

FIVE NEW SPECIES AND ONE NEW SUBSPECIES
OF BUTTERFLIES FROM THE SIERRA DE BAORUCO
OF HISPANIOLAKURT JOHNSON¹DAVID MATUSIK²

ABSTRACT

Based on collections from 1981-87 in the Las Abejas region of broadleaf forests on the south slope of the Sierra de Baoruco, Pedernales Province, Dominican Republic, five new species and one new subspecies of butterflies are described. These include *Electrostrymon minikyanos*, *Strymon andrewi*, *Heterosmaitia abeja*, and *Leptotes idealus* (Lycaenidae), new species, and *Panoquina ocola distipuncta* (Hesperiidae), new subspecies. *P. hecebolus* Scudder is also documented from the Antilles for the first time. A new genus, *Terra* (Lycaenidae), is erected for a new species *T. hispaniola* and distinguished from its sympatric sister genus *Nesiostrymon* Clench by a numerical cladistic analysis (PAUP). Range disjunctions between Jamaica and southern Hispaniola in *Heterosmaitia* and *Leptotes* are noted in relation to Caribbean tectonic history and vicariance biogeography.

INTRODUCTION

In 1987, The Carnegie Museum of Natural History (CMNH) sponsored an expedition to the remote broadleaf forests on the south slope of the Sierra de Baoruco, in a region called Las Abejas, Pedernales Province, Dominican Republic, for purposes of collecting all groups of diurnal and nocturnal insects. The expedition followed on collections of Lepidoptera at Las Abejas by Matusik (1981-84) and Matusik and Johnson (1985, 1986), when several new species of butterflies were discovered and a number of unusual moths taken at bait. The purpose of this paper is to characterize previously undescribed butterflies from the region and make names available for forthcoming publications on the Antillean fauna.

Recent publications by Albert Schwartz and his colleagues (Schwartz, 1983a, 1983b, in press; Schwartz and Gali, 1984; Schwartz and Miller, 1985; Gali, 1983, 1985; Gonzalez, 1987; Schwartz and Correa, 1986; Schwartz and Sommer, 1986), and the present authors (Johnson and Matusik, 1986; Johnson et al., 1987) have called attention to the diversity of butterfly taxa occurring on Hispaniola and described various new taxa recently discovered on the island. The Sierra de Baoruco region of the southwestern Dominican Republic comprises part of the original "southern paleoisland" of Hispaniola (Gali and Schwartz, 1983; Schwartz and Gali, 1984; Schwartz and Correa, 1986) and thus has a distinctive fauna. Here, in isolated, mesic forests, occur a virtual "who's who" of "rare" and "exceedingly rare" (Riley, 1975) butterflies. Prior to recent work, many of these taxa had seldom been collected (*Battus zetides* Munroe, *Doxocopa thoe* (Godart), *Anetia jaegeri* (Menetries), *Myscelia aracynthia* (Dalman), *Paratrytone batesi* Bell, *Adelpha gal-*

¹ Department of Entomology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024.

² Department of Entomology, Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, Illinois 60605.

Submitted 1 March 1988.

ania (Godart), *Greta diaphana galii* Schwartz, *Calisto raburni* Gali). Recent collections in the region have added some half dozen new species to the Hispaniolan fauna (Schwartz et al., 1983–86, see the ten papers cited above).

Our collections at Las Abejas from 1981–87 have included five new species and one distinctive new subspecies of butterflies. The new taxa are described below as a group, arranged taxonomically by family, with each section reviewed by appropriate specialists (see Acknowledgments and Remarks). Brief introductory sections are provided for each family, noting recent research concerning that group on Hispaniola. Each new species is compared in detail with its congeners and male and female genitalic drawings of all taxa are presented. Since the taxa are described in the context of related congeners, an extensive differential diagnosis is provided before each description, citing the relevant literature. In descriptions we follow Ehrlich and Ehrlich (1961) for wing venation and surface features, incorporating for phylogenetic consistency the CuA (cubitus anterior) notation. For certain genitalic structures peculiar to the Lycaenidae we follow Johnson (1976, 1978, 1988). For specimen depositions the following abbreviations are used: Albert Schwartz Collection (ASC), Allyn Museum of Entomology (AME), American Museum of Natural History (AMNH), Carnegie Museum of Natural History (CMNH), David Matusik Collection (DMC), National Museum of Natural History (NMNH). For certain type specimen designations required by the Code of the International Commission on Zoological Nomenclature we quote verbatim from the citations in Bridges (1988).

Las Abejas

“Las Abejas” (Gali and Schwartz, 1983, Schwartz, in press) is a local name applied as a “transect” designation by Ideal Dominicana S.A. (and formerly by Alcoa Exploration Company) to a sector of land located north of an east/west ridge running directly north and west of Aceitillar (found on most maps), proceeding west toward the Haitian border, and north to the border between the provinces of Pedernales and Independencia, Dominican Republic. In fact, conversations with native people living near the region, indicate that the name is applied in the singular (La Abeja). On some local maps the area is indicated as Fondo de Abeja. In this paper, we use the plural, Las Abejas, to be consistent with prior publications on the region. The mesic broadleaf forests in this transect, which occur as enclaves within and along upland escarpments bordering xeric pine forests, are protected as a National Park under the direct supervision of Ideal Dominicana. The forest at Las Abejas may be reached only by walking some 3–5 km, after proceeding as far as possible by vehicle. The most densely forested portion of Las Abejas, called Fondo de Abeja, lies at the compass coordinates of 18°09'N, 71°38'W and extends from an altitude of approximately 1160 m to 1250 m at the margin with upland pine forest. We note three principal collecting localities at Las Abejas which are characterized by distinctive taxa of both butterflies and moths. We summarize these here to allow brief subsequent reference: (1) “lower Abejas”—elevation 1160 m, at the base of the steep slopes, is the wettest area of the basin and covered with dense forest; collecting is difficult except for small clearings; (2) “middle Abejas”—elevation 1190 m, along an ascending path from lower Abejas, is more interspersed with understory. Areas without canopy are frequent in the region 50–100 m below adjacent, pine-covered ridges; (3) “upper Abejas”—elevation 1250 m, is at the abrupt margin between broadleaf forest and pine woodland where the access trail first begins to descend. This area

is sunny and peppered with flowering blackberry bushes (*Rubus*), a rich nectar source for many butterflies.

TAXONOMIC DESCRIPTIONS

Lycaenidae

New lycaenid butterflies from the Antilles are not entirely unusual. In the Theclinae, Comstock and Huntington (1944) distinguished several Hispaniolan taxa and, more recently, Schwartz and Miller (1985) described the very distinctive *Strymon monopeteinus*. We recently described a new *Tmolus* species from Hispaniola, presently known from only two specimens (Johnson and Matusik, in press). Other taxa, like *Tmolus azia* (Hewitson) have only recently been found on the island (Beck, 1983; Schwartz, in press). In the Polyommatainae, Kaye (1931) differentiated the Jamaican endemic *Leptotes perkinsae* from the more familiar *L. cassius* (Cramer) and *L. marina* (Reakirt).

Hairstreak butterflies occur in low density, are often habitat-specific, and because of their small size, are often overlooked by collectors. Of the five species described below, two have been taken by us on Hispaniola since 1984. Two others were first captured in 1986 and a fifth in 1987.

Theclinae

Genus *Electrostrymon* Clench

Clench (1961) erected this genus with the rather unfortunate type species *Papilio endymion* Fabricius (see Hemming, 1967 [*Evenus*, *Hexuropteris*, *Lycaena*]; Miller, 1978; and Miller and Brown, 1981, concerning confusion regarding this name). Since this species is without an unambiguous type specimen and part of a farflung and highly variable assemblage, it is uninformative as a type species. Riley (1975) used the genus to include a large number of Antillean taxa. Undoubtedly such usage is not monophyletic. In 1986 we collected a small undescribed hairstreak at Las Abejas. As might be expected, its morphology was divergent. Thus, the following description of this species in *Electrostrymon* follows Riley's general concept for the genus and must be considered tentative until *Electrostrymon* is more thoroughly studied.

Electrostrymon minikyanos, new species

Fig. 1A, B; 2A

Diagnosis.—This small hairstreak (forewing expanse 10.0 mm) (Fig. 1A, B) differs markedly from any other *Electrostrymon* species known from the Antilles. Though similar to other *Electrostrymon* taxa in its small size, dark lower surface coloration, and lack of male androconial brand, the species is unique in being markedly dull purplish blue on the hindwing uppersurface and forewing base. The undersurface is most like *E. pan* (Drury) (endemic to Jamaica) (Fig. 1F) with a dark basal disc and medial tripartite band. However, the *Thecla*-spot (sensu Clench, 1961, marginal in cell CuAl) in *E. minikyanos* is not of the huge size that characterizes *E. pan* (Fig. 1F). The limbal area of *E. minikyanos* is heavily grizzled with black, interspersed with distinct white spots and patches based on the anal lobe and across the limbal area. Other Antillean endemics *E. angelia* (Hewitson) (Fig. 1E), *E. dominicana* (Lathy) (Fig. 1C), and *E. angerona* (Godman and Salvin) (Fig. 1D), contrast with *E. minikyanos* in having lavish coloration on the under surface limbal areas. Genitalia of *E. minikyanos* (Fig. 2A) differ markedly from

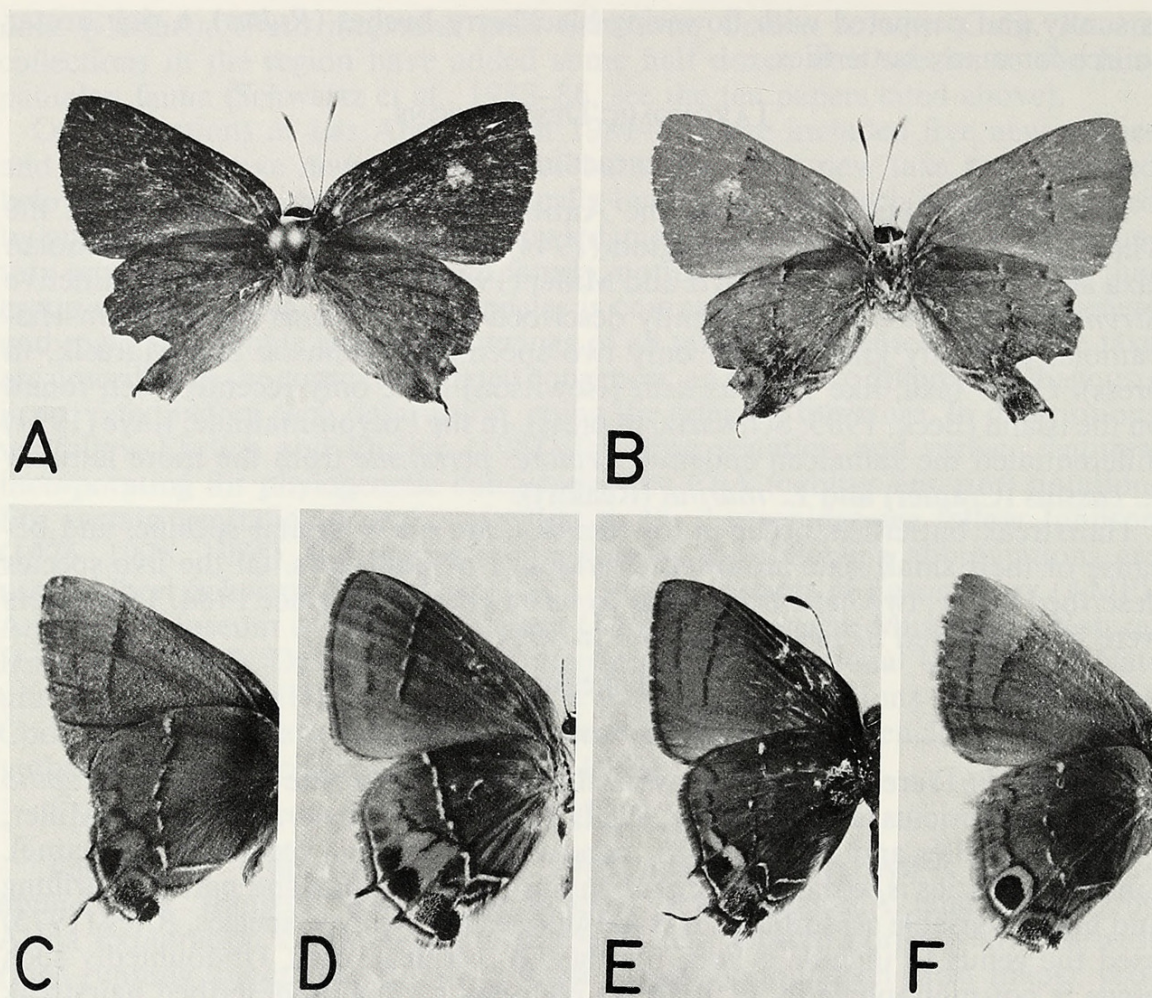


Fig. 1.—LYCAENIDAE. Adults of *Electrostrymon*. A. Upper surface, holotype male, *E. minikyanos*. B. Lower surface, same. C. Lower surface, *E. dominicana*, topotypical male, Canefields, Dominica, 12–16 November 1933, leg. L. E. Chadwick (AMNH). D. Lower surface, *E. angerona*, topotypical male, St. Vincent (AMNH). E. *E. angelia boyeri*, paratype male, Aux Cayes, Haiti, 15–20 March 1922 (AMNH). F. *E. pan*, male, Bellevue, St. Anns, Jamaica, 26 February 1955, leg. B. Heineman (AMNH).

other taxa of *Electrostrymon* (*E. pan*, Fig. 2C, *E. angelia boyeri* (Comstock and Huntington), Fig. 2B) as noted below.

Description.—*Male*. Upper surface of the wings: forewing blackish brown, dull purplish basad. Hindwing dull purplish, submargins distally blackish brown. No androconial brand. Short tail, terminus of vein CuA2. Lower surface of the wings: ground blackish brown. Forewing with median to postmedian blackish line, costa to vein CuA2. Hindwing ground as above, bipartite median line, black basad, white distad. Limbal area with orange *Thecla*-spot, cell CuA1, otherwise grizzled darkly and area strewn with white to whitish patches cells 2A–M3. Length of forewing: 10.0 mm (holotype). *Female*. Unknown. *Male genitalia*. Fig. 2A. Saccus large and triangular, vinculum quite elongate for genus with uncus produced ventro-centrad. Valvae in ventral view with termini rather hook-shaped caudad round and bulbous bilobes (sensu Johnson, 1976, 1978). Aedeagus long, nearly twice length from tip of saccus to labides with single pointed terminal cornutus. A small brush organ extends from the middle of the vinculum to base of labides. *Female genitalia*. Unknown.

Type.—Holotype, male, middle Abejas, 1500 m 1030 hrs, nectaring in sunlight, July 11, 1986, leg. K. Johnson deposited AMNH (AMNH/HS #82).

Remarks.—Behavior of *E. minikyanos*: Four individuals were observed in 1986 but only one collected. The sightings occurred on successive days and led to the

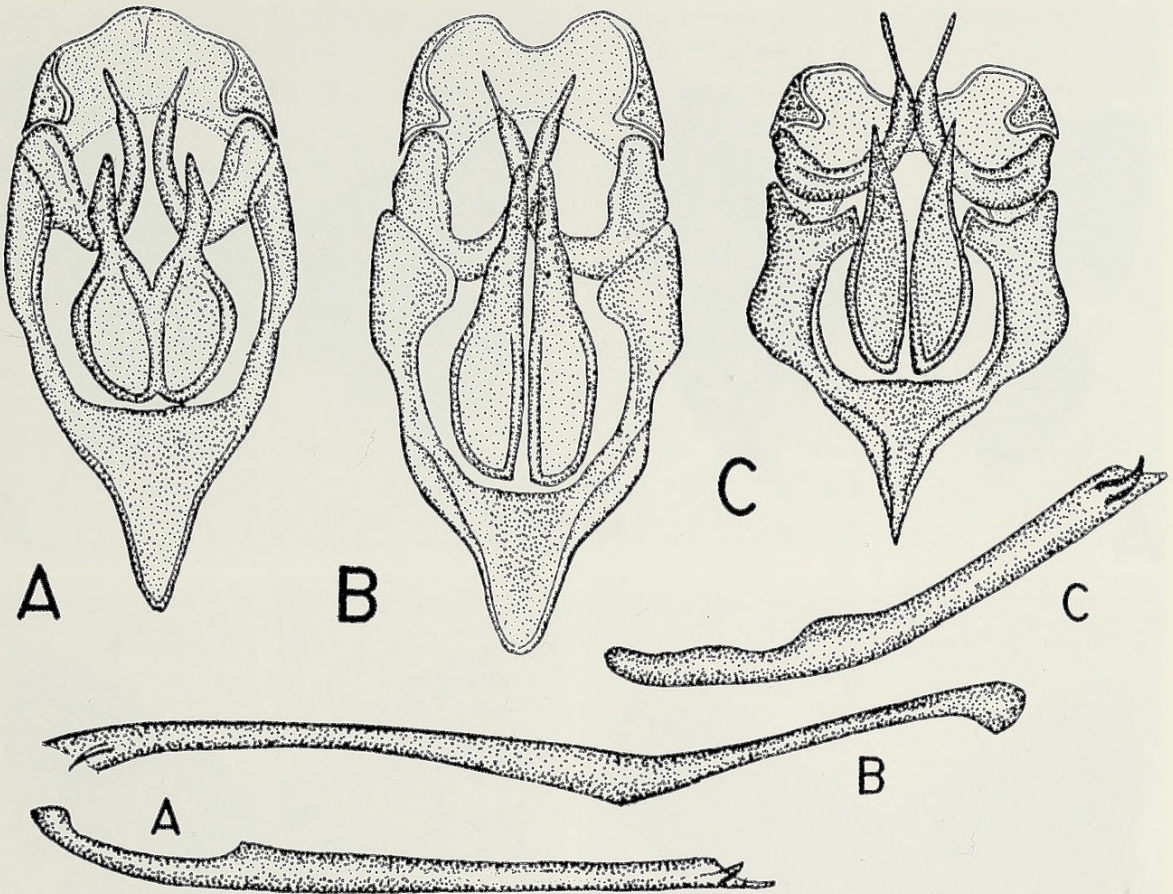


Fig. 2.—LYCAENIDAE. Genitalia of *Electrostrymon*. A–C, male, ventral view with aedeagus removed and placed below (corresponding smaller letters). A. Holotype, *E. minikyanos*. B. *E. angelia boyeri* of Fig. 1. C. *E. pan* of Fig. 1.

increased vigilance necessary to eventually capture the holotype. Individuals observed appeared suddenly from rapid flight to nectar on flowers in a rather xeric clearing of middle Abejas. In contrast to the behavior of *Strymon andrewi* (see below), none returned to a nectar source after being disturbed. The species was not seen in 1987. However, our observation of plant growth and general abundance of certain butterflies suggested that 1987 activity was about two weeks later than that during 1986.

