. 1Q) de líneas negras transversales, separadas por líneas transversales de gris claro, y hay una línea dorsal clara, estrecha e indistinta a lo largo del medio del cuerpo; las franjas amarillas y blancas de los costados (en la región subdorsal y sub-espiracular) se observan más marcadas; la franja amarilla clara dorsal del A9 se se mantiene interrumpido; la cabeza presenta una línea blanca en forma de una "Y" invertido en el medio de la cara. Al comenzar la prepupa, la larva se va transparentando y engrosando hasta obtener el color verde limón; su cabeza se conserva negra (Fig. 1AA); la larva en instar 5 dura 5.1 días y 1 día en prepupa.

Pupa: El color inicial de la pupa es verde limón. Con el pasar del tiempo se van tornando doradas las regiones laterales y a enmarcarse los márgenes con hilos dorados (Fig. 1AB).

Tabla 3. Tamaño y duración de los estadios inmaduros y cápsulas cefálicas de *P. veia florea*.

Estadio	Longitud promedio (mm)	Duración promedio en días (horas)	Cápsula cefálica (mm)
Huevo	0.2 x 0.5	5.1 (122)	
Instar 1	2-5	5.9 (142)	
Instar 2	5-9	7.1 (169)	10
Instar 3	9-13	4.9 (117)	15
Instar 4	13-18	5.9 (141)	20
Instar 5	18-22	6.0 (144)	30
Pupa	10	10.3 (248)	

Pteronymia medellina (Fig. 1AC-AL)

Esta especie se alimenta de la misma planta que *P. zerlina zerlina* (*S. aphyodendron*) (Fig. 1AD). Los tamaños y duración de los estadios se determinaron a partir de 200 individuos (Tabla 4).

Huevo (Fig. 1AE): Las posturas fueron individuales, encontradas en el envés de la hoja en las partes basales de la planta a 0.2m o 0.7m del suelo, en hojas jóvenes y maduras. Las plantas más bajas eran las que presentaban más posturas. Se registraron varias posturas individuales en la misma hoja con diferentes grados de madurez. Se observa una seda muy fina por la cual los huevos se pegan a la hoja.

Instar 1 (Fig. 1AF): La cabeza es redonda, de color café claro (Fig. 3b). Una vez comienza a alimentarse aparece en su cuerpo la coloración verde. Presentan patas y abdomen de color claro, el cual se mantiene durante todos los estadios larvales.

Instar 2 (Fig. 1AG): La larva toma coloración verde oscura, la piel se observa muy plegada con apariencia casi aterciopelada, aparecen dos franjas amarillas muy delgadas en los costados, en la región subdorsal y una un poco más gruesa ubicada en el último segmento del abdomen de color amarillo en disposición transversal, la cual no esta interrumpida excepto por una línea estrecha continua en la parte posterior del segmento. La cabeza cambia de color café a color negro.

Instar 3 (Fig. 1AH): La larva conserva el color verde oscuro de su cuerpo, en la parte inferior de las dos franjas amarillas aparece una franja blanca muy delgada, la franja amarilla del último segmento abdominal del dorso se observa más gruesa y definida, aparece una franja amarilla en el prototórax (Fig. 1AH). Por la mayor parte del tiempo las larvas adoptan postura en forma de bastón.

Instar 4 (Fig. 1AI): Similar al tercer instar; el cambio más marcado se encuentra en la cabeza, la cual presenta una línea blanca en forma de una "V" invertido en el medio de la cara; se encuentra una línea blanca estrecha subespiracular a lo largo del cuerpo.

Instar 5 (Fig. 1AJ): Similar al cuarto instar, excepto que el color dorsal es verde oscuro, casi negro. Cuando la larva está entrando a la etapa de prepupa el color se va tornando transparentoso, y prácticamente desaparecen las franjas amarillas intensas de los costados y del dorso al igual que el color verde oscuro que siempre predominó (Fig. 1AK). La larva en instar 5 dura 7 días y 1 día en prepupa.

Pupa (Fig. 1AL): La pupa es similar en forma a la pupa de *P. z. zerlina*, y de color verde claro brillante; pasadas 6 horas aparecen hilos dorados en las márgenes de la pupa que se mantienen hasta 12 horas antes de la eclosión.

A los adultos de los ithomiinos estudiados en Colombia se los observó usualmente volando a alturas de entre 50 y 100 centímetros en el sotobosque y de 1 a 3 metros en los claros de bosque, prefiriendo volar cerca de las fuentes de agua; dicho

Tabla 4. Tamaño y duración de los estadios inmaduros y cápsulas cefálicas de *P. medellina*.

Estadio	Longitud promedio (mm)	Duración promedio en días (horas)	Cápsula cefálica (mm)
Huevo	0.2 x 0.6	9.2 (221)	
Instar 1	2-4	4.0 (96)	
Instar 2	4-8	4.4 (105)	10
Instar 3	8-17	4.2 (102)	15
Instar 4	17-20	4.0 (96)	20
Instar 5	20-25	8.0 (191)	30
Pupa	10	10.1 (243)	

Fig. 1. Adultos, plantas hospederas y estados inmaduros de *Pteronymia*. **A-L**, *P. zerlina zerlina*; **M-R**, *P. zerlina machay*; **S-AB**, *P. veia florea*; **AC-AL**, *P. medellina*. Si no hay otros datos, las plantas hospederas y los estados inmaduros de *Pteronymia zerlina zerlina*, *P. veia florea* y *P. medellina* son desde Colombia, Cauca, Finca Bellavista, y los de *P. zerlina machay* son desde Ecuador, Zamora-Chinchipec, San Francisco. **Pteronymia zerlina zerlina**: **A**, hembra, Colombia, 'Bogotá'; **B**, huevos, vista dorsal y lateral; **C**, instar 1; **D**, instar 2; **E**, instar 3; **F**, instar 4; **G**, instar 5; **H,I**, instar 5 asumido ser *Pteronymia zerlina* de Colombia, Valle del Cauca, Saladito (KRW); **J**, prepupa y pupa; **K**, pupa, vista ventral; **L**, pupa, vista lateral. **Pteronymia zerlina machay**: **M**, hembra, Ecuador, Morona-Santiago, Río Abanico; **N**, *Solanum* aff. *youngi*; **O**, instar 3; **P**, instar 4; **Q**, instar 5; **R**, pupa, vista lateral. **Pteronymia veia florea**: **S**, hembra, Colombia, 'Bogotá'; **T**, *Solanum* sp.; **U**, huevos; **V**, instar 1; **W**, instar 2; **X**, instar 3; **Y**, instar 4; **Z**, instar 5; **AA**, prepupa; **AB**, pupa, vista ventro-lateral. **Pteronymia medellina**: **AC**, hembra, Colombia, 'Medellín'; **AD**, *Solanum aphyodendron*, flores desde una planta en Colombia, Saladito, en donde se encontro larvas asumidos a ser *P. medellina* (KRW); **AE**, huevo, vista lateral; **AF**, instar 1; **AG**, instar 2; **AH**, instar 3; **AI**, instar 4; **AJ**, instar 5; **AK**, prepupa; **AL**, pupa, vista lateral.

vuelo es de manera lenta de una planta a otra. En Colombia, observamos que *Besleria solanoides* es la más visitada para libar su néctar por las especies en estudio como planta nutricia, aunque también liban excrementos de algunas aves.

DISCUSION

Las larvas de las especies ithomiinos descritas aquí tienen como planta hospedera especies del género *Solanum*, como es el caso por la mayoría de las especies del género *Pteronymia* y otros miembros del subtribu Dircennina (Drummond & Brown, 1987; Willmott & Freitas, 2006; Beccaloni *et al.*, 2008). La planta hospedera de *P. zerlina zerlina* y *P. medellina*, *Solanum aphyodendron*, también ha sido registrada como planta hospedera de otras especies de *Pteronymia* y *Episcada* Godman & Salvin, 1879, a lo largo del Neotrópico (Drummond y Brown, 1987; Willmott & Mallet, 2004; Willmott y Elias, datos no publicados). Plantas identificadas como *S. aphyodendron* fueron halladas en los sitios en donde colectamos los estados inmaduros de *P. zerlina machay* en Ecuador, pero no encontramos esta especie alimentándose en esta planta, solamente dos especies de *Episcada* y tres otras especies de *Pteronymia* (Willmott y Elias, datos no publicados). Aunque los adultos de *P. zerlina machay* son muy comunes, solamente encontramos dos grupos de larvas, y entonces es difícil concluir definitivamente si *P. zerlina machay* usa *S. aphyodendron* o no.

El estudio sobre la duración de cada estadio inmaduro ha puesto de manifiesto para el género *Pteronymia* una duración que va entre 5.1 y 9.2 días en etapa de huevo (Tabla 1, 2, 3, 4), con la salvedad de que los huevos fueron colectados en campo y nunca se colectó una postura que haya sido recién ovopositada, lo cual disminuye la exactitud del tiempo para esta fase. Gallusser (2002) determinó una duración promedio de 3 días para la fase de huevo para dos subespecies de *Oleria onega* (Hewitson, [1852]).

Vasconcellos-Neto y Ferreira (1993), en su estudio realizado con dos subespecies de *Mechanitis lysimnia* (Fabricius, 1793), reportaron posturas gregarias e individuales que varían entre 1 y 57 huevos en el haz de la hoja. En el presente estudio las especies presentan posturas gregarias o individuales pero nunca los dos casos. Posturas gregarias son relativamente raras en Ithomiini, pero conocidas en la mayoría de los subtribus, y es relativamente común en *Pteronymia* (Brown & Freitas, 1996; Willmott & Freitas, 2006; Willmott, pers. obs.). En Lepidoptera, las posturas gregarias están vinculadas con patrones aposemáticos en las larvas (Sillen-Tullberg, 1988), y las larvas de todas las especies descritas aquí sí parecen ser aposemáticos. Actualmente, un color aparentemente aposemático es común en el género *Pteronymia* y otros géneros de la Dircennina (Young, 1974; Brown & Freitas, 1994; Janzen & Hallwachs, 2009; Willmott, 2011), y aunque no hay estudios sobre la palatabilidad de las larvas de la Dircennina, es probable que estas especies tienen alguna forma de protección química (Willmott *et al.*, 2011).

Pteronymia zerlina zerlina y *P. medellina* presentan en el primer instar la cabeza de color café claro, la cual al pasar al segundo instar se torna negra, mientras *Pteronymia veia florea* presenta cabeza negra desde su eclosión. Un cambio de

color similar fue mencionado por Willmott y Lamas (2008) para *Megoleria orestilla orestilla* (Hewitson, 1867) (Oleriina) y por Brown y Freitas (1994) para Oleriina, pero por lo general carecemos descripciones adecuadas para evaluar la distribución de este carácter en los ithomiinos. Las larvas de *Pteronymia* estudiadas presentan patas de color claro al igual que lo reportado por Willmott y Lamas (2006) para *Hyalenna Forbes*, 1942, confirmando que este carácter es típico en estos dos géneros relacionados (Willmott & Freitas, 2006). Todas las larvas quintas descritas aquí tienen un patrón similar a la mayoría de las especies de *Pteronymia* (p. ej., Willmott, 2011), con dos bandas subdorsales claras y el área dorsal entre estas bandas del color negro. También, todos comparten una banda clara transversal en el segmento abdominal A9, un carácter que potencialmente define el género (Willmott & Freitas, 2006).

La formación de las pupas para las especies estudiadas duro aproximadamente 60 min, lo cual es un tiempo corto comparándolo con el estudio realizado por Ingram y Parker (2006), donde registran 85 minutos para este proceso en *Greta morgane ota* (Hewitson, [1855]). La duración media pupal para *P. zerlina zerlina* es de 8.8 días, *P. medellina* 10.1 días y *P. veia* 10.3 días (Tablas 1, 3, 4). Gallusser (2002) reportó una duración menor en el estadio de pupa de 7 días para *Oleria onega* en Perú, una observación que puede ser el resultado de la baja elevación y de la temperatura más alta del sitio de estudio en Perú.

La duración del ciclo de vida desde huevo hasta adulto fue de 38 días (910 hr) para *P. zerlina zerlina*, de 44 días (1055 hr) para *P. medellina* y de 46 días (1084 hr) para *P. veia florea*; existe un margen de error de 2 días puesto que nunca se observó una oviposición para determinar con exactitud la duración de los ciclos. *Pteronymia zerlina machay* presenta una duración de 35 días a partir del segundo estadio de larva hasta adulto, que es similar al tiempo reportado por *P. veia florea*.

Los adultos de *P. medellina* y *P. zerlina zerlina* son obviamente muy similares (Fig. 1A, AC) y están aparentemente involucrados en el mimetismo. Es interesante notar que las larvas de estas dos especies comen la misma especie de planta, un patrón que es común en otras comunidades de ithomiinos Andinos y que supuestamente está vinculado con el desarrollo de mimetismo entre las especies (Willmott & Mallet, 2004).

Uno de los resultados más importantes para la taxonomía es que las larvas de *Pteronymia zerlina zerlina* muestran diferencias muy significativas en comparación con *Pteronymia zerlina machay*, que vuela en los vertientes orientales del Ecuador. Tales diferencias están más obvias en el quinto instar (Fig. 1G, Q) e incluyen el color de las bandas longitudinales subdorsales (blanco vs amarillo), la presencia de una banda dorsal ancha y blanca en *P. z. zerlina*, y la forma de la banda clara transversal en A9 (estrecha e interrumpida en *P. z. zerlina*, completa y ancha en *P. z. machay*). Actualmente, las larvas de *P. veia florea* son más similares a las de *P. zerlina machay*, pero se diferencian por la forma de la banda amarilla en A9 del quinto instar, que esta interrumpida en *P. veia* pero completa en *P. z. machay* y en la presencia de la línea blanca en la cara de *P. veia*. *Pteronymia zerlina* y *P. veia* son miembros de un clado de unas siete especies de *Pteronymia* (Willmott y Freitas, 2006; L. Lima e Mota, datos no publicados) en donde los

adultos de las especies se identifican solamente por caracteres del patrón de las alas. Entonces, es difícil decidir el estatus taxonómico de taxones alopatricos, como *P. zerlina zerlina*, *P. veia florea*, y *P. zerlina machay*, en la ausencia de caracteres morfológicos. La taxonomía actual trata *P. zerlina* como una especie polimórfica con una distribución amplia, desde la Cordillera de la Costa en Venezuela hasta el oeste de Ecuador en los vertientes occidentales de los Andes y hasta Bolivia en los vertientes orientales (Lamas, 2004). Sin embargo, nuestros resultados sugieren, al menos, que el taxón occidental *P. zerlina zerlina* constituye una especie distinta al taxón oriental *P. z. machay*. Dado el hecho que los Andes parecen ser una barrera biogeográfica importante para los ithomiinos (p. ej., *Ithomia terra*, Mallarino *et al.*, 2005), es posible que otras subespecies occidentales como *P. z. pronuba* (Hewitson, 1870) (Ecuador Occ.), *P. z. nubivaga* R. & J. Fox, 1947, *P. z. amarillana* Neild, 2008, y *P. z. cristalina* Neild, 2008 (Venezuela), pertenecen a la misma especie de *P. z. zerlina*, mientras los taxones restantes de los vertientes orientales constituyen otra especie. Si es así, el nombre más viejo para los taxones orientales es *Pteronymia alina* Haensch, 1909. Sin embargo, nuestros resultados también indican una relación cercana entre *P. veia florea* y *P. zerlina machay*, que podría indicar una necesidad de revisar la taxonomía de la especie *P. veia* también y muestran el valor de información de los estados inmaduros en la taxonomía al nivel de la especie. Afortunadamente, caracteres moleculares también podrían ofrecer una solución al problema, y estamos en el proceso de investigar tales caracteres.

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MARIPOSAS DIURNAS (LEPIDOPTERA: PAPILIONOIDEA Y HESPERIOIDEA) DE LA RESERVA PRIVADA OSUNUNÚ-PARQUE PROVINCIAL TEYÚ CUARÉ Y ALREDEDORES DE SAN IGNACIO, PROVINCIA DE MISIONES, ARGENTINA

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Abstract - During nine field trips from December 2008 to September 2010, 357 species of butterflies were found at Argentina's Teyú Cuaré Provincial Park and Osununú private reserve, in the Interior Atlantic Forest biome. A list of these species is presented here, representing the first list of Lepidoptera from southern Misiones. A number of species typical of Brazilian and Paraguayan cerrado vegetation, such as *Eurytides dolicaon deicoon*, *Aricoris* aff. *colchis* and *Cogia hassan evansi*, were found in this study. This suggests a possible movement of these species from northern latitudes through gallery forests along the Paraná river. The species *Napaea eucharila* (Bates, 1867) and *Pompeius dares* (Plötz, 1883) are new records for the country. Additional species should eventually be recorded, especially within grassland on the outskirts of Osununú reserve, when we expand our sampling efforts to other times throughout the year.

Key words: Biodiversity, Butterflies, Cerrado, Conservation, Misiones, Osununú, Teyú Cuaré.

RESUMEN.- Durante nueve viajes de campo realizados entre Diciembre 2008 y Septiembre 2010 se registraron 357 especies de mariposas en el Parque Provincial Teyú Cuaré y la reserva privada Osununú (Argentina), correspondientes al bioma Bosque Atlántico Interior. El listado de tales especies se presenta aquí, siendo el primer listado de Lepidoptera del sector sur de Misiones. Varias especies típicas del cerrado Brasileiro y Paraguay, tales como *Eurytides dolicaon deicoon*, *Aricoris* aff. *colchis* y *Cogia hassan evansi*, fueron encontradas en el presente estudio, lo cual sugiere un posible movimiento de estas especies desde latitudes norteñas a través de bosques de galería a lo largo del río Paraná. Las especies *Napaea eucharila* (Bates, 1867) y *Pompeius dares* (Plötz, 1883) son nuevos registros para el país. Especies adicionales serán registradas eventualmente, especialmente en el área de pastizales localizada en los alrededores de la reserva privada Osununú, ya que hubo varios meses en que no se visitó la zona.

PALABRAS CLAVE: Biodiversidad, Mariposas, Cerrado, Conservación, Misiones, Osununú, Teyú Cuaré.

INTRODUCCION

La conservación de la biodiversidad se ha convertido en un objetivo común entre las distintas naciones y culturas del mundo. El deterioro del ambiente por la utilización inadecuada de los recursos naturales, origina a su vez la pérdida de la diversidad biológica, siendo una carrera contra el tiempo conocer que diversidad tenemos y en qué estado se encuentra. A través de los inventarios biológicos es posible evaluar la riqueza de especies, su distribución o si la disminución de la abundancia de las especies es debida a posibles factores antrópicos que afectan el ecosistema. Por lo tanto, la información generada es de gran importancia para la creación de programas de conservación dirigidos a ecosistemas prioritarios como lo es el Bosque Atlántico. El Bosque Atlántico, llamado localmente selva Paranaense o Misionera, es uno de los ecosistemas de mayor biodiversidad. Sin embargo, este ecosistema se encuentra altamente fragmentado lo cual lo hace un lugar de alta prioridad para la conservación. La protección de este Bosque, además de preservar la biodiversidad como tal, permitirá también conservar la diversidad de las mariposas. Estos insectos han sido sugeridos como excelentes bioindicadores del estado de perturbación

ecológica y grado de conservación de los ambientes húmedos tropicales (Brown, 1991; DeVries *et al.* 1997). Así mismo, el estudio de las comunidades y poblaciones de determinadas especies de mariposas a lo largo del tiempo puede ofrecer información importante para ejecutar medidas urgentes antes de que los efectos de perturbación ambiental sean irreversibles (Uehara Prado *et al.*, 2004).