Species status of *E. minikyanos*: No other *Electrostrymon* species or small hairstreak butterfly resembles *E. minikyanos* in wing or genitalic facies. The only other *Electrostrymon* with any blue or violet hue to the upper surface is the female of *E. angelia dowi* (Clench) of the Bahamas. Among Antillean *Electrostrymon*, which *sensu* Riley (1975) appear to be paraphyletic (*E. pan*, at least, being distinctive), *E. minikyanos* does share with *E. angelia* (Fig. 2B) and other “brown” *Electrostrymon* (Riley, 1975, plate 12) the distended condition of the vinculum caudad the saccus. Divergence of facies in *E. minikyanos* is further evidence of probable polyphyly in the Antillean “*Electrostrymon*” as conventionally arranged.

Review: Supplementing general review acknowledged herein, A. Schwartz examined the genitalia of the holotype. Johnson specializes in Theclinae, and he, MacPherson, and Ingraham (1986) have listed taxa examined including dissection of males and females of 359 Nearctic and Neotropical species of 58 genera of the

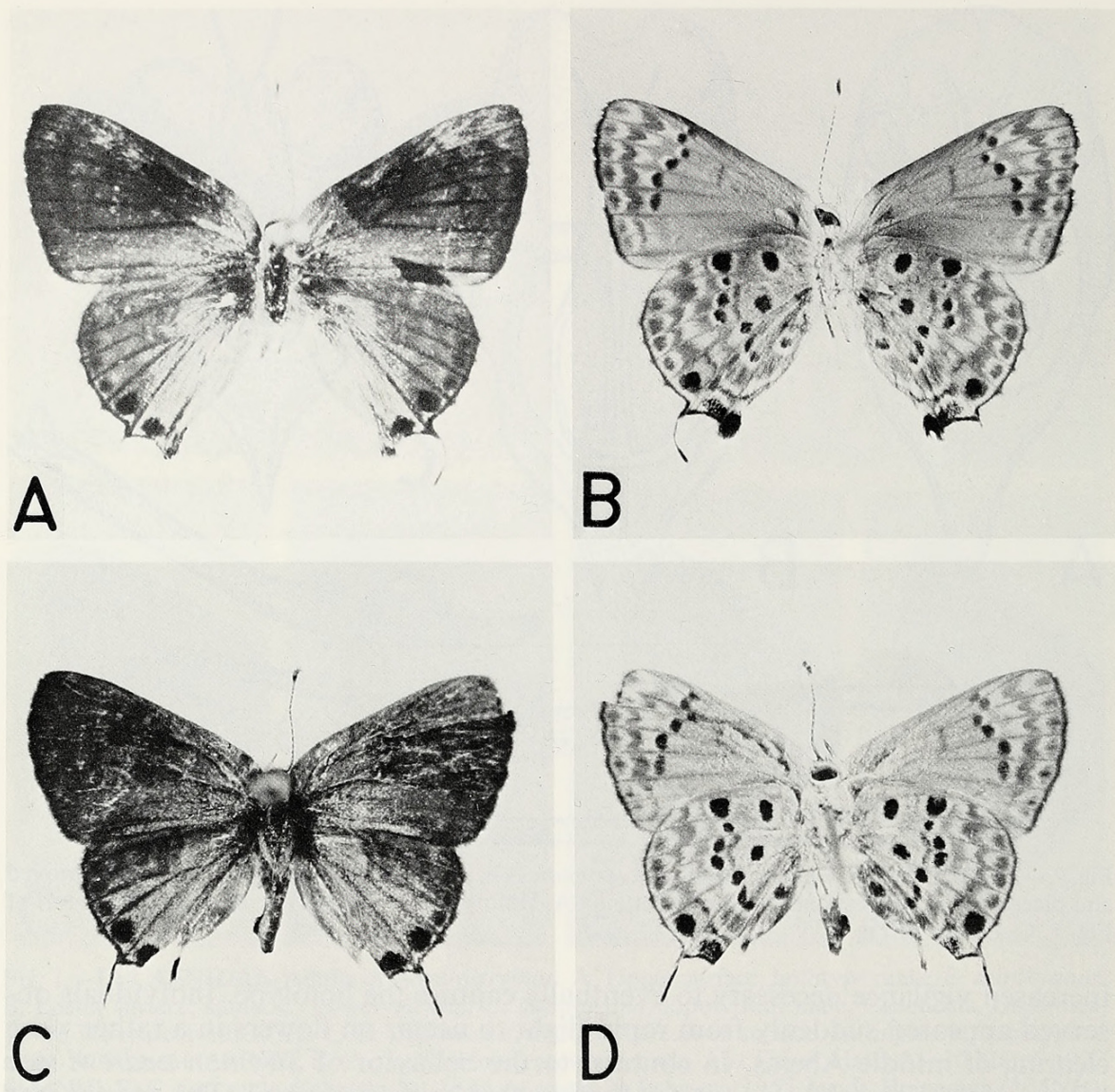


Fig. 3.—LYCAENIDAE. Adults of *Strymon andrewi*. A. Upper surface, holotype male. B. Lower surface, same. C. Upper surface, allotype female. D. Lower surface, same.

eumaeine Theclinae (including 45 species of *Strymon sens. lat.* and *Electrostrymon*). These have served, hereafter, as a basis for Material Examined.

Etymology.—The name combines the Greek prefix *miny* (“small”) and *kyanos* (“blue”), referring to the appearance of the species.

Material examined.—In addition to the material listed in Johnson, MacPherson, and Ingraham (1986), we have been able to compare *E. minikyanos* with the extensive Antillean material of Comstock and Huntington (AMNH) and Clench (CMNH) along with Hispaniolan specimens of Luis Marion Heredia (Santo Domingo, Dominican Republic). Dissections were examined of males and females of the Antillean congeners and comprise AMNH/HS #60, 61 [*E. pan*, data Fig. 1F]; #62, 63 [*E. angelia angelia*, Santiago, Cuba]; #64, 65 [*E. a. boyeri*, data Fig. 1E]; #66, 67 [*E. a. dowi*, Staniard Creek, Andros, Bahamas]; #68, 69 [*E. dominicana*, data Fig. 1C]; #70, 71 [*E. angerona*, data Fig. 1D]; #135, 136 [*E. endymion*, Pichanal, Salta, Argentina; Caldez, Colombia].

Genus *Strymon* Huebner

The unique specimens of *Strymon* captured by us in upland broadleaf forests and adjacent pine woodlands of the Sierra de Baoruco require preliminary com-



Fig. 4.—LYCAENIDAE. Adults of *Strymon* congeners. Upper surface (left), lower surface (right). A. Holotype male, *S. toussainti*, Fond Parisien, Haiti, 11–18 February 1922. B. Paratype female, *S. toussainti*, same data as entry A. C. *S. columella cybira*, male, Fond Parisien, Haiti, 11–18 February 1922 (AMNH). D. *S. columella cybira*, female, San Cristobal, Dominican Republic, 29 January 1961, leg. B. Heineman (AMNH).

ment. It is easy to characterize the population but more difficult to determine taxonomic status. Although having unique characters, the population also exhibits characters of two relatives, the polytypic, pan-Caribbean *S. columella* (Fabricius) and the Hispaniolan endemic *S. toussainti* Comstock and Huntington. The latter two species are sympatric lowland xerophiles. Neither is known from upland habitats of the Sierra de Baoruco. It is possible that the Las Abejas population represents an undifferentiated descendant of populations ancestral to *S. columella* and *S. toussainti*. Despite the intermediate nature of some characters, it is unlikely that this population represents a subspecies of either *S. columella* or *S. toussainti*, because of unique character combinations and the widespread sympatry of *S. columella* with various endemic Antillean *Strymon*. In addition, it seems unlikely that the population reflects conspecificity of those species, because *S. columella* is consistently distinct from endemic congeners, including *S. toussainti*, through-

out the Antilles. Until someone can substantiate taxonomic and biogeographic reasons warranting an omnibus Antillean *Strymon columella*, with allopatric and sympatric subspecies, we have no choice but to treat the upland pine forest Sierra de Baoruco *Strymon* as follows.

Strymon andrewi, new species

Fig. 3A–D, 5A–C, F

Diagnosis.—In the field this species greatly resembles the blue butterfly *Hemiargus ammon* (Lucas) but has a tail! From other hairstreaks, *S. andrewi* is distinctive in having fresh specimens of both sexes bright blue above. This structural coloration (Fig. 3A, C; 5A, B) is brighter than other “blue-above” Antillean *S. limenia* (Hewitson) and *S. christophei* (Comstock & Huntington). Contrasting these two species, however, the under surface of *S. andrewi* is like that characterizing *S. columella cybira* (Hewitson) [Hispaniolan ssp.] (Fig. 4A, C) and *S. toussainti* [Hispaniolan endemic] (Fig. 4A, B), except that the pattern is more spotted and pronounced than on either of those species. Not only does *S. andrewi* have prominent costo-medial hindwing spots like *S. toussainti* (Fig. 4A, B), large spots, cells CuA2 and 2A, are also directed toward the anal margin, where *S. toussainti*’s pattern is mostly obsolescent. The centro-medial spots of the median line in *S. andrewi* are boldly red (as in *S. christophei*), not black. In both sexes *S. andrewi* has prominent marginal spots extending costad on the hindwing; *S. columella* and *S. toussainti* have these spots limited to cells directly adjacent the tail and anal lobe. Fig. 5C, F shows the genitalia of *S. andrewi*, Fig. 5D, E, G, H those of *S. toussainti* and *S. c. cybira*. Comments on their differences are included below. At Las Abejas, *S. andrewi* was taken at 1530–1750 m in mountain crest pine forest and along its margin with mesic broadleaf forest.

Description.—*Male.* Upper surface of the wings: forewing ground color, black to grayish black, blue basad (Fig. 5A); black androconial band at distal edge of discal cell. Hindwing ground color, distally silvery blue, basally darker blue to blackish (Fig. 5A). Lower surface of the wings: ground color, gray-white with variegated gray. Forewing with postmedian line of emphatic black dots, costa to vein 2A, dark slash at end of discal cell and bright white chevrons in the margin and submargin. Hindwing with medial band of seven equally large spots and a darkened slash at end of discal cell just basad this line (first spot black, next four red, last two black). Postbasal area with three large black spots—costad, centrad and in anal area, all boldly ringed with white. Submargin and margin with bright white chevrons. Margin with a black line encircling dark gray marginal spots in each cell interspace; *Thecla*-spot emphatically orange; anal lobe and adjacent cell black. Length of forewing: 11.0 mm. *Female.* Upper surface of wings: similar to male but more silvery blue (Fig. 5B) and lacking androconial brand. Lower surface of the wings: similar to male. Length of forewing: 11.0 mm. *Male genitalia.* Fig. 5C. More similar to *S. columella* (Fig. 5D) than *S. toussainti* (Fig. 5E), with the former and *S. andrewi* having saccus distally inclined, strong ventral recurvature of the aedaeagal terminus, and diminutive brush organs. *S. andrewi* differs from *S. columella* by having an extremely thin vinculum and falces, and widely separated lobes on the labides. *Female genitalia.* Fig. 5F. Resembling *S. columella* (Fig. 5H) most, with a wide, cephalically spiral-shaped ductus. The spiral in *S. andrewi* is smaller, however, and more caudally located. The juncture of the ductus bursae with the cervix bursae exhibits the largest sclerotized hood (*sensu* Johnson, 1976) of any of the species. The ductus bursae of *S. toussainti* (Fig. 5G) is relatively constricted and diminutive.

Types.—Holotype male, upper Abejas 1750 m, 8 km on footpath, Las Abejas transect, NW of Aceitillar, Pedernales Province, Dominican Republic, nectaring in sunlight 1330 hrs, July 16, 1986, leg. D. Matusik; allotype female, same data but 1400 hrs, July 17, 1986, both deposited AMNH (AMNH/HS #83, 84). Paratypes: AMNH—(male) same data as holotype but 1300 hrs, 1530 m in xeric pine/broadleaf margin, nectaring in sunlit opening, July 17, 1986, leg. D. Matusik

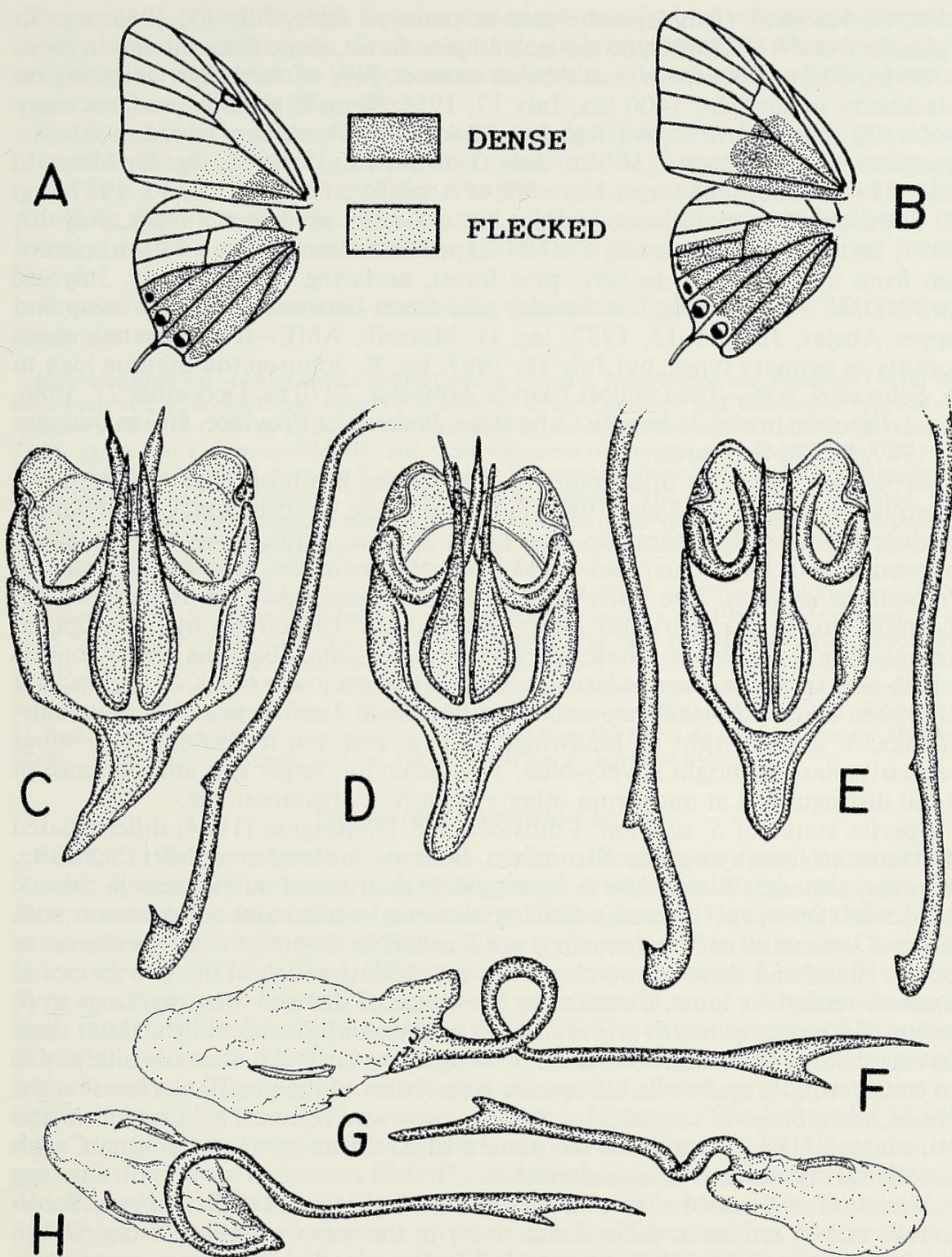


Fig. 5.—LYCAENIDAE. Upper surface structural coloration in *S. andrewi* and genitalia of Hispaniolan *Strymon*. A, B. Extent of upper surface iridescent blue scaling on fresh specimens of *S. andrewi*. A. Male. B. Female. C–E. Male genitalia: left, ventral view of genitalia with aedeagus removed; right, aedeagus, lateral view. C. Holotype, *S. andrewi*. D. *S. c. cybira* of Fig. 4. E. Holotype, *S. toussainti*. F–H. Female genitalia: lateral view of genitalia. F. Allotype, *S. andrewi*. G. Allotype, *S. toussainti*. H. *S. c. cybira* of Fig. 4.