La reserva privada Osununú está localizada en el departamento de San Ignacio, al sudoeste de la provincia de Misiones, abarcando 174 hectáreas de ecosistemas de gran valor biológico. El Parque Provincial Teyú Cuaré y la reserva Osununú se encuentran a unos 8 km de la localidad de San Ignacio, donde se ubican las famosas ruinas jesuíticas de San Ignacio Mini (Fig. 1). La topografía particular de la región, junto con las características del suelo y del clima, originaron un hábitat que permitió el desarrollo de especies vegetales que se encuentran solo en esta región de la Argentina, siendo algunas de ellas especies endémicas.

En el presente estudio se muestra un listado de especies de mariposas del área, con comentarios acerca de algunas especies de distribución restringida. Este trabajo fue realizado dentro del marco del proyecto de conservación de mariposas, de la Fundación Temaikén.

MÉTODOS

Área de estudio

El Parque Provincial Teyú Cuaré y la reserva privada Osununú, se ubican fitogeográficamente en lo que se denomina la Provincia Paranaense (Cabrera, 1976). Esta provincia abarca casi todo el territorio de Misiones y el extremo nordeste de la Provincia de Corrientes, continuándose por el este del Paraguay y Brasil (Chébez, 2005). La Provincia Paranaense pertenece a lo que Cabrera y Willink (1980) denominan Provincia Biogeográfica Paranaense, comprendiendo ésta el extremo Sur de Brasil, al Oeste de la Serra do Mar, hasta el centro de Río Grande do Sul, el extremo nordeste de la Argentina y el Este del Paraguay. El Bosque Atlántico Interior se considera que en su porción Argentina sólo incluye dos distritos: a) Distrito de las Selvas mixtas, y b) Distrito de los Campos. El Distrito de las Selvas mixtas ocupa casi toda Misiones, continuándose hacia el sur formando angostas galerías a lo largo de los ríos Paraná y Uruguay, mientras el de los campos se ubica al sur de Misiones, continuándose extensamente en la vecina provincia de Corrientes (Cabrera, 1976).

La reserva privada Osununú (S 27° 17' 00"; W 55° 34' 45") pertenece a la Fundación Temaikén y tiene como objetivo preservar ecosistemas de gran valor biológico. Osununú limita al oeste con las 78 hectáreas del Parque Provincial Teyú Cuaré, el cual fue creado en 1991 para conservar este paisaje geológico inusual. Al oeste y al norte limita con el río Paraná, el cual la separa de la República del Paraguay. Hacia el este limita con un emprendimiento recreativo privado (Club del Río) y al sur con otras propiedades privadas.

El clima es subtropical sin estación seca y la precipitación ronda los 1.700 mm anuales. El paisaje de esta zona es ondulado y geomorfológicamente pertenece a la sierra de Amambay de Paraguay. Este tipo de suelo, llamado areniscas, sólo se encuentra en la Argentina en los alrededores de San Ignacio y en áreas ubicadas en el sudeste de la Provincia de Misiones (Fontana, 1996). La vegetación de esta zona comprende pastizales en suelos arenosos, bosques sobre afloramientos de areniscas que bajan hacia el Paraná, comunidades rupícolas sobre las paredes rocosas de los afloramientos rocosos y pajonales de zonas bajas y húmedas cercanas al río Paraná (Teruggi, 1970).

Una de las características principales de esta área es la presencia de afloramientos rocosos, denominados localmente peñones, muchos de los cuales avanzan sobre el Paraná. Los mismos alcanzan una altura de entre 120 y 216 m (Chébez, 2005) (Figs. 2 y 3). También sobresalen por su importancia conservacionista los pastizales, ubicados al sudoeste de San Ignacio, entre el arroyo Yabebiry y el río Paraná, en una superficie de lomadas bajas y redondeadas, donde se destaca una palmera enana, el Pindocito (*Allagoptera campestris*) junto a los bosquecillos de Urunday Blanco (*Acosmium subelegans*), ambas plantas en Argentina restringidas a solo ésta parte del país (Fontana, 2005). (Fig. 4)

Biganzoli & Múlgura de Romero (2004) identificaron para Teyú Cuaré 659 especies de plantas vasculares, incluyendo 4 plantas endémicas para la región y 19 plantas que crecen sólo en esta parte de Argentina. Esto confirma la gran riqueza de especies y la singularidad de la flora de este sitio. Sin embargo,

en Osununú se estima habría más riqueza total de especies pues contiene mayor diversidad de ambientes naturales (M. Munno, com. pers.).

Muestreo

Se realizaron 9 campañas estacionales de entre 3 y 5 días de duración cada una en las siguientes fechas: 9 a 11/12/2008; 3 a 5/3/2009; 3 a 8/9/2009; 13 a 18/10/2009; 23 a 25/11/2009; 29 a 31/3/2010, 23 a 26/4/2010, 15 a 17/8/2010 y 17 a 21/9/2010, para un total de 35 días de esfuerzo de muestreo, aunque en varios de ellos se contó con tiempo nublado, frío o lluvioso, lo que realmente se traduce en menor cantidad de días y horas efectivas de muestreo. Se recorrieron asiduamente los senderos de la Reserva Privada Osununú y el camino de acceso a la misma, hasta llegar inclusive al pastizal de San Ignacio, un ambiente de características muy particulares, el cual no está representado en la reserva. Se recorrió en menor medida el Parque Provincial Teyú Cuaré y los alrededores de San Ignacio, incluyendo el Club del Río, de donde se contó con fotografías de las mariposas tomadas *in situ* por un particular.

Los ejemplares fueron avistados, observados e identificados en el campo, con ayuda de binoculares y anotados en una libreta de campo. Aquellos ejemplares que no pudieron ser identificados en el campo, fueron colectados con el auxilio de una red cazamariposas, colocándolos en sobres. Posteriormente fueron extendidos, etiquetados y almacenados en cajas entomológicas. La técnica Ahrenhölz (Lamas *et al.*, 1993), un método de atracción con papel tissue humedecido y colocado sobre hojas, fue empleada en un sendero selvático de Osununú para atraer ciertos Hesperiidae y en menor medida otras familias del interior selvático que son difíciles de hallar o muestrear a través de otros métodos.

Identificación

Los ejemplares colectados fueron identificados en su mayoría por el primer autor si bien en algunos casos de ciertas especies de las familias Lycaenidae, Riodinidae y Hesperiidae se contó con la ayuda de especialistas (Robert K. Robbins, Curtis C. Callaghan, Olaf H. H. Mielke y Andy Warren respectivamente).

Los especímenes adquiridos durante el proyecto serán depositados en la colección del Instituto Superior de Entomología "Dr. Abraham Willink" (INSUE), Facultad de Ciencias Naturales e Instituto Miguel Lillo, Universidad

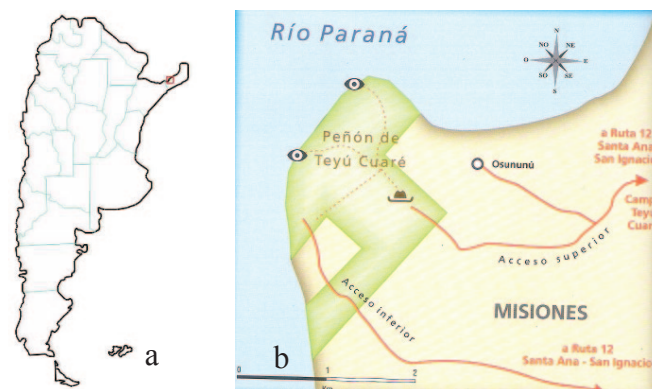


Fig. 1. a) Situación relativa en Argentina. b) Área de estudio.

Nacional de Tucumán.

La bibliografía utilizada para la identificación de las especies fue la siguiente: Hayward (1948, 1950, 1964, 1967), Brown (1992), D'Abbrera (1994, 1995), Tyler *et al.*, (1994) y Canals (2003). El orden sistemático de las especies sigue a Lamas (2004) y Mielke (2005), con algunas modificaciones de obras posteriores. Las especies que poseen un * no están citadas para Argentina en Hayward (1973) ni en Canals (2003). Todas las imágenes fueron tomadas por el primer autor, excepto la Fig. 5.

RESULTADOS Y DISCUSION

Este trabajo es el primer inventario intensivo publicado sobre las mariposas del sur de la provincia de Misiones, área donde no se tenía registro específico de su fauna de mariposas. El área más cercana con un inventario de mariposas publicado es Iberá, Corrientes (Bar *et al.*, 2008), pero con ambientes bastante diferentes (pastizales, palmares, lagunas e isletas de selva) y con solo un listado preliminar de 45 especies de mariposas diurnas, cifra correspondiente a solo un año de muestreos, cuyo número total debería ser mucho mayor.

Del Paraguay no hay información acerca de inventarios de mariposas publicados, con el cual comparar este estudio, hecho agravado por el deterioro ambiental de las selvas remanentes en el este de ese país. El área protegida más cercana y afin (Parque Nacional San Rafael) posee un inventario inédito de su fauna de mariposas diurnas de 225 especies, aunque incompleto (P. Smith, com. pers.).