(AMNH/HS #85); (female) same data as paratype male, July 17, 1986, leg. K. Johnson (AMNH/HS #86); (male) upland pine forest, slope from mountain crest, 1780 m, 6 km on footpath, Las Abejas transect, NW of Aceitillar, nectaring on blackberry in sunlight, 1400 hrs, July 17, 1986; (female) data as previous entry but 1520 m, 1430 hrs; (two females) 12 km NW Aceitillar, near Las Abejas, margin with pine forest, 1130 m, July 3, 1984, July 5, 1985, leg. D. Matusik. CMNH—(female) pine forest 1 km NE of Aceitillar, 1430 m, July 17, 1987, leg. K. Johnson; (two males, one female) same locality as primary types, July 15, 1987, leg. K. Johnson; (male) CMNH Expedition Base Camp, 1730 m, circa 4 km from upper Abejas, in xeric pine forest, nectaring on blackberry, July 16, 1987. DMC—(five males, one female) pine forest between 1987 base camp and upper Abejas, July 11–15, 1987, leg. D. Matusik; AME—(two females), same locality as primary types, but July 16, 1987, leg. K. Johnson (on lifetime loan to A. Schwartz). ASC—(two males) 1 km N Aceitillar, 1270 m, December 27, 1986, leg. J. Escobio; (male) 26 km NE Cabo Rojo, Pedernales Province, 800 m, January 2, 1987, leg. A. Schwartz.

Remarks.—Behavior of *S. andrewi*: The species has been observed from numerous captures in 1986 and 1987. Typical of these has been quick flight which, if closely observed, flashes the blue upper surface. Thus, *S. andrewi* is easily construed as a large blue, and could be mistaken in the field for a female of *Hemiargus ammon*. The latter species has not been taken on Hispaniola but *Leptotes cassius* (Cramer) and *Hemiargus thomasi* Clench are frequent upland xerophiles at Las Abejas. These species share the same fabaceous nectar sources which also serve the blues as larval hosts. In contrast to the blues, *S. andrewi* has also been taken on blackberry and other flowers at Las Abejas. Like most hair-streaks, *S. andrewi* rubs its hindwings while at rest, but it also opens its wings regularly, flashing bright silvery-blue. This behavior, larger size and presence of a tail distinguish it at once from other sympatric Polyommatainae.

Species status of *S. andrewi*: Comstock and Huntington (1944) differentiated *S. toussainti* from sympatric *S. c. cybira*. Both are lowland xerophiles (Schwartz, in press) although *S. c. cybira* is more widely distributed on Hispaniola than *S. toussainti* (Schwartz, in press). Placing *andrewi* in trinomial combination with either *S. toussainti* or *S. columella* is not reasonable if both of these species occur on the island and there are no characters to arbitrate which of the two species *S. andrewi* resembles most. Considering the range of distinct wing markings in *S. columella*, *S. toussainti*, *S. limenia*, *S. christophei* and *S. andrewi* (the latter three having distinct structural coloration on wing upper surfaces), the only alternative to considering *S. andrewi* a full species is to return to the pre-1944 view that the entire assemblage is conspecific. Such a view was rejected by Comstock and Huntington (1944) because of the pattern of Antillean sympatry among *C. columella* subspecies and local endemics.

Variation in *S. andrewi* specimens: Preserved specimens of *S. andrewi*, *S. columella* and *S. toussainti* differ distinctively in the way wear affects wing pattern appearance (see Riley, 1975, plates 11, 12). On wing lower surfaces, worn specimens of *S. andrewi* retain both the bold, black-spotted medial bands (traditionally considered characteristic of *S. columella*) and the emphatic basal spots (considered characteristic of *S. toussainti*). Worn specimens of *S. toussainti* retain bold basal spots, but usually have medial spots only costad of the discal cell. The marked upper surface blue in both sexes of *S. andrewi* (flashed in flight and while at rest) is outstanding in fresh specimens, dulls with wear, but is still apparent on worn

specimens. *S. columella*, with females sometimes basally blue when fresh, appears mostly brown in collections. *S. toussainti*, vaguely blue (if at all) when fresh, also appears generally brown in collections with females often showing a lighter brown upper surface suffusion (Fig. 4B).

Review: Aside from general review acknowledged herein, A. Schwartz provided his specimens *S. andrewi* for study and examined the dissections of the primary types. Lee D. and Jacqueline Miller compared photographs of *S. andrewi* to the Antillean *Strymon* at AME. We referred to the genitalic preparations listed in Johnson, MacPherson and Ingraham (1986) and the material examined listed below.

Etymology.—This species is named for the father, the late Andrew Matusik, of the junior author.

Material examined.—Along with material listed in Johnson, MacPherson and Ingraham (1986) we have been able to compare our series of *S. andrewi* to the Comstock and Huntington types of *S. toussainti* (AMNH, CMNH) and *C. christophei* (AMNH), *S. columella arecibo* (AMNH), the types of *Thecla cybira* and *T. limenia* (BMNH), and other specimens of *Strymon* at the AMNH and CMNH. We have also been able to compare *S. andrewi* with hairstreaks collected by Luis Marion Heredia of Santo Domingo and specimens in the collection of A. Schwartz. The type series, as indicated, has been dissected and the dissections are attached in microvials to the individual specimens deposited as noted under TYPES. Representative dissections of various Antillean congeners comprise AMNH/HS #87, 88 [*S. columella arecibo*, holotype male, Guayanilla, Puerto Rico, July 22, 1944; allotype female, Arecibo, Puerto Rico, July 30–August 1, 1941]; #89, 90 [*S. c. cybira*, Fond Parisien, Haiti, February 11–18, 1922; San Cristobal, Dominican Republic, January 29, 1961, B. Heineman]; #91, 92 [*S. toussainti*, holotype male (Fig. 5E), allotype female (Fig. 5G), Fond Parisien, Haiti, February 11–18, 1922, paratype male, Port-au-Prince, Haiti, March 5–11, 1922]; #93, #94 [*S. limenia*, Fond Parisien, Haiti, February 11–18, 1922]; #95, 96 [*S. christophei*, holotype male, Port-au-Prince, Haiti, February 1–6, 1922, allotype female, Paradis, Dominican Republic, 1800 ft, August 15, 1952, leg. W. M. Bush]. There is a single non-paratype of *S. andrewi* from the Sierra de Baoruco near the Haitian border: .6 km SE Los Arroyos, 1200 m, July 3, 1983, leg. A. Schwartz (ASC).

Genus *Heterosmaitia* Clench

Clench (1964) erected this genus to contain the notable Jamaican endemic *bourkei* Kaye. In discussion Clench suggested several mainland congeners for *Heterosmaitia*. Some of these (particularly *Thecla brescia* Hewitson) differ little in morphology from the type of *Rekoa* Kaye (type species *Papilio meton* Cramer). Later, Clench (1970) placed *Heterosmaitia* as a synonym of *Thereus* Huebner (type species *Papilio lausus* Cramer) based on examination of a single male specimen (CMNH) identified by Clench as *T. lausus*. The extant syntype of *P. lausus* (BMNH) is a female. I have examined and dissected this specimen and designated it the lectotype (Fig. 7E); the lectotype's continuous, fluted, genital structure in no way resembles that of *H. bourkei* (Johnson, in press). The battered CMNH male identified as *T. lausus* by Clench is also of questionable identification. Its genitalia differ from numerous BMNH and Milwaukee Public Museum specimens which can be positively identified as *T. lausus* (probably because common usage of "*T. lausus*" actually includes a group of species). Since neither *Heterosmaitia* or *Rekoa* has been revised, we retain *Heterosmaitia*: its type species is *bourkei* and, although Bridges (1988) placed *bourkei* with *Rekoa* in his clerical work, it is not certain that current common usage of *Rekoa* for Antillean and mainland butterflies represents a monophyletic group.

In 1986 we collected hairstreak females at Las Abejas which were difficult to identify. They slightly resembled *Allosmaitia fidena* (Hewitson), but differed from Riley's (1975) description of this Hispaniolan endemic. Like Cuban *A. coelebs*

(Herrich-Schaeffer), they had two hindwing tails (see Riley, 1975, plate 11, p. 99). We also considered if such specimens might represent the then unknown female of *Strymon monopeteinus* Schwartz and Miller (1985). As Schwartz and Miller (1985, pp. 1–2) mentioned, a number of Antillean hairstreaks have similar lower surface patterns, making differentiation of some taxa at first confusing. However, in 1987 we collected a male with the odd lower surface pattern seen the year before and it was apparent from the large forewing scent brand (lack of which is a generic character of *Allosmaitia*) that we had been dealing all along with an undescribed species. Further examination of these specimens indicates they constitute a sister species of *H. bourkei* which we describe below.

Heterosmaitia abeja, new species

Fig. 6A–D, 7A, D

Diagnosis.—Similar only to *H. bourkei* of Jamaica, (*A. fidenia* of Hispaniola has no male scent brand, and along with differing wing pattern (see below) females of *H. abeja* have three black marginal spots on the hindwing upper surface in cells CuA2 to M3 lacking in *A. fidenia*). Differing from *H. bourkei* (Fig. 6E, F) as follows: *H. abeja* males—(a) under surface with submarginal black lines greatly reduced (bold in *H. bourkei*); (b) lower surface hindwing with medial black band rather straight (inclined baso-costad in *H. bourkei*), with line detached from yellow *Thecla*-spot (conjoined in *H. bourkei*) and generally rounded toward anal angle (incised and jagged in *H. bourkei*); and (d) anal area darkly suffused black and bluish (*H. bourkei* with conspicuous second yellow spot along anal lobe); *H. abeja* females—(a) with all differences of male (though less vividly marked) (b) three black marginal spots extending from the anal lobe to cell M3 on the hindwing upper surface (*H. bourkei* with continuous black marginal line somewhat enlarged or blotch-like at these veins). Of less certain significance, but notable—forewing expanse in the known specimens of *H. abeja* (\bar{x} of primary types, 11.75 mm) smaller than eleven specimens of *H. bourkei* examined by us (males \bar{x} = 14.2, range 13.5–15.0 mm; females \bar{x} = 16.0, range 15.0–18.0 mm) and the male scent brand on the holotype of *H. abeja* is shiny gray, not black as in all *H. bourkei* examined. Genitalic differences are reviewed below.

Description.—*Male.* Upper surface of wings: ground color iridescent azure blue, forewing base to postmedian area, margins and apex blackish; hindwing, anal margin to costal vein of discal cell iridescent azure blue, margins and costal areas blackish. Forewing with shiny parabolic scent brand distad in discal cell. Single long black tail, terminus vein CuA2. Lower surface of wings: ground color, light gray; forewing with slight submarginal darker line, vaguely apparent and dark continuous postmedian line costa to cell CuA1, in latter slightly inclined basad; hindwing with submarginal line vague to obsolescent, postmedian line, continuous and generally vertical across wing from costa to slightly basad the yellow *Thecla*-spot, then bent roundly toward anal margin; area of anal lobe suffused darkly bluish and black. Length of forewing: 12.0 mm (holotype). *Female.* Upper surface of wings: ground color, dull silvery blue (forewing base to postmedian area, hindwing base to costal area and margins) marginal areas fuscous. Forewing without scent brand; hindwing with three prominent black marginal spots, cells CuA2 to M3. Lower surface of wings: as on males but less vividly marked and with slight yellow apparent in the area of the anal lobe. Length of forewing: 11.5 mm (allotype). *Male genitalia.* Fig. 7A. Similar to *H. bourkei* (Fig. 7B) but (a) valvae more elongate relative to vincular configuration, (b) prong for brush organ attachment reduced and (c) ratio of aedeagus length to caudal length of vincular arc 3.3 (*H. abeja*), 2.6 (*H. bourkei*), with caecum of *H. abeja* not inclined laterally as on *H. bourkei* (see Clench, 1964, fig. 6). *Female genitalia.* Fig. 7D. Similar to *H. bourkei* (Fig. 7C): ductus bursae with two disjunct sclerotized elements (caudad and cephalad a central transparent juncture), cephalic element slightly displaced distally. *H. abeja* differing slightly, with (i) caudal element of ductus bursae more basally constricted, (ii) cephalic component of ductus bursae less displaced laterally and (iii) corpus bursae comparatively small with two large, pronged, signa.

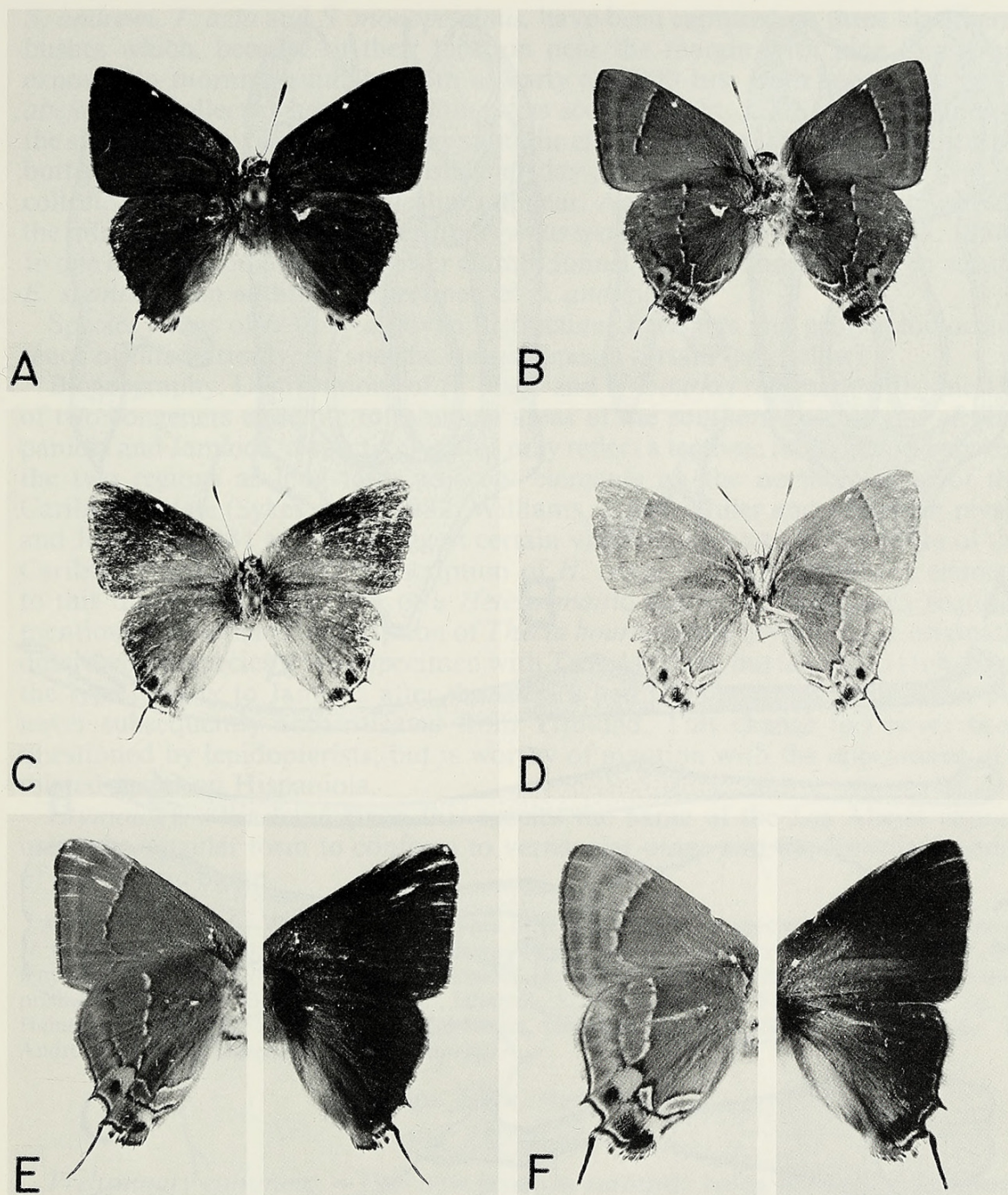


Fig. 6.—LYCAENIDAE. Adults of *Heterosmaitia abeja* and *H. bourkei*. A. Upper surface, holotype male, *H. abeja*. B. Lower surface, same. C. Upper surface, allotype female, *H. abeja*. D. Lower surface, same. E. Upper surface (right), lower surface (left), *H. bourkei*, male, Duncans, Trelawny Parish, 28 October 1984 (AMNH). F. Same, *H. bourkei*, female, same data.

Types.—Holotype male, upper Abejas, nectaring in sunlight on blackberry, 15 July 1987, leg. Kurt Johnson, deposited CMNH; allotype female, same location, same conditions, 10 July 1986, leg. Kurt Johnson, deposited CMNH (AMNH/HS #104, 105 transferred to CMNH).