La cantidad de especies citada en el presente estudio (357) es algo más de la mitad a las halladas en Iguazú (Núñez Bustos, 2009), sin embargo la diversidad de especies fue mayor a lo que se esperaba antes de comenzar el estudio, dada la menor humedad ambiental, menor desarrollo de la selva en esta zona con respecto al norte de la provincia y ambientes algo más abiertos. Es posible igualmente que la riqueza se deba a la continuidad desde latitudes nortenas, de las selvas marginales ubicadas en las barrancas del río Paraná, permitiendo el desplazamiento de especies a través de estos relictos selváticos, que por su pendiente pronunciada, aún se conservan intactas en muchos sitios de Paraguay y Argentina. Si bien la mayoría de las especies halladas vuelan también en el norte de la provincia (Núñez Bustos, 2008; 2009), algunas parecen predominar en las zonas de los pastizales y los campos característicos del sur de Misiones y Corrientes, aunque la mayor parte de las especies son típicas de la selva paranaense (Núñez Bustos, obs. pers.).

El hallazgo de especies como *Eurytides dolicaon deicoon*, *Aricoris aff. colchis* y *Cogia hassan evansi* durante los relevamientos, daría sustento a la idea de que algunas especies parecen tener más relación con la vegetación del cerrado, ambiente propio de Brasil y Paraguay. Todas estas especies fueron vistas varias veces, aunque las dos últimas solo se hallaron en los pastizales cercanos al arroyo Yabebiry. En Osununú fue colectado por Jon Turner un solo ejemplar macho de *Napaea eucharila* (Bates, 1867) (Riodinidae) (Fig. 5), nuevo registro para el país (Hayward, 1973; Canals, 2003; Hall, 2005).

Se hallaron un total de 240 géneros y los que poseen más



Fig. 2. Peñones en costa del río Paraná.



Fig. 3. Peñones cubiertos de selva.



Fig. 4. Campos con pastizales y urunday blanco.

de 5 especies en la zona fueron: *Strymon*, *Adelpha* y *Astrartes* (6 especies), *Dynamine* (7 especies) y *Urbanus* (10 especies). La familia más abundante en especies fue Hesperidae, con 145 especies (40,61 %), siguiéndole Nymphalidae, con 118 especies (33,05 %), Lycaenidae, con 41 especies (11,48 %), Riodinidae, con 22 especies (6,16 %), Pieridae, con 18 especies (5,04 %), y finalmente Papilionidae, con 13 especies (3,64 %). En la familia Papilionidae la especie *Parides anchises nephalion* (Fig. 6) es muy común en todo Misiones, y en el área es vista casi todo el año (posiblemente debido a la abundancia de *Aristolochia triangularis*, planta hospedadora de la oruga).

En Pieridae sobresale *Pieriballia viardi molione* (Fig. 7), presente gran parte del año y la cual vuela en el interior y adyacencias de la selva, posando a menudo en flores rojas por breves instantes. Esta posee un vuelo veloz a media altura, siendo frecuente ver ejemplares de ambos sexos revoloteando juntos.

La mayoría de los Lycaenidae son escasos, hecho comprobado en zonas cálidas, dado la enorme cantidad de especies, los hábitos de muchos de ellos y en especial, su pequeño tamaño. *Aubergina vanessoides*, especie bastante frecuente en la zona, se halló en flores menudas de bordes y claros de selvas y capueras (Fig. 8).

En el caso de Riodinidae, *Synargis axenus ochrophlegma* (Fig. 9) es una especie que si bien vuela en muchas otras provincias del país, es muy escasa usualmente (Volkman & Núñez Bustos, 2010). En la zona fue hallada en uno de los miradores de Osununú y en menor medida en los pastizales de San Ignacio. Es muy variable en coloración, existiendo en la misma población fenotipos amarillos y otros anaranjados. Es muy pasiva, posando en el suelo o en el envés de hojas con alas abiertas, volando rápidamente a su encuentro en cuanto pasa un ejemplar de su misma especie. Las hembras son mucho más pasivas, estando gran parte del tiempo posadas en la vegetación.

Con respecto a la familia Nymphalidae, los representantes de la subfamilia Satyrinae son bastante numerosos, como corresponde a todas las zonas cálidas y húmedas. Se destaca en el área *Moneuptychia soter* (Fig. 10), la cual vuela en sectores soleados de bordes y claros de selvas, posando en el suelo a menudo y asoleándose con alas abiertas sobre el suelo. Sobre esta especie, en un sitio cercano (Cerro Santa Ana) en agosto de 2010 el primer autor vió y escuchó a un individuo emitir sonido mientras volaba al costado de un camino. Dicha observación recuerda la efectuada previamente en setiembre de 1996 en la Reserva Natural Estricta San Antonio (una de las pocas reservas de ese tipo con árboles de *Araucaria angustifolia* en Misiones), ubicada en el nordeste de Misiones, donde se observó a dos ejemplares de *Moneuptychia griseldis* emitiendo sonido mientras revoloteaban y daban vueltas en el aire. Dada la coincidencia en el período del año en que se efectuaron las observaciones de los sonidos en ambas áreas, quizá localmente en esa época solo produzcan sonido con fines territoriales o reproductivos (ya que es algo muy infrecuente de notar). Sin embargo, es interesante recalcar que el género *Moneuptychia* no tenía antecedentes al respecto, estando citados solo los géneros *Pharneuptychia* e *Ypthimoides* en Satyrinae, ambos registros en Brasil (Kane, 1982; Murillo, 2006).

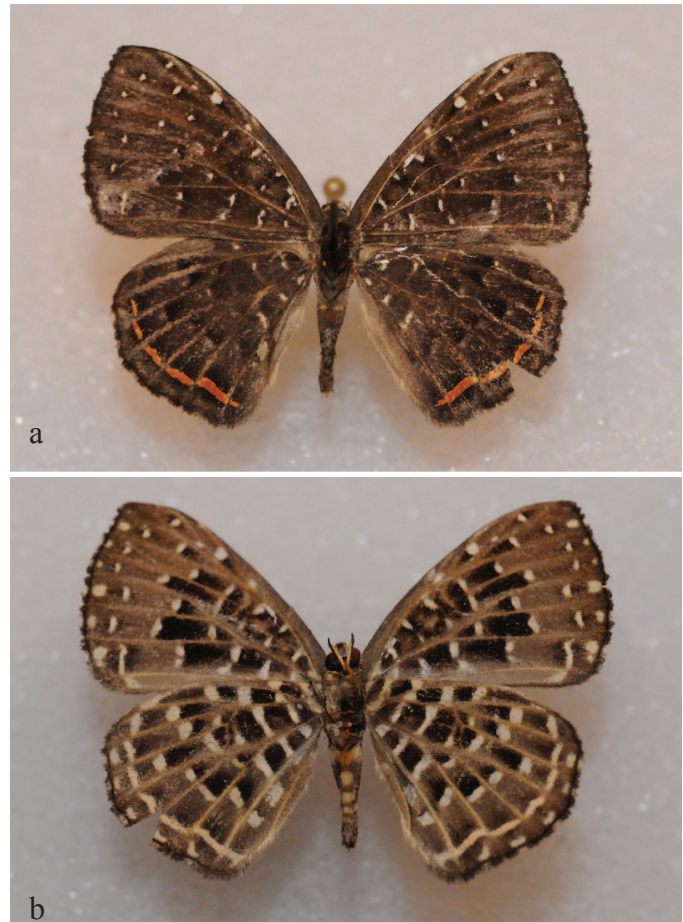


Fig. 5. *Napaea eucharila* macho, a) faz dorsal; b) faz ventral.

De los Hesperidae sobresale la ya nombrada *Cogia hassan evansi* (Fig. 11), propia del pastizal, no volando aparentemente en la selva, tal como la mayoría de las especies de ese género. Dicha especie es propia de ambientes del Cerrado en Bolivia, Brasil y Paraguay, si bien en Misiones no es éste en el único sitio donde vuela. En el pastizal es bastante frecuente observarla posándose en perchas y pequeñas flores, siempre en sitios soleados. Comparte su hábitat con *Cogia calchas* y *Viola minor*. En el mismo ambiente vuela *Pompeius dares* (Fig. 12), muy ligada también a ambientes de pastizal del cerrado en Brasil (O. Mielke, com. pers.) y que recientemente fue hallada por ENB en ambientes de pastizales y palmares en el Parque Nacional El Palmar (Provincia de Entre Ríos), sitio ubicado bastante más hacia el sur. Esta especie no contaba con citas para el país según la bibliografía. Otra especie que se destaca de esta familia por su belleza es *Synale hylaspes* (Fig. 13), la cual vuela en el interior y la periferia de selvas y capueras. En el área es muy frecuente, llamando la atención sus ojos rojo carmín, a pesar de que no parece ser una especie crepuscular. Normalmente posa en el suelo o sobre hojas bajas, pero no por mucho tiempo, siendo bastante arisca y de vuelo muy veloz. La larva está citada sobre *Syagrus romanzoffiana*, palmera muy común en el área.

El número de especies identificadas en este trabajo, en un período tan corto de tiempo, permite estimar una diversidad total mayor de especies para el área (quizás 400 o más). Se espera el descubrimiento de varias especies adicionales, más



Fig. 6. *Parides anchises nephalion*.



Fig. 7. *Pieriballia viardi molione*.



Fig. 8. *Aubergina vanessoides*.

aún teniendo en cuenta la zona de los pastizales ubicada en las afueras de la reserva, con especies propias de ese ambiente.

Sería importante tratar de conectar áreas privadas con porciones de selva, adyacentes a la Reserva Privada Osununú y el Parque Provincial Teyú Cuaré, con los campos ubicados en las cercanías de San Ignacio, con la intención de asegurar a perpetuidad la conservación de esta masa boscosa de gran interés ecológico y natural.

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Fig. 9. *Synargis axenus ochrophlegma*.Fig. 10. *Moneuptychia soter*.Fig. 11. *Cogia hassan evansi*.