Remarks.—Behavior of *H. abeja*: The collecting conditions of this species are interesting because nearly all hairstreaks taken at Las Abejas, including *A. fidena*,

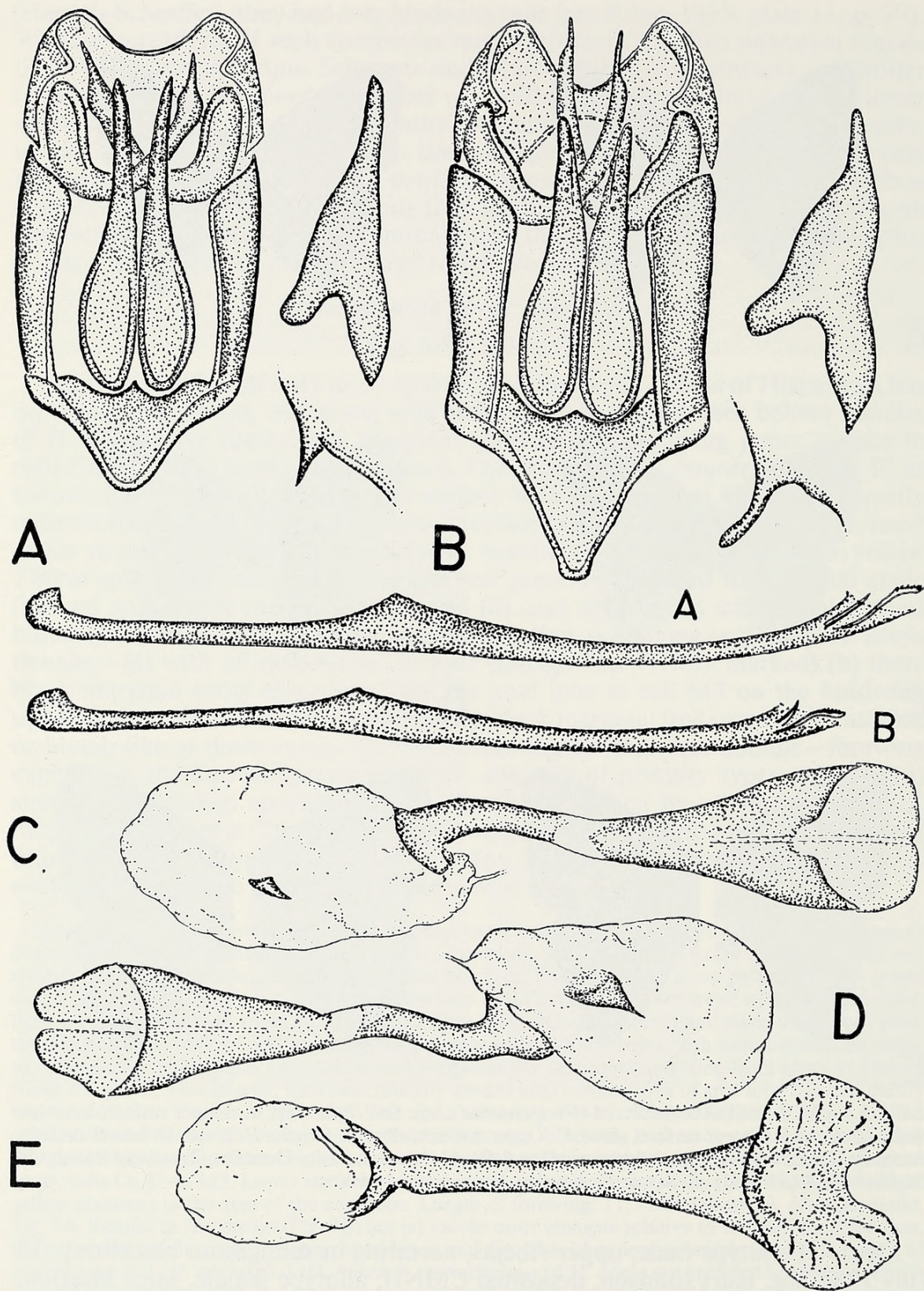


Fig. 7.—LYCAENIDAE. Genitalia of *Heterosmaitia*. A, B. Male genitalia: left, ventral view of genitalia with aedeagus removed; right (above), lateral view, valve; right (below), lateral view vincular spur for attachment of brush organ. Below (with smaller letters), lateral view, aedeagus. A. Holotype, *H. abeja*. B. *H. bourkei* of Fig. 6. C, D. Female genitalia, lateral view. C. *H. bourkei* of Fig. 6. D. Allotype, *H.*

S. andrewi, *T. azia* and *S. monopeteinus*, have been captured on three blackberry bushes which, because of their location near the margin with pine forest, are exposed to morning sunlight from as early as 0900 hrs. Both specimens of *H. abeja* were collected here but neither was seen in flight. Like other theclines at the site, they have been collected by sporadic checking of these bushes for nectaring butterflies. Standing at these bushes all day has never proved a useful way to collect. On certain days no theclines appear. Another visitor of these bushes is the infrequently collected skipper *Epargyreus spanna* (Johnson and Matusik, 1986). In one instance, on the same flower clump, Johnson had to choose between netting *E. spanna* or an additional specimen of *S. andrewi*.

Species status of *H. abeja*: Given distinctive characters and geographic occurrence of this butterfly, its specific status appears certain (see below).

Biogeography: Distributions of *H. abeja* and *H. bourkei* represent a disjunction of two congeners endemic to montane areas of the southern paleoisland of Hispaniola and Jamaica, respectively. This may reflect a tectonic relationship between the two regions as long term adjacent elements on the northern edge of the Caribbean plate (Sykes et al., 1982; Williams, 1986). Miller and Miller (in press) and Johnson (1981 and ms.) suggest certain vicariant patterns in the origin of the Caribbean butterfly fauna. Description of *H. abeja* adds an interesting element to this discussion. Discovery of a *Heterosmaitia* species in Hispaniola requires mention of the original description of *Thecla bourkei* Kaye (1925). Kaye originally described the species from a specimen with Trinidad data, but later (1931) changed the type locality to Jamaica after the species had been collected often there but never subsequently authenticated from Trinidad. This change has never been questioned by lepidopterists, but is worthy of mention with the appearance of a related taxon on Hispaniola.

Etymology.—We have given this species the name of the Las Abejas region, using the singular form to conform to vernacular usage and the feminine gender of the generic name.

Material examined.—We compared the types of *H. abeja* to eleven specimens and dissections of *H. bourkei* (all AMNH) from Duncans, Trelawny Parish, Jamaica, October 24, 1984 (one male, one female); October 28, 1984 (one male, one female), January 20, 1984 (two males, two females) (comprising AMNH/HS #137, 138, 139, 140); Islington, St. Anns, Jamaica, February 20, 1951, leg. B. Heineman (male); Rio Bueno, St. Ann's, Jamaica, December 30, 1952 (female); Sandy Quilly, St. Andrews, Jamaica, December 3, 1951 (female).

Genus *Terra*, New Genus

Fig. 8A–D, 9B, 10

Preliminary comment.—This new genus is currently being revised by Johnson. It includes, along with a number of mainland species, a new species from Hispaniola which cannot be placed in any known eumaeine genus. Thus, to allow treatment of new Hispaniolan taxa as a group, and to make the new generic name available for colleagues, it is described here.

Terra (which, along with a number of undescribed species, contains the species *tera* Hewitson, *cana* Hayward, *chilica* Schaus, *calchinia* Hewitson and *hycarra* Hewitson [all originally described in "*Thecla*"]) is the immediate sister genus of

←

abeja. E. Lectotype female, *Papilio lausus* Cramer, Utitl. Kapellen, (1775–90 [1779]), 3(20): 70, pl. 233, f E, BMNH Cramer syntype, labelled "Surinam," "designated lectotype by K. Johnson, 1988."

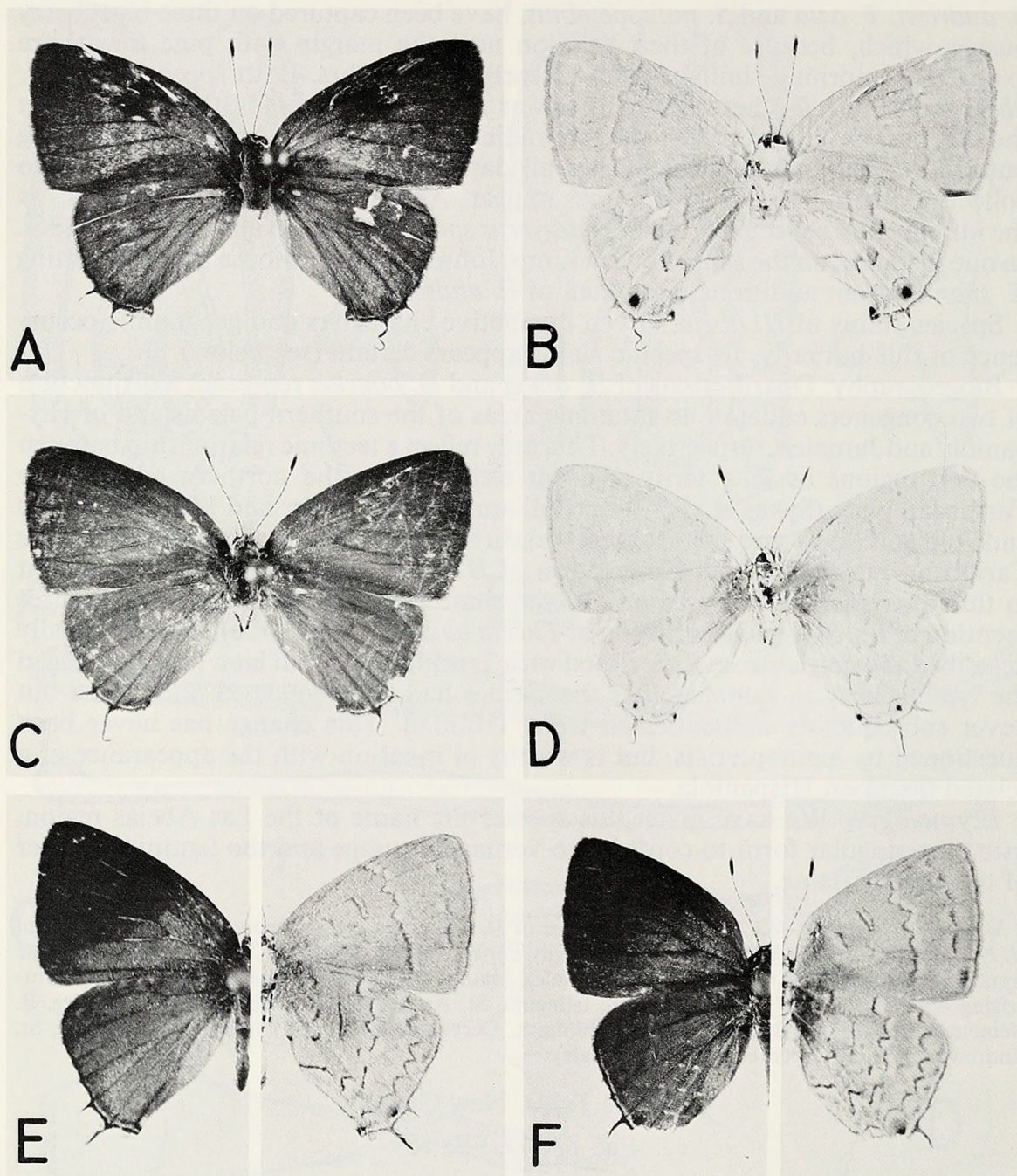


Fig. 8.—LYCAENIDAE. Adults of *Terra* and *Nesiostrymon*. A. Upper surface, holotype male, *T. hispaniola*. B. Lower surface, same. C. Upper surface, allotype female, *T. hispaniola*. D. Lower surface, same. E. Upper surface (left), lower surface (right) male, *N. celida*, lower Abejas, July 6, 1986, leg. Kurt Johnson. F. Same, female, *N. celida*, same data.

Nesiostrymon Clench (1964) (species *celida* Lucas, *shoumatoffi* Comstock & Huntington, and *celona* Hewitson [also all originally described in "*Thecla*"]). *Nesiostrymon* also contains a number of undescribed mainland species. In a four taxon statement, *Terra* and *Nesiostrymon* form the apotypic sister lineage to respective plesiotypic outgroups summarized here as the *Thecla uzza* Hewitson assemblage and the *Thecla celmus* Cramer assemblage (Fig. 10).

The familiar small blue Antillean hairstreaks, species *celida* and *shoumatoffi*

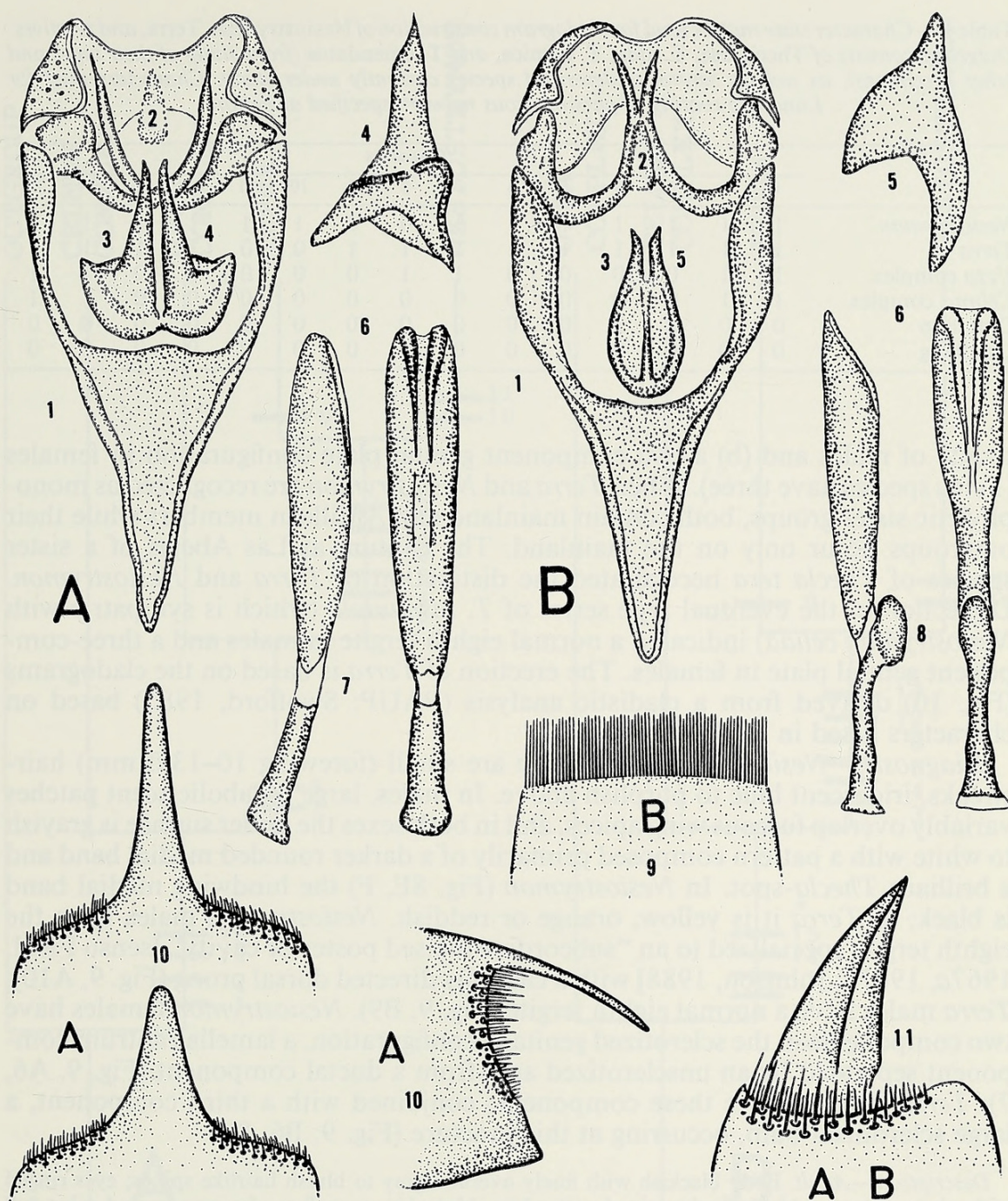


Fig. 9.—LYCAENIDAE. Morphology of *Nesiostrymon* (A) and *Terra* (B). For each of the larger letters A and B, above left: ventral view, genitalia with aedeagus removed; above right: lateral view of valve. Below right: female genitalia, lateral view (left), ventral view (right). Numerals refer to characters listed Table 1. For each of the smaller letters A and B, below: A, far left: dorsal view, incised posterior cavity of eighth tergite with terminal prong, *N. celida celida*, Cuba (above and immediate right), *N. c. ssp.* of Fig. 8 (below). B, right center: dorsal view, normal eighth tergite, holotype *T. hispaniola*. A, B, below right: lateral view of heavily sclerotized, pointed papillae anales, *Nesiostrymon* and *Terra*.

were placed by Clench (1964) in *Nesiostrymon* as an endemic Antillean genus; Clench suggested that *Thecla tera* might be a mainland relative. However, *Nesiostrymon* taxa differ greatly in morphology from *Thecla tera* with only the former and *Thecla celona* having (a) a specialized incised posterior cavity in the eighth

Table 1.—Character state matrix used for cladogram construction of *Nesiostrymon*, *Terra*, and relatives. Outgroup consists of *Thecla asa*, *T. alda*, *T. carnica*, and *T. emendatus* (from study of their types and other specimens), as well as several undescribed species currently under study. Characters used for Lundberg rooting of parsimonious network specified at bottom.

	Characters														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Nesiostrymon</i>	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1
<i>Terra</i>	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1
<i>Uzza</i> complex	1	1	0	0	0	0	1	1	0	0	0	0	0	1	1
<i>Celmus</i> complex	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1
Outgroup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lundberg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

tergite of males and (b) a two component genital plate configuration in females (*Terra* species have three). When *Terra* and *Nesiostrymon* are recognized as monophyletic sister groups, both contain mainland and Antillean members while their outgroups occur only on the mainland. The capture at Las Abejas of a sister species of *Thecla tera* necessitated the distinction of *Terra* and *Nesiostrymon*. Dissection of the eventual type series of *T. hispaniola* (which is sympatric with *Nesiostrymon celida*) indicated a normal eighth tergite in males and a three-component genital plate in females. The erection of *Terra* is based on the cladograms (Fig. 10) derived from a cladistic analysis (PAUP: Swofford, 1985) based on characters listed in Table 1.