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APPENDIX: LISTADO DE ESPECIES HALLADAS EN EL ÁREA DE ESTUDIO

SUPERFAMILIA PAPILIONOIDEA**FAMILIA PAPILIONIDAE****Subfamilia Papilioninae****Tribu Leptocerini**

-*Eurytides dolicaon deicoon* (C. Felder & R. Felder, 1864)

-*Mimoides lysithous rurik* (Eschscholtz, 1821)

-*Protesilaus stenodesmus* (Rothschild & Jordan, 1906)

Tribu Troidini

-*Battus polydamas polydamas* (Linnaeus, 1758)

-*Battus polystictus polystictus* (Butler, 1874)

-*Parides agavus* (Drury, 1782)

-*Parides anchises nephalion* (Godart, 1819)

-*Parides neophilus eurybates* (Gray, [1853])

Tribu Papilionini

-*Heraclides anchisiades capys* (Hübner, [1809])

-*Heraclides androgeos laodocus* (Fabricius, 1793)

-*Heraclides astyalus astyalus* (Godart, 1819)

-*Heraclides hectorides* (Esper, 1794)

-*Heraclides thoas brasiliensis* (Rothschild & Jordan, 1906)

FAMILIA PIERIDAE**Subfamilia Dismorphiinae**

-*Pseudopieris nehemia nehemia* (Boisduval, 1836)

-*Dismorphia astyocha* Hübner, [1831]

-*Enantia lina psamathe* (Fabricius, 1793)

Subfamilia Coliadinae

-*Colias lesbia lesbia* (Fabricius, 1775)

-*Anteos clorinde* (Godart, [1824])

-*Phoebis argante argante* (Fabricius, 1775)

-*Phoebis neocypris neocypris* (Hübner, [1823])

-*Phoebis philea philea* (Linnaeus, 1763)

-*Phoebis sennae marcellina* (Cramer, 1777)

-*Rhabdodryas trite banksi* (Breyer, 1939)

-*Aphrissa statira statira* (Cramer, 1777)

-*Pyrisitia leuce leuce* (Boisduval, 1836)

-*Pyrisitia nise tenella* (Boisduval, 1836)

-*Eurema albula sinoe* (Godart, 1819)

-*Eurema elathea flavescens* (Chavannes, 1850)

Subfamilia Pierinae**Tribu Pierini**

-*Glutophrissa drusilla* (Cramer, 1777)

-*Pieriballia viardi molione* (Fruhstorfer, 1908)

-*Ascia monuste orseis* (Godart, 1819)

FAMILIA LYCAENIDAE**Subfamilia Theclinae****Tribu Eumaeini**

-*Paiwarria venulius* (Cramer, 1779)

-*Paiwarria aphaca* (Hewitson, 1867)

-*Atlides polybe* (Linnaeus, 1763)

-*Pseudolycaena marsyas* (Linnaeus, 1758)

-*Evenus latreillii* (Hewitson, 1865)

-*Denivia hemon* (Cramer, 1775)

-*Rekoa palegon* (Cramer, 1780)

-*Arawacus separata* (Lathy, 1926)

-*Arawacus ellida* (Hewitson, 1867)

-*Ocaria thales* (Fabricius, 1793)

-*Chlorostrymon simaethis* (Drury, 1773)

-*Chlorostrymon telea* (Hewitson, 1868)

-*Cyanophrys acaste* (Prittitz, 1865)

-*Badecla badaca* (Hewitson, 1868)

-*Camissecla* sp. *

-*Ziegleria hesperitis* (Butler & H. Druce, 1872)

-*Calycopis calus* (Godart, [1824])

-*Calycopis caulonia* (Hewitson, 1877)

-*Calycopis gentilla* (Schaus, 1902)

-*Calycopis* sp.

-*Strymon eremica* (Hayward, 1949)

-*Strymon mulucha* (Hewitson, 1867)

-*Strymon cestri* (Reakirt, [1867])

-*Strymon bazochii* (Godart, [1824])

-*Strymon eurytulus* (Hübner, [1819])

-*Strymon megarus* (Godart, [1824])

-*Tmolus echion* (Linnaeus, 1767)

-*Ministrymon azia* (Hewitson, 1873)

-*Siderus giapor* (Schaus, 1902)

-*Ostrinotes sophocles* (Fabricius, 1793)

-*Strephonota ambrax* (Westwood, 1852)

-*Strephonota jactator* (H. H. Druce, 1907)

-*Panhiades phaleros* (Linnaeus, 1767)

-*Parrhasius polibetes* (Stoll, 1781)

-*Parrhasius orgia* (Hewitson, 1867)

-*Aubergina vanessoides* (Prittitz, 1865)

-*Celmia celmus* (Cramer, 1775)

-*Dicya carnica* (Hewitson, 1873)

-*Symbiopsis strenua* (Hewitson, 1877)

Subfamilia Polyommatae**Tribu Polyommataini**

-*Leptotes cassius cassius* (Cramer, 1775)

-*Hemiargus hanno hanno* (Stoll, 1790)

FAMILIA RIODINIDAE**Subfamilia Euselasiinae****Tribu Euselasiini**

-*Euselasia brevicauda* Lathy, 1926

-*Euselasia geon* Seitz, 1913

Subfamilia Riodininae**Tribu Mesosemiini**

-*Mesosemia odice* (Godart, [1824])

-*Leucochimona icare matatha* (Hewitson, 1873)

-*Napaea eucharila* (Bates, 1867) *

-*Cremna alector* (Geyer, 1837)

Tribu Eurybiini

-*Alesa prema* (Godart, [1824])

Tribu Riodinini

-*Nothome erota angellus* Stichel, 1910

-*Barbicornis basilis mona* Westwood, 1851

-*Chamaelimnas briola meridionalis* Lathy, 1932

-*Calephelis aymarana* McAlpine, 1971

-*Caria marsyas* Godman, 1903

-*Lasaea agesilas agesilas* (Latreille, [1809])

-*Riodina lyeisca lyeisca* (Hewitson, [1853])

-*Melanis xenia xenia* (Hewitson, [1853])

Tribu Symmachiini

-*Mesene monostigma* (Erichson, [1849])

Tribu Incertae Sedis

-*Emesis diogenia* Prittitz, 1865

-*Emesis russula* Stichel, 1910

-*Emesis ocyptore zelotes* Hewitson, 1872

Tribu Nymphidiini

-*Aricoris* aff. *colchis* (C. Felder & R. Felder, 1865)

-*Synargis calyce* (C. Felder & R. Felder, 1862)

-*Synargis axenus ochrophlegma* (Stichel, 1911)

FAMILIA NYMPHALIDAE**Subfamilia Libytheinae**

-*Libythea carinenta carinenta* (Cramer, 1777)

Subfamilia Danainae**Tribu Danainini**

-*Danaus erippus* (Cramer, 1775)

-*Danaus gilippus gilippus* (Cramer, 1775)

Subfamilia Ithomiinae**Tribu Tithoreini**

-*Tithorea harmonia pseudethra* Butler, 1873

Tribu Mechanitini

-*Mechanitis lysimnia lysimnia* (Fabricius, 1793)

Tribu Methonini

-*Methona themisto themisto* (Hübner, 1818)

Tribu Napeogenini

-*Epityches eupome* (Gayer, 1832)

Tribu Ithomiini

-*Placidina euryanassa* (C. Felder & R. Felder, 1860)

Tribu Dircennini

-*Dircenna dero celtina* Burmeister, 1878

-*Episcada hymenaea hymenaea* (Prittitz, 1865)

-*Episcada sylvo* (Geyer, 1832)

-*Pteronymia carlia* Schaus, 1902

Tribu Godyridini

-*Mcclungia cymo salonina* (Hewitson, 1855)

-*Pseudoscada erruca* (Hewitson, 1855)

Subfamilia Morphinae**Tribu Morphini**

-*Morpho aega aega* (Hübner, [1822])

-*Morpho helenor achillides* C. Felder & R. Felder, 1867

Tribu Brassolini

-*Brassolis sophorae vulpeculus* Stichel, 1902

-*Caligo illioneus pampeiro* Fruhstorfer, 1904

-*Dynastor darius ictericus* Stichel, 1904

-*Opsiphanes invirae amplificatus* Stichel, 1904

Subfamilia Satyrinae**Tribu Elymniini**

-*Manataria hercyna hercyna* (Hübner, [1821])

Tribu Satyrini

-*Praepedaliodes phanias* (Hewitson, 1862)

-*Cissia terrestris* (Butler, 1867)

-*Forsterinaria quantius* (Godart, [1824])

-*Godartiana muscosa* (Butler, 1870)

-*Hermeuptycha hermes* (Fabricius, 1775)

-*Magneuptychia pallemma* (Schaus, 1902)

-*Moneuptychia soter* (Butler, 1877)

-*Pareuptychia summandosa* (Gosse, 1880)

-*Parythimoides eous* (Butler, 1867)

-*Parythimoides phronius* (Godart, [1824])

-*Parythimoides poltys* (Prittitz, 1865)

-*Parythimoides* sp. aff. *sylvina* (C. Felder & R. Felder, 1867) *

-*Pharneuptychia phares* (Godart, [1824])

-*Splendeuptychia libitina* (Butler, 1870)

-*Taygetis kerea* Butler, 1869

-*Taygetis laches marginata* Staudinger, [1887]

-*Taygetis tripunctata* Weymer, 1907

-*Taygetis yphthima* Hübner, [1821]

-*Yphthimoides affinis* (Butler, 1867)

-*Yphthimoides mimula* (Hayward, 1954)

-*Yphthimoides* [n. sp.] Freitas, MS

Subfamilia Charaxinae**Tribu Anaeni**

-*Hypna chlytemnestra huebneri* (Cramer, 1777)

-*Zaretis isidora* (Cramer, 1779)

-*Fountainea ryphea phidile* (Geyer, 1837)

-*Memphis moruus stheno* (Prittitz, 1865)

Tribu Preponini

-*Archaeoprepona demophon thalpius* (Hübner, [1814])

-*Prepona pylene pylene* (Hewitson, [1854])

Subfamilia Biblidinae**Tribu Biblidini**

-*Marpesia chiron marius* (Cramer, 1779)

-*Biblis hyperia nectanabis* (Fruhstorfer, 1909)

-*Catonephele numilia neogermanica* Stichel, 1899

-*Eunica eburnea* Fruhstorfer, 1907

-*Eunica tatila bellaria* Fruhstorfer, 1908

-*Myscelia orsis* (Drury, 1782)

-*Ectima thecla thecla* (Fabricius, 1796)

-*Hamadryas amphinome amphinome* (Linnaeus, 1767)

-*Hamadryas epinome* (C. Felder & R. Felder, 1867)

-*Hamadryas februa februa* (Hübner, [1823])

-*Hamadryas feronia feronia* (Linnaeus, 1758)

-*Epiphile hubneri* Hewitson, 1861

-*Pyrrhogyra neareta arge* Gosse, 1880
 -*Temenis laothoe meridionalis* Ebert, 1965
 -*Dynamine agacles agacles* (Dalman, 1823)
 -*Dynamine artemisia artemisia* (Fabricius, 1793)
 -*Dynamine athemon athemaena* (Hübner, [1824])
 -*Dynamine coenus coenus* (Fabricius, 1793)
 -*Dynamine myrrhina* (Doubleday, 1849)
 -*Dynamine postverta postverta* (Cramer, 1779)
 -*Dynamine tithia tithia* (Hübner, [1823])
 -*Callicore hydaspes* (Drury, 1782)
 -*Callicore pygas thamyras* (Ménétriés, 1857)
 -*Callicore sorana sorana* (Godart, [1824])
 -*Diaethria candrena candrena* (Godart, [1824])
 -*Diaethria clymena janeira* (C. Felder, 1862)
 -*Haematera pyrame pyrame* (Hübner, [1819])
 -*Paulogramma pyracmon pyracmon* (Godart, [1824])

Subfamilia Apaturinae

-*Doxocopa agathina vacuna* (Godart, [1824])
 -*Doxocopa kallina* (Staudinger, 1886)
 -*Doxocopa laurentia laurentia* (Godart, [1824])
 -*Doxocopa linda mileta* (Boisduval, 1870)

Subfamilia Nymphalinae**Tribu Coeini**

-*Colobura dirce dirce* (Linnaeus, 1758)
 -*Smyrna blomfieldia blomfieldia* (Fabricius, 1781)

Tribu Nymphalini

-*Hypanartia bella* (Fabricius, 1793)
 -*Hypanartia lethe* (Fabricius, 1793)
 -*Vanessa braziliensis* (Moore, 1883)
 -*Vanessa carye* (Hübner, [1812])
 -*Vanessa myrinna* (Doubleday, 1849)

Tribu Kallimini

-*Anartia amathea roeselia* (Eschscholtz, 1821)
 -*Anartia jatrophae jatrophae* (Linnaeus, 1763)
 -*Junonia evarete flirtea* (Fabricius, 1793)
 -*Junonia genoveva hilaris* C. Felder & R. Felder, 1867
 -*Siproeta epaphus trayja* Hübner, [1823]
 -*Siproeta stelenes meridionalis* (Fruhstorfer, 1909)

Tribu Melitaeini

-*Chlosyne lacinia saundersi* (Doubleday, 1847)
 -*Anthanassa frisia hermas* (Hewitson, 1864)
 -*Eresia lansdorfi* (Godart, 1819)
 -*Ortilia dicoma* (Hewitson, 1864)
 -*Ortilia ithra* (W. F. Kirby, 1900)
 -*Ortilia orthia* (Hewitson, 1864)
 -*Ortilia velica durnfordi* (Godman & Salvin, 1878)
 -*Tegosa claudina* (Eschscholtz, 1821)

Subfamilia Limenitidinae**Tribu Limenitidini**

-*Adelpha falcipennis* Fruhstorfer, 1915
 -*Adelpha malea goyama* Schaus, 1902
 -*Adelpha serpa serpa* (Boisduval, 1836)
 -*Adelpha syma* (Godart, [1824])
 -*Adelpha thessalia indefecta* Fruhstorfer, 1913
 -*Adelpha zea* (Hewitson, 1850)

Subfamilia Heliconiinae**Tribu Argynnini**

-*Euptoieta hegesia meridia* Stichel, 1938
 -*Euptoieta hortensia* (Blanchard, 1852)

Tribu Acraeini

-*Actinote pyrrrha pyrrrha* (Fabricius, 1775)

Tribu Heliconiini

-*Agraulis vanillae maculosa* (Stichel, 1908)
 -*Dione juno juno* (Cramer, 1779)
 -*Dryadula phaetusa* (Linnaeus, 1758)
 -*Dryas iulia alcionea* (Cramer, 1779)
 -*Eueides alipha alipha* (Godart, 1819)
 -*Eueides isabella dianasa* (Hübner, [1806])
 -*Heliconius erato phyllis* (Fabricius, 1775)
 -*Heliconius ethilla narcaea* Godart, 1819
 -*Heliconius ethilla polychrous* C. Felder & R. Felder, 1865

SUPERFAMILIA HESPERIOIDEA**FAMILIA HESPERIIDAE****Subfamilia Pyrrhopyginae****Tribu Passovini**

-*Granila paseas* (Hewitson, 1857)
 -*Myscelus amystis epigona* Herrich-Schäffer, 1869

Tribu Pyrrhopygini

-*Mysoria barcastus barta* Evans, 1951

Subfamilia Pyrginae**Tribu Eudamini**

-*Aguna asander asander* (Hewitson, 1867)
 -*Astraptus alardus alardus* (Stoll, 1790)
 -*Astraptus anaphus anaphus* (Cramer, 1777)
 -*Astraptus aulus* (Plötz, 1881)
 -*Astraptus creteus siges* (Mabille, 1903)
 -*Astraptus elorus* (Hewitson, 1867)
 -*Astraptus fulgurator fulgurator* (Walch, 1775)
 -*Bungalotis midas* (Cramer, 1775)
 -*Celaenorrhinus similis* Hayward, 1933
 -*Chioides catillus catillus* (Cramer, 1779)
 -*Codatractus aminias* (Hewitson, 1867)
 -*Epargyreus clavicornis clavicornis* (Herrich-Schäffer, 1869)
 -*Epargyreus socus socus* (Hübner, [1825])
 -*Narcosius parisi parisi* (R. C. Williams, 1927)
 -*Nascus phocus* (Cramer, 1777)
 -*Phanus australis* L.D. Miller, 1965
 -*Phocides charon* (C. Felder & R. Felder, 1859)
 -*Phocides metrodorus metron* Evans, 1952
 -*Polygonus savigny savigny* (Latreille, [1824])
 -*Polythryx caunus* (Herrich-Schäffer, 1869)
 -*Proteides mercurius mercurius* (Fabricius, 1787)
 -*Urbanus belli* (Hayward, 1935)
 -*Urbanus dorantes dorantes* (Stoll, 1790)
 -*Urbanus doryssus albicuspis* (Herrich-Schäffer, 1869)
 -*Urbanus esmeraldus* (Butler, 1877)
 -*Urbanus esta* Evans, 1952
 -*Urbanus pronta* Evans, 1952
 -*Urbanus proteus proteus* (Linnaeus, 1758)
 -*Urbanus simplicius* (Stoll, 1790)
 -*Urbanus teleus* (Hübner, 1821)
 -*Urbanus virescens* (Mabille, 1877)

Tribu Pyrgini

-*Achlyodes busirus rioja* Evans, 1953
 -*Achlyodes mithridates thraso* (Hübner, [1807])
 -*Aethilla echina coracina* Butler, 1870
 -*Anastrus sempiternus simplicior* (Möschler, 1877)
 -*Anisochoria sublimbata* Mabille, 1883
 -*Antigonus erosus* (Hübner, [1812])
 -*Antigonus liborius areta* Evans, 1953
 -*Bolla atahuallpai* (Lindsey, 1925)
 -*Camptopleura auxo* (Möschler, 1879)
 -*Carrenes canescens pallida* Röber, 1925
 -*Chiomara asychis autander* (Mabille, 1891)
 -*Chiomara mithrax* (Möschler, 1879)
 -*Cogia calchas* (Herrich-Schäffer, 1869)
 -*Cogia hassan evansi* Bell, 1937
 -*Cycloglypha thrasibulus thrasibulus* (Fabricius, 1793)
 -*Ebrietas anacreon anacreon* (Staudinger, 1876)
 -*Gorgythion begga begga* (Prittwitz, 1868)
 -*Gorgythion beggina escalophoides* Evans, 1953
 -*Grais stigmaticus stigmaticus* (Mabille, 1883)
 -*Helias phalaenoides palpalis* (Latreille, [1824])
 -*Heliopetes alana* (Reakirt, 1868)
 -*Heliopetes arsalte* (Linnaeus, 1758)
 -*Heliopetes libra* Evans, 1944
 -*Heliopetes ochroleuca* J. Zikán, 1938
 -*Heliopetes omrina* (Butler, 1870)
 -*Heliopyrgus domicella willi* (Plötz, 1884)
 -*Milanion leucaspis* (Mabille, 1878)
 -*Mylon pelopidas* (Fabricius, 1793)

-*Mylon maimon* (Fabricius, 1775)
 -*Nisoniades bipuncta* (Schaus, 1902)
 -*Nisoniades macarius* (Herrich-Schäffer, 1870)
 -*Nisoniades maura* (Mabille & Boulet, 1917)
 -*Polyctor polyctor* (Prittwitz, 1868)
 -*Pyrgus orcus* (Stoll, 1780)
 -*Pyrgus orcynoides* (Giacomelli, 1928)
 -*Quadrata cerialis* (Stoll, 1782)
 -*Sostrata bifasciata* (Ménétriés, 1829)
 -*Sostrata cronion* (C. Felder & R. Felder, 1867)
 -*Spathilepia clonius* (Cramer, 1775)
 -*Staphylus ascalon* (Staudinger, 1876)
 -*Staphylus melangon epicaste* Mabille, 1903
 -*Staphylus minor* Schaus, 1902
 -*Staphylus musculus* (Burmeister, 1875)
 -*Telemiades amphion marpesus* (Hewitson, 1876)
 -*Trina geometrina geometrina* (C. Felder & R. Felder, 1867)
 -*Viola minor* (Hayward, 1933)
 -*Xenophanes tryxus* (Stoll, 1780)
 -*Zera hyacinthinus servius* (Plötz, 1884)