Diagnosis.—*Nesiostrymon* and *Terra* are small (forewing 10–13.0 mm) hair-streaks, iridescent blue to purplish above. In males, large parabolic scent patches variably overlap fuscous wing apices, and in both sexes the under surface is grayish to white with a pattern composed primarily of a darker rounded medial band and a brilliant *Thecla*-spot. In *Nesiostrymon* (Fig. 8E, F) the hindwing medial band is black; in *Terra* it is yellow, orange or reddish. *Nesiostrymon* males have the eighth tergite specialized to an “subcordate incised posterior cavity” [sensu Field, 1967a, 1967b; Johnson, 1988] with a caudally directed dorsal prong (Fig. 9, A10); *Terra* males have a normal eighth tergite (Fig. 9, B9). *Nesiostrymon* females have two components in the sclerotized genitalic configuration, a lamellar/antrum component separated by an unsclerotized area from a ductal component (Fig. 9, A6, 7); *Terra* females have these components conjoined with a third component, a large sclerotized bulb, occurring at this juncture (Fig. 9, B6, 8).

Description.—*Adult.* Body blackish with finely overlaid gray to bluish hairlike spines; eyes ringed with white; antennae black, finely striped with white. *Male.* Upper surface of wings: ground color dull iridescent blue to violet with margins of hindwing and margins and apices of forewing variously dark fuscous; forewing with parabolic androconial brand, usually black and variously intersecting with fuscous distal ground color; hindwing with long tail, terminus vein CuA2, short tail, terminus vein CuA1. Lower surface of wings: ground color ranging from white to dull gray-brown, forewing with postmedian line, disjunct or continuous, usually across entire wing, most often orange, reddish or yellow with darker edges; limbal area with bright yellow, orange or reddish *Thecla*-spot and often with various limbal suffusion. Length of forewing: 12.5–15.0 mm. *Female.* Upper surface of the wings: similar to male but with fuscous marginal areas more extensive and with no forewing androconium. Lower surface of wings: as on males. Length of forewing: 12.5–15.5 mm. *Male tergal morphology and genitalia.* Fig. 9, B2, 3, 5, 9. Eighth tergite unspecialized (B9). Genitalia with (i) vinculum thin and elongately parabolic (B1); (ii) saccus elongate and parabolic (B1); (iii) valvae short (not filling vincular arc, never extending to cephalad arch of falces) and compressed laterally (B5) [in *Nesiostrymon*, Fig. 9, A2, 3, 4, 10, valvae have thick, steeply angled, incised lobes, tapered terminally]; (iv) aedeagus elongate, exceeding in length 2.75 × ventro-caudal length of vincular arc. *Female tergal morphology*

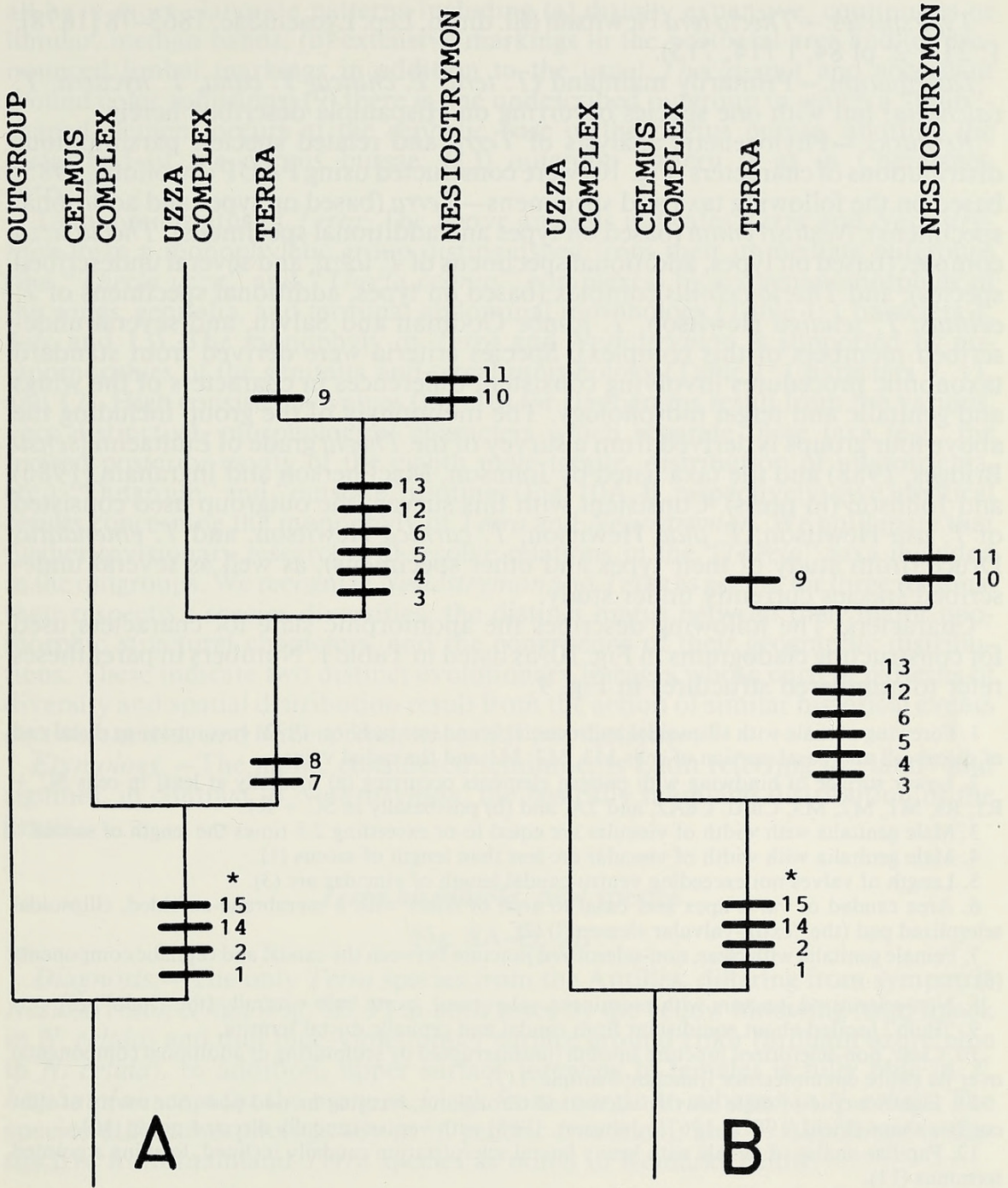


Fig. 10.—Cladograms of *Nesiostrymon*, *Terra*, and relatives. A. Cladogram derived from parsimonious distribution of unweighted characters and rooted using an outgroup as described in text (Consistency Index = .923). Uniquely derived apomorphies are specified by horizontal bars on internodes, and represent characters as numbered in text. Characters 1, 2, 14, and 15 were polarized using information provided by Johnson on additional taxa not included in the outgroup. B. As in Fig. 10A, cladogram rooted using the Lundberg method based on the presumed primitive states listed at the bottom of Table 1 (Consistency Index = .889).

and genitalia. Fig. 9, B6, 8, 11. Eighth tergite unspecialized but papillae anales distinctively sclerotized into pointed configuration [shared with *Nesiostrymon* but not outgroups] (Fig. 9, A11, B11). Genitalia with (i) sclerotized lamellal/antrum configuration conjoined to ductus with a large sclerotized ventral bulb (Fig. 9, B9) [in *Nesiostrymon*, Fig. 9, A6, 7 there are two sclerotized components separated by a clear, unsclerotized area]; (ii) corpus bursae with two small pronglike signa [as on *Nesiostrymon*].

Type species. — *Thecla tera* Hewitson (Ill. diurn. Lep. Lycaenidae, 1863–78 [1878], 1: 211; 2: pl 84, f 714, 715).

Distribution. — Primarily mainland (*T. tera*, *T. chilica*, *T. cana*, *T. hycarra*, *T. calchinia*) but with one species occurring on Hispaniola described herein.

Remarks. — Phylogenetic analysis of *Terra* and related species: parsimonious distributions of characters (Fig. 10) were constructed using PAUP (Swofford, 1985) based on the following taxa and specimens—*Terra* (based on types and additional specimens); *Nesiostrymon* (based on types and additional specimens); *Thecla uzza* complex (based on types, additional specimens of *T. uzza*, and several undescribed species); and *Thecla celmus* complex (based on types, additional specimens of *T. celmus*, *T. seudiga* Hewitson, *T. jambe* Godman and Salvin, and several undescribed members of this complex). Species criteria were derived from standard taxonomic procedures involving consistent differences in characters of the wings and genitalic and tergal morphology. The monophyly of the group including the above four groups is derived from a survey of the *Thecla* grade of Eumaeini (*sensu* Bridges, 1988) and the taxa listed by Johnson, MacPherson and Ingraham (1986) and Johnson (in press). Consistent with this survey, the outgroup used consisted of *T. asa* Hewitson, *T. alda* Hewitson, *T. carnica* Hewitson, and *T. emendatus* Druce (from study of their types and other specimens), as well as several undescribed species currently under study.

Characters: The following describes the apomorphic state for characters used for constructing cladograms in Fig. 10, as listed in Table 1. Numbers in parentheses refer to numbered structures in Fig. 9.

1. Forewing of male with ellipsoidal androconial brand (*sensu* Eliot, 1973) encompassing distal end of discal cell and basal portion of cells M3, M2, M1 and the radial veins.
2. Lower surface of hindwing with pattern elements occurring (a) medially at least in cells SC + R1, Rs, M1, M2, M3, CuA1, CuA2, and 2A, and (b) postbasally in SC + R1.
3. Male genitalia with width of vincular arc equal to or exceeding 2.5 times the length of saccus.
4. Male genitalia with width of vincular arc less than length of saccus (1).
5. Length of valves not exceeding ventro-caudal length of vincular arc (3).
6. Area caudad of valve apex and basal to arch of falces with a membrane-enfolded, ellipsoidal sclerotized pad (the "extra-valvular element") (2).
7. Female genitalia with clear, non-sclerotized juncture between the caudal and cephalic components (6).
8. Non-sclerotized juncture with prominent, sclerotized, ovate bulb ventrally (the "bulb") (8).
9. "Bulb" located about equidistant from caudal and cephalic ductal termini.
10. Clear, non-sclerotized juncture smooth (uninterrupted by sculpturing or additional components) over its entire circumference (juncture "simple") (7).
11. Eighth tergite of male heavily sclerotized throughout, forming incised posterior cavity of subcordate shape (Field, 1967a, 1967b; Johnson, 1988) with ventro-caudally directed prong (10).
12. Papillae anales of female with heavy lateral sclerotization caudally inclined, forming a pointed terminus (11).
13. Lower surface of hindwing with pattern elements crossing inside discal cell, and occurring either (a) postbasally in at least one of the following cells: cell SC + R1, cell CuA2, cell 2A; or (b) basally in the discal cell.
14. Aedeagus of male with length (measured along lateral surface, including length of caecum displaced outside the plane of aedeagal shaft) equal to or exceeding 2.75 times the ventro-caudal length of vincular arc.
15. Male genitalia with ventro-caudal length of vincular arc equal to or less than saccus length (1).

Plesiomorphic states for the apomorphic characters described above are readily inferred except for 1, 2, 9 and 13 (entries 2 and 13 describe surface wing patterns in particular, site-specific, terms). Concerning these: (1) outgroups generally lack androconia or, in a few taxa, exhibit a small, concentrated, androconial mark limited to occurrence basad the crossvein of the forewing discal cell; (2) outgroups

all have more elaborate patterns including (a) distally expansive, continuous or lunular, median bands, (b) extensive markings in the postbasal area and (c) pronounced limbal markings in addition to the usual *Thecla*-spot and accordant ground color suffusions; (9) there is one undescribed outgroup in which a “bulb”-shaped element occurs at the cephalic base of the ductus bursae, abutting the distal end of the corpus bursae; (13) outgroup pattern is as in Characters, entry 2.

Taxonomic status of *Terra*: The above analysis indicates *Terra* and *Nesiostrymon* form a monophyletic group distinguished from their immediate outgroups (the “*Thecla uzza*” and “*Thecla celmus*” complexes) by six synapomorphies of the wings, genitalia, and terminal abdominal morphology (Table 1: Characters 1, 3–6, and 13). The monophyly of *Terra* and *Nesiostrymon* is supported by autapomorphies of the genitalia and tergal morphology (Table 1: Characters 9, 11, and 12). High consistency values (Fig. 10) for cladograms result from the various, very distinctive, morphological characters which separate these taxa (e.g., the incised posterior cavity of the eighth male tergite, distribution of microtrichia, etc.). “Outgroup” and “outstate” rootings (Fig. 10A, B, respectively) give identical results concerning the monophyly of *Terra* and *Nesiostrymon*. We anticipate that further revisionary research will resolve relations in the “*Thecla*” taxa included in the outgroups. We recognize *Nesiostrymon* and *Terra* as genera for three reasons: their respective species diversities, the distinct hiatus between their major apomorphic structural characters, and the congruence of their geographic distributions. These indicate two distinct evolutionary lineages whose current patterns of diversity and spatial distribution result from the action of similar historical events on two ancient, and widespread, ancestral populations.

Etymology.—The name, considered feminine, is Latin referring to “land” and signifies, in contrast to *Nesiostrymon*, the basically mainland distribution of the genus.

Terra hispaniola, new species

Fig. 8A–D, 9B

Diagnosis.—The only *Terra* species from the Antilles, differing from sympatric *Nesiostrymon celida* (Fig. 8E, F) in both sexes by the yellow hindwing band (black in *N. celida*) and dull blue-violet upper surface ground color (brilliant azure blue in *N. celida*). In addition, upper surface forewing in females is fully blue in *T. hispaniola* except for the margins, black from margin to subapex in *N. celida*. The species differs morphologically as in generic treatment, and *T. hispaniola* is distinctive from mainland *Terra* species as noted in Remarks below.

Description.—*Male*. Upper surface of wings: ground color dull violet blue, margins and apices cloudy black; forewing with large parabolic androconial band emphatic over ground color; hindwing with long tail, terminus vein CuA2, short tail, terminus vein CuA1. Lower surface of wing: ground color dirty white, forewing with gray, suffused postmedian line, costa to cell CuA1; hindwing with medial band of broken yellow patches slightly suffused with black, limbal area gray-white with slight cloudy suffusion, *Thecla*-spot light yellow, blackened centrad. Length of forewing: 13.0 mm (holotype). *Female*. Upper surface of wing: similar to male but with fuscous marginal areas more extensive and without forewing androconia. Lower surface of wings: as on males. Length of forewing: 12.5 mm (allotype). *Male genitalia*. Fig. 9B. Differing from mainland congeners in the parabolically tapered shape of the valval ventrum (congeners have ovate to squarish bilobed configurations and abruptly tapering caudal extensions). *Female genitalia*. Fig. 9B (right, center). Differing from mainland congeners in compact configuration of the cephalic and caudal components of the ductus bursae. Congeners have both components more elongate, particularly the cephalic component on some mainland species has

length 15–20 × width (*T. hispaniola* circa 6–7 × width). In *T. hispaniola* the ventro-central sclerotized “bulb” is located flush with the terminus of the cephalic ductal component (in congeners it is often semi-detached from the ductus on a thin stalk).

Types. — Holotype male and allotype female (a mating pair) taken slightly below upper Abejas, 6 July 1986, leg. K. Johnson, both deposited CMNH (AMNH/HS #106, 107, transferred to CMNH). Paratypes: DMC—(male) same locality as primary types, 5 July 1984, leg. D. Matusik (AMNH/HS #108 transferred to DMC). AME—(male) upper Abejas, patrolling path, 13 July 1987, leg. K. Johnson, on lifetime loan to Albert Schwartz (AMNH/HS #109 transferred to AME). AMNH—(male) same location as primary types, nectaring on small blue flowers in sunlight, 15 July 1987, leg. K. Johnson (AMNH/HS #110).

Remarks. — Behavior of *T. hispaniola*: All specimens have been taken in a relatively restricted area of Las Abejas, just below upper Abejas, where mesic broadleaf forest largely replaces pine forest. However, this area is still much drier than middle or lower Abejas and has numerous open areas where many xerophilic insects and plants are found. This habitat has produced a different moth fauna than lower and middle Abejas (J. E. Rawlins, personal communication). All individuals of *T. hispaniola* have been taken while patrolling close (0.3 m) above ground or nectaring on flowers of about the same height. However, on 16 July 1987, an individual was observed near the base camp (see entry under *Panoquina*, Hesperiniinae) a xeric area nearly 3 km from upper Abejas. All collection habitats of *T. hispaniola* differ markedly from those of *N. celida*. We have found *N. celida* only in the vicinity of lower Abejas and most commonly in dense woods or along their immediate margins.

Species status of T. hispaniola: The trans-Caribbean disjunction of the *T. hispaniola* distribution and its unique characters support its status as a distinct species.

Review: In addition to general review acknowledged in this paper, A. Schwartz examined a paratype male and the genitalia of the primary types.

Etymology. — This species is named for the island of Hispaniola.

Material examined. — We consulted the material listed in Johnson, MacPherson and Ingraham (1986) and in addition the dissections prepared for the revision of *Nesiostrymon* and *Terra* (along with their outgroups). These included (i) the types of *Thecla celona*, *T. tera*, *T. dicaea* Hewitson, *T. hycarra*, *T. celmus*, *T. calchinia*, *T. asa*, *T. phrutus* (Geyer), *T. emandatus*, *T. alda*, *T. carnica*, *T. uzza*, *T. heraldica* Dyar, *T. hicetas* Godman and Salvin, *T. jambe*, *T. hesychia* Godman and Salvin (all BMNH), *T. shoumatoffi*, *T. celida aibonito* (both AMNH); (ii) innumerable specimens of all taxa included in *Nesiostrymon*, *Terra* and groups listed above [these specimens and dissections from AMNH, CMNH, BMNH, AME, Museum National d'Histoire Naturelle (Paris), Field Museum of Natural History, and Milwaukee Public Museum]; and (iii) a series of 70 specimens of *N. celida* from lower Abejas collected 1984–1987 (AMNH, CMNH, DMC).