Subfamilia Hesperinae

-*Anthoptus epictetus* (Fabricius, 1793)
 -*Argon lota* (Hewitson, 1877)
 -*Arita arita* (Schaus, 1902)
 -*Artines aepitus* (Geyer, 1832)
 -*Calpodes ethlius* (Stoll, 1782)
 -*Cobalopsis nero* (Herrich-Schäffer, 1869)
 -*Cobalus virbius hersilia* (Plötz, 1882)
 -*Conga chydrea* (Butler, 1877)
 -*Conga iheringii* (Mabille, 1891)
 -*Corticea lysis potex* Evans, 1955
 -*Cumbre triumviralis* (Hayward, 1939)
 -*Cymaenes gisca* Evans, 1955
 -*Cymaenes laureolus loxa* Evans, 1955
 -*Cymaenes perloides* (Plötz, 1882)
 -*Eprius veleda obrepta* (Kivirikko, 1936)
 -*Evansiella cordela* (Plötz, 1882)
 -*Hylephila phyleus phyleus* (Drury, [1773])
 -*Lento krexoides* (Hayward, 1940)
 -*Lerodea eufala eufala* (W. H. Edwards, 1869)
 -*Libra aligula decia* (Hayward, 1948)
 -*Lycas argentea* (Hewitson, 1866)
 -*Metron oropa* (Hewitson, 1877)
 -*Mnasicles hicetaon* Godman, 1901
 -*Moeris striga striga* (Geyer, 1832)
 -*Morys geisa* (Möschler, 1879)
 -*Neoxeniades scipio scipio* (Fabricius, 1793)
 -*Niconiades caeso* (Mabille, 1891)
 -*Niconiades xanthaphes* Hübner, [1821]
 -*Nyctelius nyctelius nyctelius* (Latreille, [1824])
 -*Panoquina ocola ocola* (W.H. Edwards, 1863)
 -*Paracarystus hypargyra* (Herrich-Schäffer, 1869)
 -*Parphorus decora* (Herrich-Schäffer, 1869)
 -*Perichares lotus* (Butler, 1870)
 -*Perichares philetas adela* (Hewitson, 1867)
 -*Polites vibex catilina* (Plötz, 1886)
 -*Pompeius amblyspila* (Mabille, 1898)
 -*Pompeius dars* (Plötz, 1883) *
 -*Quinta cannae* (Herrich-Schäffer, 1869)
 -*Remella remus* (Fabricius, 1798)
 -*Repens repens* Evans, 1955
 -*Saliana* sp.
 -*Saturmus reticulata conspicuus* (Bell, 1941)
 -*Sodalita coler* (Schaus, 1902)
 -*Synale hylaspes* (Stoll, 1781)
 -*Synapte malitiosa antistia* (Plötz, 1882)
 -*Synapte silius* (Latreille, [1824])
 -*Thargella caura occulta* (Schaus, 1902)
 -*Thespieus aspernatus* Draudt, 1923
 -*Thespieus themides* (Burmeister, 1878)
 -*Thracides cleantes cleantes* (Latreille, [1824])
 -*Tigasis simplex* (Bell, 1930)
 -*Turesis complanula* (Herrich-Schäffer, 1869)

- Vacerra caniola elva* Evans, 1955
- Vacerra evansi* Hayward, 1938
- Vehilius inca* (Scudder, 1872)
- Vehilius stictomenes stictomenes* (Butler, 1877)
- Vertica* sp.
- Vettius lucretius* (Latreille, [1824])
- Vettius marcus marcus* (Fabricius, 1787)
- Vinius pulcherrimus* Hayward, 1934
- Xeniades orchamus orchamus* (Cramer, 1777)
- Zariaspes mys* (Hübner, [1808])
- Zenis jebus jebus* (Plötz, 1882)



Fig. 12. *Pompeius dares*.



Fig. 13. *Synale hylaspes*.

SCIENTIFIC NOTE: *MICTOPSICHIA CUBAE* RECORDED FROM HONDURAS (LEPIDOPTERA: TORTRICIDAE)

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Abstract - *Mictopsichia cubae* Razowski, 2009 is reported from northern Honduras based on specimens collected at Pico Bonito National Park, near La Ceiba. This species was previously known only from two Cuban specimens. Both male and female genitalia are figured, with the female described and illustrated for the first time.

Key words: Tortricoidea, Archipini, telochromatic tortricines, neotropical, diurnal, Parque Nacional Pico Bonito.

The neotropical tortricid genus *Mictopsichia* Hübner was recently revised (Razowski 2009) and transferred to Archipini along with the closely related genera *Mictocommosis* Diakonoff, *Chamaepsichia* Razowski and *Rubropsichia* Razowski, which can be distinguished on the basis of genitalia characters. These small telochromatic or brightly colored moths, like other Archipini, are for the most part diurnal (Razowski & Wojtusiak (2008). *Mictopsichia* is distinguished from related genera by the characteristic orange hindwings with patterns of black and silvery scaling along the anal and terminal margin that extend into the posterior half of the hindwing. *Mictopsichia* currently includes 25 species (Brown 2005, Razowski 2009, Razowski and Pelz 2010), 13 of which were newly described and illustrated in the aforementioned revision along with accounts of other species including the type species *M. hubneriana* (Stoll, 1791). Species previously described by Meyrick are illustrated by Clarke (1969).

Field work conducted in June and November 2009 at Pico Bonito Lodge (PBL), and CURLA (Centro Universitario Regional del Litoral Atlántico) Reserve, Parque Nacional Pico Bonito, La Ceiba, Honduras, as part of a cooperative comprehensive lepidopteran biodiversity survey with Escuela Agricultura Panamerica en Zamorano, CURLA, PBL, and the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, resulted in the collection of two adult specimens of *Mictopsichia cubae* Razowski, 2009. The specimens are the first records of this species for the country and two of four specimens known for the species. Both specimens were collected during the day while searching for larvae, butterflies, and diurnal moths. The present note documents the two new locality records and describes the previously unknown female genitalia.

Institutional and locality acronyms used in the text are as follows:

BMNH – Natural History Museum, London; CURLA – Centro Universitario Regional del Litoral Atlántico, Honduras; EAPZ – Escuela Agricultura Panamerica en Zamorano, Honduras; FLMNH – Florida Museum of Natural History, Gainesville, Florida; MGCL – McGuire Center for Lepidoptera and Biodiversity; PBL – Pico Bonito Lodge, La Ceiba, Honduras; USDA – United States Department of Agriculture; USNM – National Museum of Natural History, Washington, DC; ZIL – Zoological Institute, Academy of Sciences of Cuba, Havana.

Mictopsichia cubae Razowski, 2009 (Figs. 1 & 2a-d)

Material Examined. Holotype ♂, “CUBA (S.E.) Santiago, II, 02. W. SCHAUS. 1905-244”; GS 31697 [BMNH] (examined, JR); CUBA: *Lomas de Soroa*, Pinar del Rio ix.1963 Alayo & Garcia (1 ♂, slide DM 1586) [ZIL]; HONDURAS: Atlantida: Pico Bonito Lodge N15°41'48.00" W86°54'4.40", 28-29.vi.2009 D. Matthews & J. Y. Miller (1 ♂, slide DM 1556) [MGCL]; Parque Nacional Pico Bonito, vicinity Estación CURLA N15°42'07.0" W86°51'16.0" 13.xi.2009 J. Y. Miller, D. Matthews, M. Lehnert, C. Salcedo (1 ♀, slide DM 1569) [MGCL].

Descriptive notes. Head, thorax, and abdomen dark brown. Legs shiny buff with gray scaling on hindleg at tibial spurs and marking tarsi dorsally, light gray ventrally. Forewing length 5.0 mm (♂), 5.5 mm (♀). Holotype ♂ wing expanse about 12 mm. Forewing ground color auburn brown with darker chestnut-brown markings and scattered white scales near middle. Cream colored subapical streak with orange scales basad and curved silvery preapical and subapical fascia. Hindwing orange with small black to chestnut brown patches along margin and posterior half of wing. Silvery scale patches along anal margin and a patch of scattered white scales in cubital area within dark posterior half of wing. Fringe with elongate gray to buff outer scales and shorter spatulate basal scales concolorous with adjacent wing pattern. Forewing venter auburn brown to orange, yellowish toward base, with cream apical streak and three distinct partial dark brown fascia extending from costa. Hindwing ventral surface as on forewing but markings consisting of diffuse chestnut brown patches along outer margin.

Male genitalia. The Cuban holotype as figured and described by Razowski (2009) shows slender tapered and terminally acute socii and valvae somewhat proportionally wider at the base than near middle. The socii are acute in the Honduras specimen (Fig. 2a), but project outward from the focal plane of the image due to the orientation of the genitalia on the slide. Likewise, slight differences in the shape of the valvae at the base appear within variation expected with the different orientation of the preparation. In the Honduran specimen, the valvae appear to be of more uniform width. The aedeagus of the Honduras specimen (Fig. 2b) is oriented with the vesica extended so that the characteristic spatulate plate-like cornutus is laterally oriented with the minute dentate process dorsal, as opposed to ventral in the Holotype slide. A second Cuban specimen [ZIL] was dissected and matches both the Honduras male and the Holotype, especially the spatulate cornutus and dentate process of the aedeagus, as well as the shape of the valvae, transtilla, and socii. The uniform width of the stout aedeagus, together with the shape of the cornutus, and overall shape of the valvae, socii, and saccus differentiate *M. cubae* from its congeners. Other notable characters of this species include a broad, undifferentiated submedian belt (Razowski 2009) and reduced submedian rib on the valvae and a distinct transtilla with a broad rectangular margin medially.