Polyommatainae

Genus *Leptotes* Scudder

In 1987, after discovering a large population of *Calisto chrysaoros* Bates deep within the densely wooded bottomland of lower Abejas, intensive collections were made in this habitat for further specimens. In previous years we had considered this area too inaccessible to collect, since there is hardly room among the heavy plant cover to maneuver a collecting net. To our surprise a single male polyommataine was captured here which proved to be a new species. Hitherto, we had never collected a “blue” within the moist bottoms of Las Abejas. Rather, all other blues from the vicinity, in our experience and Schwartz’ (A. Schwartz, personal

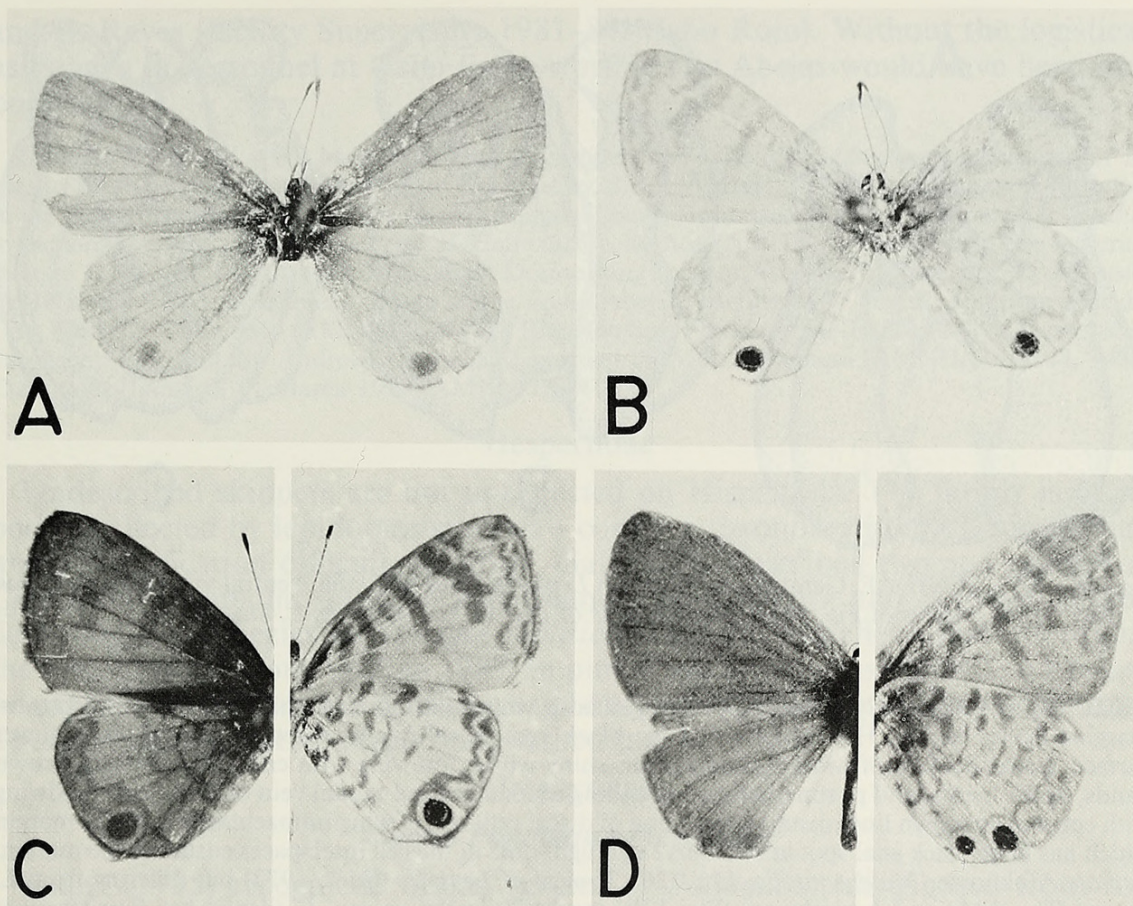


Fig. 11.—LYCAENIDAE. Adults of Antillean *Leptotes*. A. Upper surface, holotype male, *L. idealus*. B. Lower surface, same. C. Upper surface (left), lower surface (right), *L. perkinsae* Faraway, Stony Hill, St. Andrews, Jamaica, 2 February 1955, leg. B. Heineman (AMNH). D. same, *L. cassius*, 3 km E upper Abejas, pine forest, 15 July 1987, leg. D. Matusik (AMNH).

communication) are upland xerophiles occurring in pine forest above 1250 m and invading Las Abejas only along its upland pine forest margin (see *L. cassius*, Fig. 11D).

Leptotes idealus, new species

Fig. 11A, B; 12C

Diagnosis.—Similar only to *L. perkinsae* of Jamaica in having a single, large, black anal spot in cell CuA2 of the hindwing under surface. Differing from *L. perkinsae* (Fig. 11C) in being pale purplish brown on the upper surface (not washed with vivid blue iridescence) and on the under surface having (a) forewing stripes restricted costad, particularly the medial stripe which occurs costad only (in *L. perkinsae* emphatic and disjunctly broken into costad and caudad components, latter filling at least cells CuA1 and CuA2) and (b) anal spot and marginal spots of cells CuA1 and M3 generally in same plane (not greatly expansive outside rest of spot line as in *L. perkinsae*). Male genitalia of *L. idealus* with four terminal spines only (inner spine greatly elongate), on a constricted valval terminus (Fig. 12C), not (a) a lobate terminus with a single inner pointing spine as on *L. cassius* (Fig. 12A) or (b) with four terminal spines and an elongate, upward pointing fifth spine on the inner valval margin as on *L. perkinsae* (Fig. 12B).

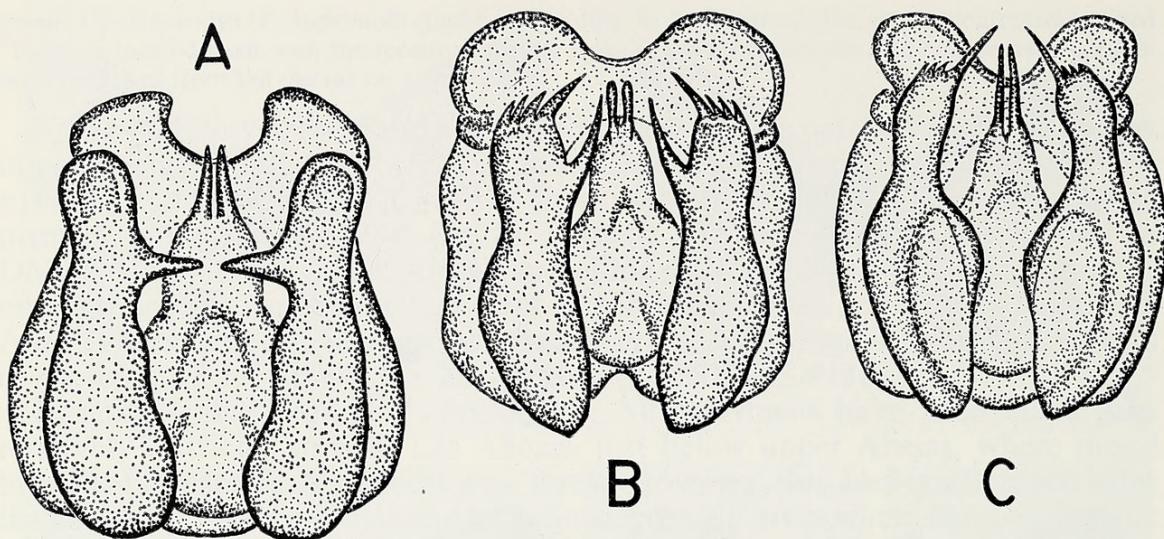


Fig. 12.—LYCAENIDAE. Genitalia of Antillean *Leptotes*. Male genitalia, ventral view with aedeagus in place. A. *L. cassius* of Fig. 11. B. *L. perkinsae* of Fig. 11. C. holotype, *L. idealus*.

Description.—*Male*. Upper surface of wings: both wings with ground color pale purplish brown, margins lighter tawny. Hindwing with large black spot at cell CuA2 showing through from lower surface. Lower surface of wings: ground color, shiny white; forewing with concentric vertical brown bands, basal, medial and postmedial, not extending caudad beyond caudal vein of discal cell; hindwing with concentric brown lines distad toward end of discal cell; rest of wing immaculate except for margin which has large black anal spot at cell CuA2 and light dots in the cell interspaces costad to the margin.

Female. Unknown. *Male genitalia*. Fig. 12C. Typical of *Leptotes* (Eliot, 1973) but differing from *L. cassius* (Fig. 12A) and *L. perkinsae* (Fig. 12B) markedly in the valvae. *L. idealus* has four terminal valval spines, the inner one being greatly elongate. The valvae are greatly constricted in the terminal one-third and concave on the inner lateral margin toward the base. In *L. cassius*, the valval terminus is widely lobate with a single inward pointing spine; *L. perkinsae* has four terminal spines, the inner one which is greatly elongate and another elongate, upward pointing spine on the inner margin of the terminal lobe.

Types.—Holotype, male, extremely dense moist woods, bottom of Las Abejas, 18 July 1987, 1100 hrs, disturbed into flight in filtered sunlight, leg. K. Johnson, deposited CMNH (AMNH/HS #111 transferred to CMNH).

Remarks.—Behavior of *L. idealus*: This species was caught in densely wooded understory where the only other butterfly species seen was *Calisto chrysaoros* Bates. The eventual *T. idealus* holotype flew up, from an apparent ground level perch, after being disturbed by efforts of the collector to move through adjacent underbrush. This behavior contrasts with that of upland xerophilic blues which flutter in bright sunlight about the blossoms of various Fabaceae. In dense woods at Las Abejas, two other butterfly species, *Nesiostrymon celida* and *Anetia jaegeri*, can also be found flying in areas of filtered sunlight.

Species status of *L. idealus*: Distinct characters and the distributional disjunction of this species from its apparent sister species *L. perkinsae* (see below) assure its species status.

Biogeography: As noted under the entry and citations concerning *H. abeja*, the disjunct geographic occurrences of *L. perkinsae* and *L. idealus* may reflect the cited tectonic relationship between Jamaica and the southern paleoisland of Hispaniola.

Etymology.—We are pleased to name this species for the Ideal Dominicana S. A. company, Messrs. R. Caceres (President, Santo Domingo), M. Kelly, V. Garcia

and R. Reyes (facility Supervisors 1981–87, Cabo Rojo). Without the logistical assistance of personnel at Cabo Rojo, work at Las Abejas would have been impossible.

Material examined.—We have been able to compare the type of *L. idealus* to specimens of *L. cassius* taken by us at many Dominican Republic localities (AMNH, CMNH) and material collected in the Dominican Republic by Luis Marion Heredia (Santo Domingo). We have compared *L. idealus* to the long series of *L. perkinsae* in the B. Heineman collection (AMNH). Dissections of this material include *L. cassius*, 12 km marker, on Ideal Dominicana road to Aceitillar, 500 m, leg. D. Matusik (AMNH/HS #141); pine forest margin above upper Abejas, 15 July 1987, leg. K. Johnson; Florida City, Florida, 9 June 1946 (AMNH/HS #142); Biscayne Bay, Florida (AMNH/HS #143); *L. perkinsae*, Faraway, Stony Hill, St. Andrews, Jamaica, 2 January 1955, B. Heineman (AMNH/HS #144, 145); Claremont, Jamaica, 11 March 1929 (AMNH/HS #146).

Hesperiidae

Undescribed skippers are not unexpected on Hispaniola. The family is often poorly collected by lepidopterists, and a complex taxonomy in many groups has made identification difficult. Recently, Gali (1983) described two new species of *Choranthus* from the southern paleoisland, and Schwartz and Sommer (1986) described a subspecies of *Synapte malitiosa* Herrich-Schaeffer which occurs in the same region. From 1985 to 1987, in pine woodlands surrounding Las Abejas, we captured specimens of a distinctive upland population of *Panoquina* Hemming. This population represents an undescribed taxon.

Hesperiinae

Genus *Panoquina* Hemming

Evans (1955) recognized fifteen species of *Panoquina*, distributed from the United States and southern Canada southward to Argentina. Riley (1975) recorded six species from the Antilles. Hitherto, three species of *Panoquina* have been reported from Hispaniola—*P. ocola* (Edwards), *P. sylvicola* (Herrich-Schaeffer) and *P. nero* (Fabricius). These have been considered easily distinguished by wing characters (Klots, 1951; MacNeill, 1975; Riley, 1975; Scott, 1986) (Fig. 14). From 1985 to 1987 we captured specimens of *Panoquina* near Las Abejas exhibiting characters of both *P. sylvicola* and *P. ocola*. These specimens had an emphatic upper surface spot in the forewing discal cell (traditionally characteristic of *P. sylvicola*), and an obsolescent costally directed line on the hindwing under surface (considered characteristic of *P. ocola*). Subsequent study of genitalia of these and other *Panoquina* species indicated the presence of a distinctive subspecies of *P. ocola* in the Sierra de Baoruco. The study also showed that *P. hecebolus* Scudder occurs on Hispaniola (see Remarks).

Panoquina ocola distipuncta, new subspecies

Fig. 13A–D, 15B, F

Diagnosis.—*P. o. distipuncta* has the white patch on the forewing upper surface (caudo-distad in the discal cell) hitherto considered diagnostic of *P. sylvicola* and *P. hecebolus*. On *P. sylvicola* (Fig. 14B) this marking is large and elongate; in *P. o. ocola* (Fig. 14C) it occurs in very few specimens as a “pinpoint” (Scott, 1986, see Remarks); in *P. hecebolus* (Fig. 14E) and *P. o. distipuncta* it is a round spot of moderate (pinhead) size. On the hindwing under surface *P. o. distipuncta* has a thin, costally directed postmedian white line or spot-row, similar to *P. hecebolus*. This line is usually absent in *P. o. ocola* and occurs as a whitish to bluish-white undersurface hindwing bar (or dense spot row) in *P. sylvicola*. Genitalia, partic-

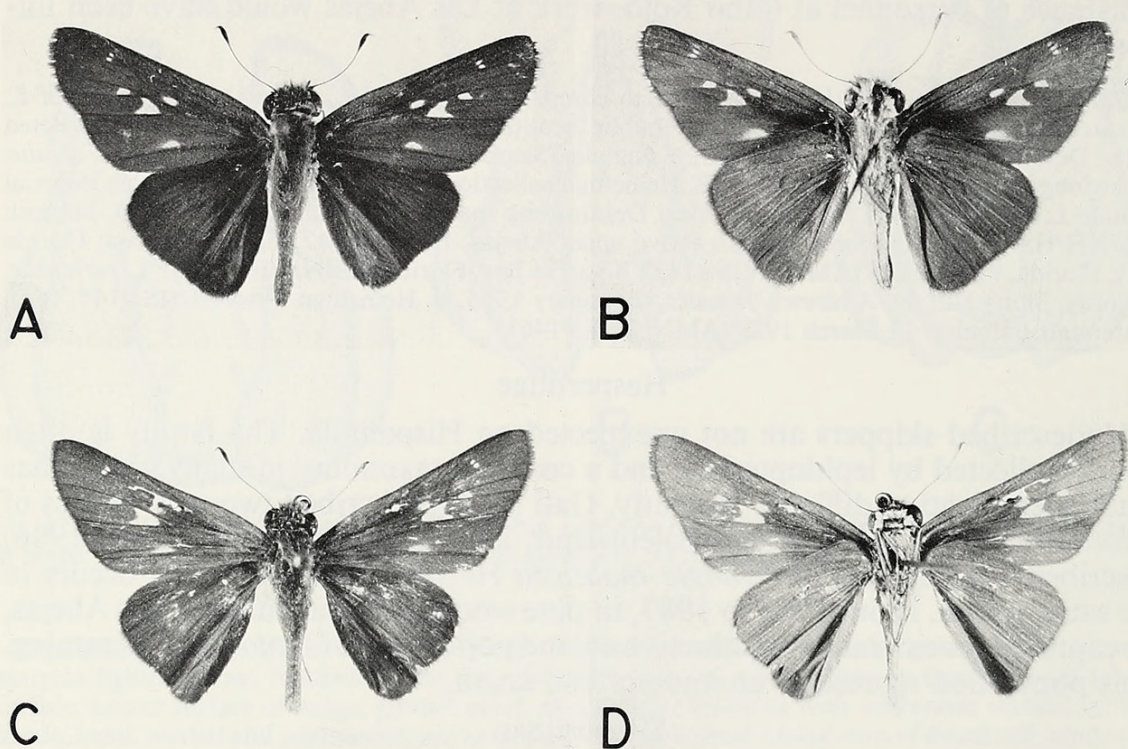


Fig. 13.—HESPERIIDAE. Adults of *Panoquina ocola distipuncta*. A. Upper surface, holotype male. B. Lower surface, same. C. Upper surface, allotype female. D. Lower surface, same.

ularly of females, are diagnostic: the lamella postvaginalis of *P. sylvicola* is prominent, bilobate and densely covered with microtrichia; *P. hecebolus* lacks the microtrichia completely and is broadly concave rather than bilobate (Fig. 15E); *P. o. ocola* (Fig. 15D) has dense microtrichia and a liplike terminal shape which, in *P. o. distipuncta* (Fig. 15F) appears generally larger, and distally more lobate (see Remarks). *P. o. ocola* and *P. sylvicola* are xerophiles generally associated (sometimes as pests) with sugar cane and other agricultural monocots (Riley, 1975). *P. o. distipuncta* occurs in upland pine forest generally remote from areas of domestic planting.

Description.—*Male.*—Upper surface of the wings: ground color brown, forewing with yellow-white patches, often golden-edged, caudo-distad in discal cell, postmedian in cells CuA2, CuA1 and M3, and as four to five apical dots along the radial veins. Hindwing with occasional small white dots in cell CuA1 and M3 as on the lower surface. Lower surface of wing: ground color olive drab, forewing with markings as on upper surface, hindwing with postmedian line of variously emphatic whitish spots, generally suffused in a line from costa to obsolescence toward the anal lobe. Length of forewing: 16 mm (holotype). *Female.* Upper surface of wings: as on males. Lower surface of wings: as on males. Length of forewing: 18 mm (allotype). *Male genitalia.* Fig. 15B. Valvae generally wide from area adjacent vinculum to terminus (valvae of Dominican Republic *P. o. ocola*, Fig. 15A, appearing inclined toward vinculum); harpe with dorsally inclined hook arising ventro-centrally along the valval terminus (a character emphatic in *P. luctuosa* Herrich-Schaeffer of Ecuador) (harpe of Dominican Republic *P. o. ocola* appearing to arise more ventro-distad [see Remarks]). *Female genitalia.* Fig. 16C. Genital terminus with microtrichia forming terminal liplike sclerotizations of the lamellae postvaginalis, this structure not as pronounced as the larger, heavily sclerotized bilobate terminus in *P. sylvicola*. In specimens examined, microtrichial structures of *P. o. distipuncta* (Fig. 16C) appear to form a more expansive terminal structure than of *P. o. ocola* (Fig. 16A). *P. hecebolus* completely lacks terminal microtrichia (Fig. 16B).

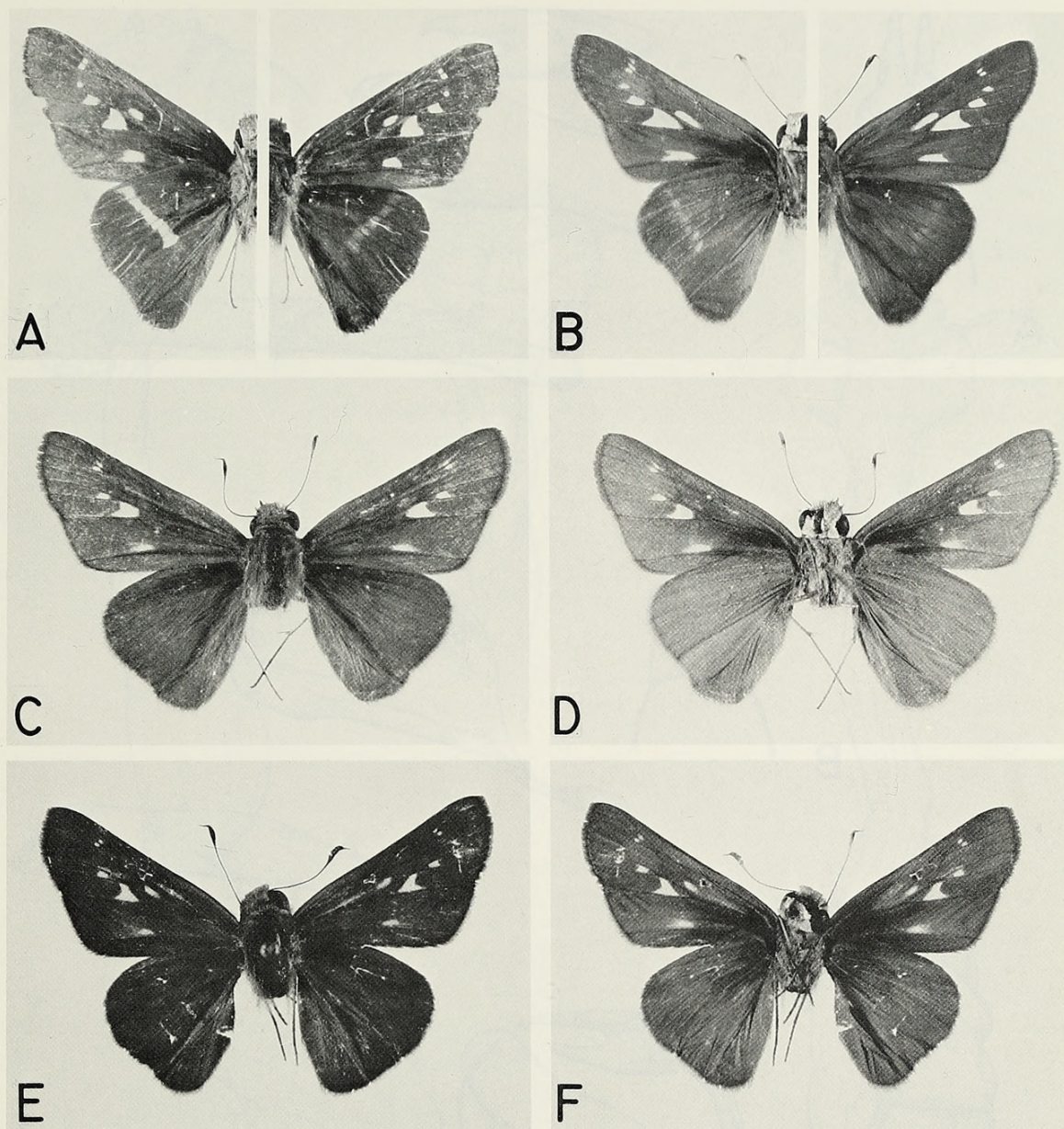


Fig. 14.—HESPERIIDAE. Adults of *Panoquina* congeners. A. Upper surface (right), lower surface (left), *P. nero*, male, Bamboo Hole Canyon, La Vega Province, Dominican Republic, 22 July 1987, leg. Johnson and Matusik (AMNH). B. Upper surface (right), lower surface (left), *P. sylvicola*, male, grassland near Aceitillar, Pedernales Province, Dominican Republic, 14 July 1987, leg. Johnson and Matusik (AMNH). C. Upper surface, *P. ocola ocola*, male, Rio Baiquate bridge, SE Jarabacoa, La Vega Province, Dominican Republic, 24 July 1987, leg. Johnson and Matusik (AMNH). D. Lower surface, same. E. Upper surface, *P. hecebolus*, female, Port-au-Prince, Haiti, 1–6 February 1922 (AMNH). F. Lower surface, same.

Types.—Holotype male, allotype female, 1987 CMNH Expedition Base Camp, 18°10'N, 71°37'W, 1600 m, circa 4 km from upper Abejas, in xeric pine forest, 16 July 1987, leg. K. Johnson, deposited CMNH (AMNH/HS dissections #39, 40 transferred to CMNH). Paratypes: CMNH—(one male, one female) same data as primary types (AMNH/HS #41, 42 transferred to CMNH), (two males), pine forest on way to Las Abejas, 4–11 July 1985 [circa 1520 m], leg. D. Matusik

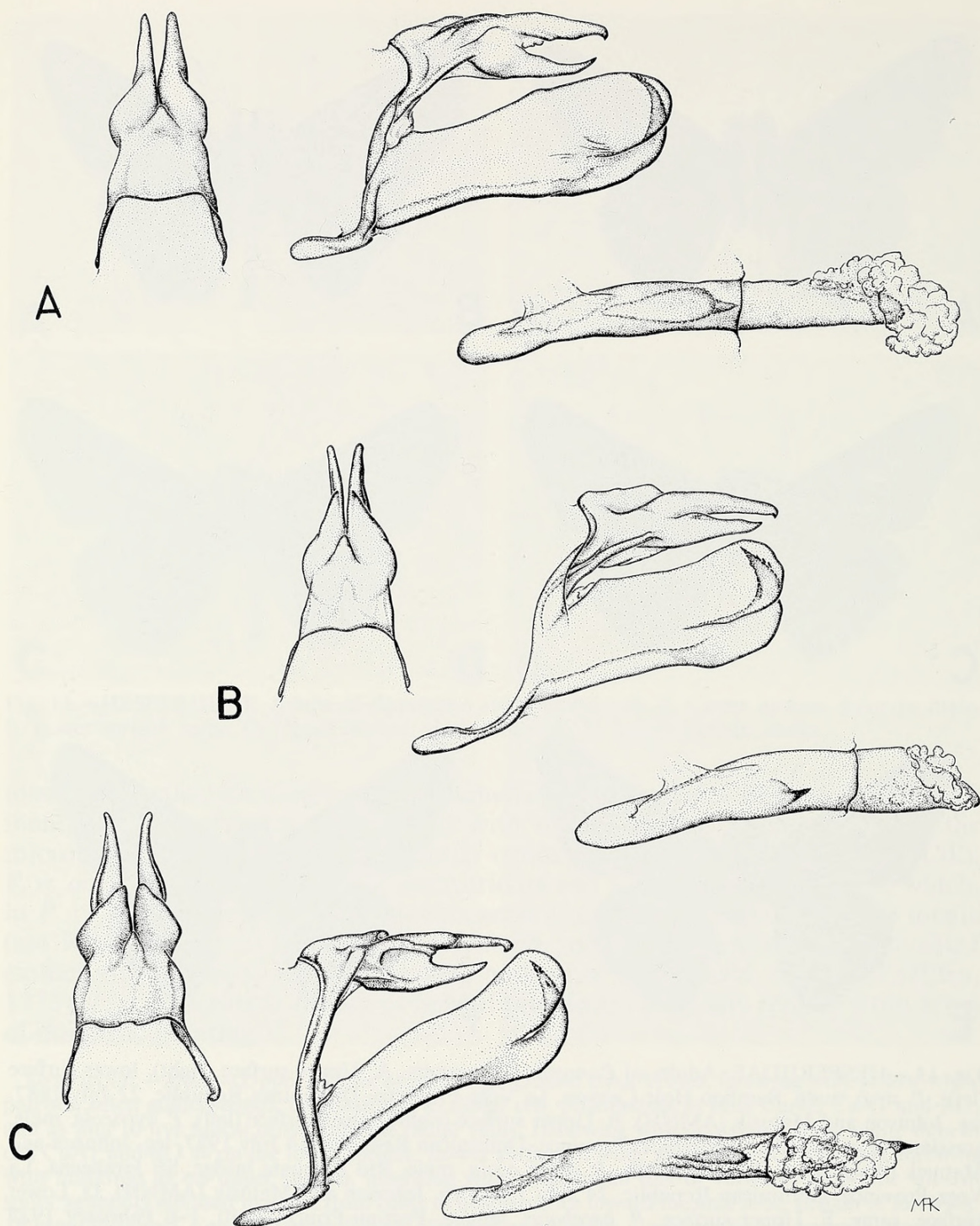


Fig. 15. — HESPERIIDAE. Male genitalia of selected *Panoquina* species. A–C: left, dorsum of tegumen/uncus; center, lateral view of genitalia with aedeagus removed; lower right, aedeagus. A. *P. ocola ocola* of Fig. 14. B. Holotype, *P. ocola distipuncta*. C. *C. hecebolus*, Port-au-Prince, Haiti, 1–6 February 1922 (AMNH).

(AMNH/HS #43, 46 transferred to CMNH); AMNH—(two males, two females) pine forest on way to Las Abejas, July 13, 1986 [circa 1520 m], legs. D. Matusik and K. Johnson (AMNH/HS #49, 50, 51, 52); AME—(two males, one female), data as on primary types, on lifetime loan to A. Schwartz (AMNH/HS #47, 120,

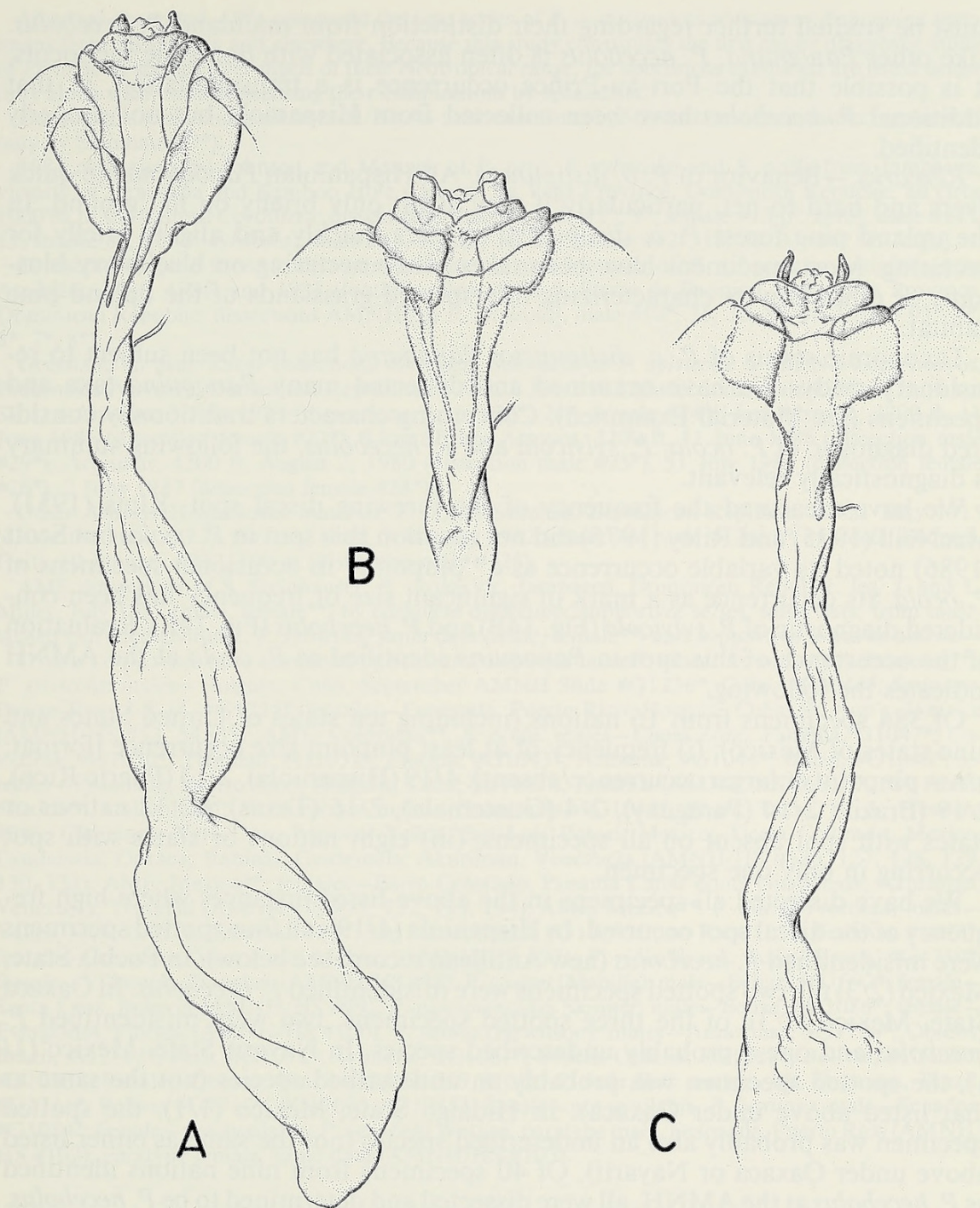


Fig. 16.—HESPERIIDAE. Female genitalia of selected species of *Panoquina*, ventral view. A. *P. ocola*, Rio Baiquate bridge, SE Jarabacoa, La Vega Province, Dominican Republic, 24 July 1987, leg. Johnson and Matusik (AMNH). B. *P. hecebolus* of Fig. 14. F. Allotype, *P. ocola distipuncta*.

121 transferred to AME); NMNH—(one male, one female), data as on primary types (AMNH/HS #48, 122).

P. hecebolus in Hispaniola (new Antillean record): female, Port-au-Prince, 1–6 February 1922 (AMNH) (Fig. 14E, F), confirmed by lack of microtrichia on lamella postvaginalis (Fig. 16B); three associated males, same data (genitalia Fig. 15C), confirmed by comparison to congeners by us and S. Steinhauser. Males

must be studied further regarding their distinction from mainland *P. hecebolus*. Like other *Panoquina*, *P. hecebolus* is often associated with domestic monocots. It is possible that the Port-au-Prince occurrence is a transplantation, or that additional *P. hecebolus* have been collected from Hispaniola but not properly identified.

Remarks.—Behavior of *P. o. distipuncta*: All Hispaniolan *Panoquina* are quick flyers and hard to net, particularly if they alight only briefly on flat ground. In the upland pine forest *P. o. distipuncta* appears quickly and alights briefly for nectaring. Most specimens have been taken while nectaring on blackberry blossoms or other flowers characterizing interspersed grasslands of the upland pine habitat.

Taxonomic status of *P. o. distipuncta*: *Panoquina* has not been subject to revisionary study. We have examined and dissected many *Panoquina* taxa and specimens (see Material Examined). Concerning characters traditionally considered diagnostic of *P. ocola*, *P. sylvicola* and *P. hecebolus*, the following summary is diagnostically relevant.

We have measured the frequency of the forewing discal spot. Klots (1951), MacNeill (1975) and Riley (1975) did not mention this spot in *P. ocola*, but Scott (1986) noted its variable occurrence as a "pinpoint" in occasional specimens of *P. ocola*. Its occurrence as a mark of significant size or frequency has been considered diagnostic of *P. sylvicola* (Fig. 14B) and *P. hecebolus* (Fig. 14E). Evaluation of the occurrence of this spot in *Panoquina* identified as *P. ocola* at the AMNH indicates the following.