Female genitalia (Fig. 2c,d). Papillae anales petaloid, narrowed anteriorly of connection with posterior apophysis, with dense arrangement of setae on ventral surface. Anterior and posterior apophyses similar in length. Anterior apophyses with short laterally projecting thumb-like appendage about 0.17 from base and transversely aligned with sterigma. Sterigma elongate with moderately sclerotized band. Ostium slightly excavate. Antrum rectangular, slightly longer than wide, anterior with transverse sclerite. Ductus bursae long and narrow, constricted near inception of ductus seminalis at about 0.1 distance from antrum. Corpus bursae ovate, with falciform signum. Anterior margin of



Fig.1. Female *Mictopsichia cubae* collected at CURLA reserve, Parque Nacional Pico Bonito. Dorsal view (above), ventral view (below).

signum serrate. Signum base extended longitudinally on bursa as curved double line of scobinations covering central 0.6 of bursa. Ductus seminals bursalike, posterior half gradually expanded toward ovate distal portion; with narrow tubular extension arising from midpoint. Rounded part of ductus seminalis with microscopic spiculations more pronounced than in corpus bursae.

Life history and habits. Other than the diurnal habits of these moths the biology and early stages are unknown. The two adults from Honduras were collected during the day on low vegetation. The male was observed jumping erratically on the surface of leaves and nearly eluded capture in a vial.

Distribution and Phenology. Adults have been collected in February and September in Cuba and in June and November in Honduras. The genus *Mictopsichia* ranges from Mexico to Brazil (Razowski 2009).

DNA barcode. A 606bp fragment of Mitochondrial Cytochrome Oxidase Subunit 1 (CO1) was obtained from one isolate of legs of the Honduras male specimen, with PCR and sequencing using the forward and reverse primers, LEP-F1, 5'-ATTCAACCAATCATAAAGATAT-3'; and LEP-R1, 5'-TAAACTTCTGGATGTCCAAAAA-3' (Hebert et al. 2004). This sequence has been deposited in the GenBank database and is provided in the appendix. Because of the age of the specimen, the Holotype (BMNH) is unlikely to provide adequate sequence data for comparison and confirmation of the present determination based on morphological characters.

DISCUSSION

Despite the striking coloration of *Mictopsichia* and related genera, the group is poorly represented in most collections, and much remains to be discovered regarding the behavior, life histories, and biogeographic distribution patterns of the group. In resting posture, the bright orange portion of the hindwing is mostly concealed beneath the forewing. This feature, together with the metallic coloration and “eye-spots” as seen in certain species such as *M. jamaicana* Razowski, 2009, suggest a possible startle display. The bright coloration

and markings of the adults, combined with the erratic jumping behavior when evading capture as observed in *M. cubae*, are suggestive of jumping spider mimicry which has been observed in other Lepidoptera (Rota and Wagner 2006). Adult behavior and potential predator evasion tactics in this group merit future study.

Likewise, the early stages and larval habits of these small moths are in need of investigation. Thus far, our only life history data for the group comes from a series of four USNM Venezuelan specimens identified as *Mictopsichia gemmisparsana* (Walker) which were reared from grape (Vitaceae). Label data from these specimens are “Ex. Vitis vinifera / El Valle, Venez. / 13-March-1943 / Lot 43-20941 / C. H. Ballou BBK” same data 24 March 1943, 2 April 1943, and 7 April 1943.

There are a number of lepidopteran taxa shared at the generic and specific level between the West Indies and other areas in the Caribbean Basin. Brown and Razowski have been actively working on the Tortricidae throughout this area, and the discovery of *M. cubae* including a female is of major interest. Whether the current distribution can be attributed to simple dispersal, hurricane activity, human transport, or is of a more ancient origin remains to be determined.

Relatively few species of Tortricidae have been encountered thus far (<18 species) in our night sampling with mercury vapor lamps at Pico Bonito Lodge (June and November, 2009, May and August, 2010), especially considering the world fauna of more than 9,757 species (Baixeras et al. 2010, Brown 2005). We anticipate additional finds as surveys continue, including more specimens and observations of *Mictopsichia* and related genera.

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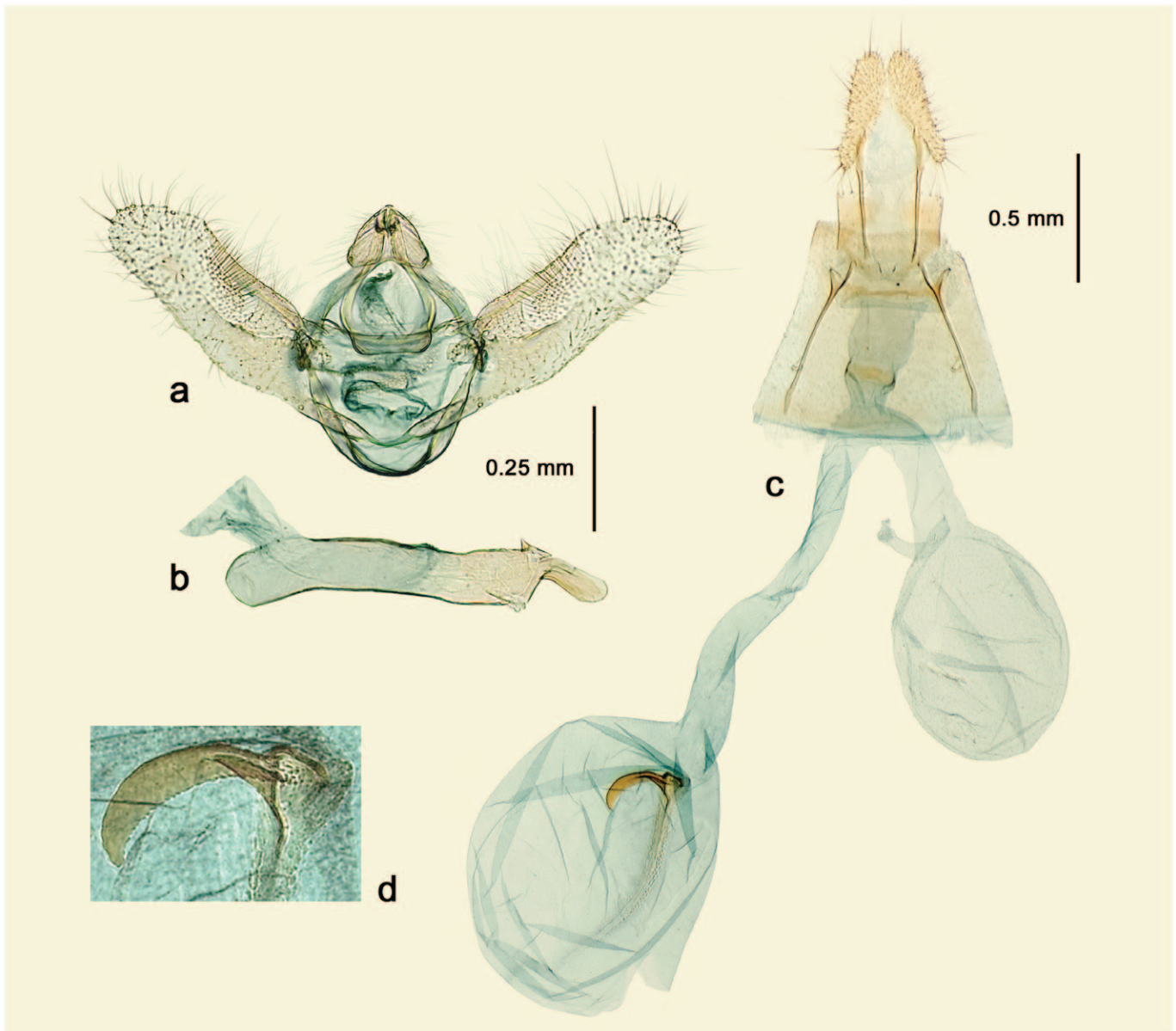


Fig. 2. Genitalia of *Mictopsichia cubae*: a) male, with aedeagus removed, slide DM 1556; b) same individual, aedeagus; c) female genitalia, slide DM 1569; d) enlargement showing detail of signum.

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APPENDIX

GCAGGAATAGTAGGAACCTCTTTAAGATTATTAATTCGTGCTGAATTAGGTTCCACCAG-
 GATCATTAAATGGAGATGATCAAATTTATAACTATTGTAACAGCTCATGCATTATTATA-
 ATTTTTTTATAGTTATACCTATTATAATGGTGGATTGGGTAATTGATTAATCCCTTTA-
 ATATTAGGTGCACCTGATATAGCTTTTCCTCGAATAAATAATAAGATTTTGATTATTAC-
 CACCTTCTATTATACTTTAATTTCTAGAAGAATTGTAGAAAATGGAGCAGGAACAGGA-
 TGAACAGTATACCCCTTCACTAATATTGCTCAIAGTGGAAAGATCTGIAGATTAGC-
 TATTTTTCTTTACATTAGCTGGTATTTCCCTCAATTCAGGAGCAGTAAATTTTACTA-
 CAATCATTAAATACGACCCAATAATATATCATTAGATCAAATACCCCTTTTGTATGAG-
 CAGTTGGAATTACAGCTTTTATTATTATTATCTTTACCAGTATTAGCAGGAGCTATTAC-
 TATTATTAACTGATCGAAATCTTAATACATCATTTCGATCTCGGGAGGAGAGAT