Of 384 specimens from 16 nations (including ten states of United States and nine states of Mexico): (i) frequency of at least pinpoint size occurrence [format: n/n = pinpoint or larger occurrence/absent]: 4/19 (Hispaniola), 2/13 (Puerto Rico), 2/19 (Brazil), 2/14 (Paraguay), 2/4 (Guatemala), 2/16 (Texas); (ii) 12 nations or states with spot absent on all specimens; (iii) eight nations or states with spot occurring in only one specimen.

We have dissected all specimens in the above-listed instances where high frequency of the discal spot occurred. In Hispaniola (4/19), all four spotted specimens were misidentified *P. hecebolus* (new Antillean record, see below). In Puebla State, Mexico (2/3) the two spotted specimens were misidentified *P. hecebolus*. In Oaxaca State, Mexico (3/3), of the three spotted specimens, two were misidentified *P. hecebolus* and one a probably undescribed species. In Nayarit State, Mexico (1/1), the spotted specimen was probably an undescribed species (not the same as that listed above under Oaxaca). In Hidalgo State, Mexico (1/1), the spotted specimen was probably also an undescribed species (not the same as either listed above under Oaxaca or Nayarit). Of 40 specimens from nine nations identified as *P. hecebolus* at the AMNH, all were dissected and determined to be *P. hecebolus*.

We conclude that, except for *P. o. distipuncta*, lack of the forewing discal spot is diagnostic of *P. ocola*. Since additional taxa appear to be present in the *Panoquina* species complex now including *P. sylvicola*, *P. ocola* and *P. hecebolus*, future studies may revise the status of *P. o. distipuncta*.

Review: In addition to the general reviews acknowledged, S. Steinhauser and A. Schwartz examined representative specimens and genitalia of *P. o. distipuncta* and other *Panoquina* as asterisked in Material Examined. S. Steinhauser also prepared additional AME material for examination; John A. Shuey and Lee D. Miller examined the materials for Fig. 15 and 16.

Etymology.—The Latinized name refers to the distinctive spot in the discal cell of the forewing.

Material examined.—We compared the type series of *P. o. distipuncta* with many *Panoquina* specimens from Hispaniola and elsewhere. Because this study constitutes the first major diagnostic study of *Panoquina* species over much of their Neotropical range, the specimens examined are listed below fully along with notes concerning their examination by specialists.

HISPANIOLA: (dissections all AMNH/HS #—; also examined by Schwartz and Steinhauser*; examined only by Steinhauser**).

1987 collections by Johnson and Matusik of *P. nero*, *P. sylvicola*, and *S. ocola* from Jarabacoa, vicinity of Jarabacoa and Bamboo Hole Canyon, La Vega Province, Dominican Republic, all circa 1000 m in the Central Cordillera: dissections AMNH, male #1*, 9*, female #13 [*P. nero*]; male #11*, 15, female #2, 16 [*P. sylvicola*]; male #14, 17, 19, 30, 31, female #12*, 18, 32, 33, 34* [*P. ocola*].

Grassland in pine forest collections by Johnson and Matusik of *P. sylvicola* in vicinities near Aceitillar, 1985, 1986, and 1987 (foothills, circa 4000 ft, Sierra de Baoruco, Pedernales Province, Dominican Republic: dissections AMNH [all *P. sylvicola*], male #10*, 35, 36, 37, 38, female #3*, 4*, 6*, 7*, 8*).

Grassland in pine forest collections of Albert Schwartz of *P. sylvicola*: 5 km NE Los Arroyos, Pedernales Province, Dominican Republic, 5300 ft, 2 July 1983 (dissections, male #20*, 21*); .6 km SE Los Arroyos, 3 July 1983 (dissections, male #22*, 23*, female #24*); Los Arroyos, 3200 ft, 11 June 1986 (dissection female #27*); 3 km SE Los Arroyos, 3200 ft, 11 June 1986 (dissection male #29*); Aceitillar, 4200 ft, August 2, 1980 (dissection male #25*), 31 July 1980 (dissection female #26*), 2 June 1987 (dissection female #28*).

Other AMNH Hispaniolan material: *P. ocola*, Sanchez, Dominican Republic, 17–21 May 1915 (dissection male #123); Bizeton, Haiti, 7 January 1922 (dissection male #124); *P. sylvicola*, Diquini, Haiti, 10 January 1922, 100 m (dissection male #125).

AME dissections of S. Steinhauser: *P. ocola*, vic. Jarabacoa, Dominican Republic, leg. J. and L. Miller, July 1987 (male, female**) by complete dissection; supportive series, same data, from undetached extruded genitalia; *P. sylvicola*, same data (male, female**) and supportive series as above.

OTHER LOCALITIES: (also examined by Schwartz and Steinhauser*; examined only by Steinhauser**), *P. sylvicola*: males—Holguin, Cuba, September AMNH Slide #G1236*; Cuba, #G1046*; Santurce, Puerto Rico, I-8-14, #G1235*; females—Ensenada, Puerto Rico; Holguin, Cuba; St. Ann's, Jamaica (AMNH/HS #53, 54, 55); AME, Colombia**. *P. ocola*: males—Canal Zone, Panama, G1047*; Colombia, #G1050*; Trinidad, #G1051*; Florida, #G1043*; Alabama, #G1048*; Brazil, #G1046*; females—Ensenada, Puerto Rico; Holguin, Cuba; St. Ann's, Jamaica (AMNH/HS #56, 57, 58); AME, Mexico**, Colombia**. *P. hecebolus*: males—Guatemala, #G1042*; Pharr, Texas, H. A. Freeman #886; Catemaco, Vera Cruz, Mexico; Valles, San Luis Potosi, Mexico; Tierra Colorado, Mexico; Candelaria, Oaxaca; Rabinal, Guatemala; Akuriman, Venezuela (AMNH/HS #126, 127, 128, 129, 130, 131); AME, Mexico**; females—Barro Colorado, Panama Canal Zone; Guatemala; Akuriman, Venezuela; Trinidad (AMNH/HS #59, 132, 133, 134); AME, Mexico**. *P. evansi* Freeman: males—Valles, Mexico, H. A. Freeman #887; Sao Paulo, Brazil, #G1729; Costa Rica, H. A. Freeman #1093*; female—Catemaco, Vera Cruz, Mexico (AMNH/HS #97). *P. viola* Evans: male—Brazil, #G1759*; female—Villaracia, Paraguay (AMNH/HS #98). *P. pauper* (Mabille): male—Belize, #G1092*; female—Santa Cruz, Bolivia (AMNH/HS #99). *P. panoquinoides* Skinner: male—Belize, #G1086*; female—Everglades, Florida (AMNH/HS #100). *P. fusina* (Hewitson): males—Amazonas, #G1726*; Obidos, Brazil, #G1712*; Peru, #G1091*; Trinidad, #G1087*; French Guiana, #G1088*; Bolivia, #G1090*, #G1089*; female—Obidos, Brazil (AMNH/HS #101). *P. bola* Bell: males—Mt. Roraima, Brazil, #G1711*; Bolivia #G1710*, #G1709*, #G1085*; female—not available. *P. luctuosa*: male—Ecuador, #G1084*; female—not available; *P. nero belli* Watson, paratype male, Ensenada, Puerto Rico (AMNH/HS #102), paratype female, same data (AMNH/HS #103).

CONSERVATION

The mesic broadleaf forests of Las Abejas are currently threatened by habitat destruction. In 1984, Matusik first noted significant deforestation from slashing and burning by Haitian and Dominican squatters converting the moist wooded areas for planting of beans and bananas. CMNH field workers at Las Abejas noted nighttime temperatures dropped steeply and that the area was covered by heavy dew (J. E. Rawlins, personal communication). This moisture probably maintains the broadleaf forest. Except for a few hours after heavy rain, we have never observed surface water in the region. Because of the lack of water, there are few, if any, permanent residents in the forests; migrant planters seed crops and return for random harvests. Near lower Abejas, approximately five acres of canopy has

been destroyed and the land planted over. Farther down the drainage much larger areas have been cleared. On two separate days in 1986 and 1987 lower and middle Abejas were filled with smoke from burning in adjacent drainages.

Administrative personnel of Ideal Dominicana, S. A. ("Ideal") maintain regular records of habitat destruction in the Parque Nacional Sierra Bahoruco [sic]. Except for locals, the area is so remote it is seldom visited. It appears that no one from the Departamento Nacional de Parques has ever been to Las Abejas. In 1987, after "Ideal" forwarded photographs of habitat destruction to park officials, we guided an army patrol into the area and it was temporarily cleared of squatters. As one method of protection, "Ideal" plans to allow the deterioration of all access roads which approach Las Abejas from Aceitillar. However, it appears doubtful there can be a permanent solution. Hopefully, the publication of these results concerning new species of butterflies at Las Abejas will offer further impetus for the protection of the Parque Nacional Sierra Bahoruco.

ACKNOWLEDGMENTS

We are particularly grateful to Albert Schwartz (MCC) who reviewed numerous drafts of this publication and examined and exchanged extensive material involving these descriptions. We are equally grateful to Stephen R. Steinhauser and Jacqueline Y. Miller (AME) who examined numerous specimens and dissections as well as provided review comments. In addition, we thank several specialists and general reviewers who reviewed various drafts of this manuscript. These include John A. Shuey (OSU) [Hesperiidae, ms. through 1986], Lee D. Miller (AME) [Hesperiidae and general review]; John E. Rawlins (CMNH), Frederick H. Rindge and Eric L. Quinter (AMNH) [general review]. Special thanks are due H. A. Freeman (Garland, Texas) for previous review comments on certain Hesperiidae, and John M. Burns (NMNH) for sharing with us results of his recently published work concerning *Hesperia nabokovi* (Hesperiidae) (Burns, 1987). This spared us having to deal with the confusing characters of certain xeric skippers whose proper generic assignment was uncertain.

Heretofore cited personnel of Ideal Dominicana, S.A., along with staff of the Museo Nacional de Historia Natural, Santo Domingo (A. Jimenez Lambertus, Director; R. Sosa, Head of Entomology; K. Guerrero, Assistant) and the Direccion Nacional de Parques gave indispensable assistance. The Carnegie expedition of 1987 was funded by the O'Neil Fund for Invertebrate Zoology; J. E. Rawlins and R. Davidson (CMNH) organized the expedition and also joined us in the field. Joe Brexa (Chicago, Illinois) accompanied the junior author in the field in 1981. Luis Marion Heredia (Santo Domingo), Robert Postelnik (Skokie, Illinois) and David Schmidt, Judith Kunreuther and Betty Manuppelli (New York, New York) provided necessary professional assistance facilitating this work.

LITERATURE CITED

- BECK, A. F. 1983. *Tmolus azia* (Lycaenidae) and *Anteos chlorinde* (Pieridae) in the Dominican Republic. *Journal of the Lepidopterists' Society*, 37(1):89-90.
- BRIDGES, C. A. 1988. Catalogue of Lycaenidae & Riodinidae (Lepidoptera: Rhopalocera). Published by author, Urbana, Illinois, vii + 811 pp.
- BURNS, J. M. 1987. The big shift: *nabokovi* from *Atalopedes* to *Hesperia* (Hesperiidae). *Journal of the Lepidopterists' Society*, 41(4):173-186.
- CLENCH, H. K. 1961. Theclinae. Pp. 178-220 in *How to know the butterflies* (P. R. Ehrlich and A. H. Ehrlich, eds.), W. C. Brown Co., Dubuque, Iowa, 262 pp.
- . 1964. A synopsis of West Indies Lycaenidae with remarks on their zoogeography. *Journal of Research on the Lepidoptera*, 2(4):247-270.
- . 1970. Generic notes on two hairstreaks new to the United States. *Journal of the Lepidopterists' Society*, 24(1):56-59.
- COMSTOCK, W. P., AND E. I. HUNTINGTON. 1944. Lycaenidae of the Antilles (Lepidoptera: Rhopalocera). *Annals of the New York Academy of Science*, 45:119-130.
- EHRlich, P. R., AND A. H. EHRlich. 1961. *How to know the butterflies*. William C. Brown Company, Publishers, Dubuque, IA, 262 pp.
- ELIOT, J. N. 1973. The higher classification of the Lycaenidae (Lepidoptera): a tentative arrangement. *Bulletin of the British Museum (Natural History), Entomology*, 28:373-505.
- EVANS, W. H. 1955. A catalogue of the American Hesperiidae indicating the classification and

- nomenclature adopted in the British Museum (Natural History). Part IV, Groups A–P, Hesperinae and Megathyminae. British Museum (Natural History), London, v + 499 pp.
- FIELD, W. D. 1967a. Preliminary revision of butterflies of the genus *Calycopis* Scudder (Lycaenidae, Theclinae). Proceedings of the United States National Museum, 119:1–48.
- . 1967b. Butterflies of the new genus *Calystryma* (Lycaenidae: Theclinae, Strymonini). Proceedings of the United States National Museum, 123:1–31.
- GALL, F. 1983. Two new species of *Choranthus* (Hesperiidae) from Hispaniola, West Indies. Bulletin of the Allyn Museum, 82:1–9.
- . 1985. Five new species of *Calisto* (Lepidoptera: Satyridae) from Hispaniola. Milwaukee Public Museum Contributions in Biology and Geology, 63:1–16.
- GALL, F., AND A. SCHWARTZ. 1983. *Battus zetides* in the Republica Dominicana. Journal of the Lepidopterists' Society, 37(2):171–174.
- GONZALES, F. L. 1987. Three new species and one new subspecies in the *grannus* complex of Hispaniolan *Calisto* (Lepidoptera: Satyridae). Bulletin of the Allyn Museum of Entomology, 108:1–17.
- HEMMING, F. 1967. The generic names of the butterflies and their type-species (Lepidoptera: Rhopalocera). Bulletin of the British Museum (Natural History), supplement 9:1–509.
- JOHNSON, K. 1976. Three new Nearctic species of *Callophrys* (*Mitoura*) (Lycaenidae) with a diagnosis [sic] of all Nearctic consubgenera. Bulletin of the Allyn Museum, 38:1–30.
- . 1978. Specificity, distributions and foodplant diversity in four Nearctic *Callophrys* (*Mitoura*), Lycaenidae. Journal of the Lepidopterists' Society, 32(1):3–19.
- . 1981. Revision of the Callophryina of the world, with phylogenetic and biogeographic analyses. Unpublished Ph.D. dissertation, Graduate Center, City University of New York, i + 902 pp.
- . 1988. *Tergissima* and *Femniterga*, new sister genera of *Calycopis* Scudder and *Calystryma* Field from the south-central Andes. Insecta Mundi, 2(1):28–42.
- . (In press). A revisionary study of the Neotropical hairstreak butterfly genus *Noreena* and its new sister genus *Contrafacia* (Lepidoptera: Lycaenidae). Journal of the New York Entomological Society, 97.
- JOHNSON, K., AND D. MATUSIK. 1986. First reported males, species status, and affinities of *Epargyreus spanna* (Evans) (Hesperiidae). Journal of the Lepidopterists' Society, 40(1):59–63.
- . (In press). A new species of *Tmolus* (Lycaenidae) from Hispaniola. Addendum in Schwartz, A., Butterflies of Hispaniola. Publications of the Museo Nacional de Historia Natural, Santo Domingo.
- JOHNSON, K., B. MACPHERSON, AND J. INGRAHAM. 1986. A new genus and species of Eumaeini (Theclinae) from western Argentina (Lepidoptera: Lycaenidae). Bulletin of the Allyn Museum, 102:1–7.
- JOHNSON, K., E. QUINTER, AND D. MATUSIK. 1986 [1987]. A new species of *Calisto* from Hispaniola with a review of the female genitalia of Hispaniolan congeners (Satyridae). Journal of Research on the Lepidoptera, 25(2):73–82.
- KAYE, W. J. 1925. New species and subspecies of Trinidad Rhopalocera and Heterocera. Transactions of the Entomological Society of London, 72:413–428.
- . 1931. Additions and corrections to the author's "Butterflies of Jamaica (1926)." Transactions of the Entomological Society of London, 79:531–537.
- KLOTS, A. B. 1951. A field guide to the butterflies of North America, east of the Great Plains. Houghton Mifflin Company, Boston, xvi + 349 pp.
- MACNEILL, C. D. 1975. Hesperidae. Pp. 423–578 in The butterflies of North America (W. H. Howe, ed.), Doubleday and Company, Garden City, xiii + 633 pp.
- MILLER, L. D. 1978. *Electrostrymon angelia angelia* (Lycaenidae), the oldest Florida record? Journal of the Lepidopterists' Society, 32(2):139–140.
- MILLER, L. D., AND F. M. BROWN. 1981. A catalogue/checklist of the butterflies of North America north of Mexico. The Lepidopterists' Society, Memoir No. 2:viii, 1–280.
- MILLER, L. D., AND J. Y. MILLER. (In press). The biogeography of West Indian butterflies (Lepidoptera: Papilionoidea, Hesperioidea): a vicariance model. In Biogeography of the West Indies (C. A. Woods and H. H. Genoways, eds.), E. J. Brill, Leiden.
- RILEY, N. D. 1975. A field guide to the butterflies of the West Indies. New York Times Book Company, New York, 224 pp.
- SCHWARTZ, A. 1983a. Haitian butterflies. Publications of the Museo Nacional de Historia Natural, Santo Domingo, 69 pp.
- . 1983b. A new Hispaniolan *Calisto* (Satyridae). Bulletin of the Allyn Museum, 80:1–10.
- . (In press). The butterflies of Hispaniola. Publications of the Museo Nacional de Historia Natural, Santo Domingo, in press.

- SCHWARTZ, A., AND J. C. CORREA. 1986. The status of *Calisto hysius batesi* (Lepidoptera, Satyridae) with the description of a new species of *Calisto* from Hispaniola. *Florida Scientist (Biological Sciences)*, 49(1):11-18.
- SCHWARTZ, A., AND F. GALI. 1984. Five new species of *Calisto* (Satyridae) from Hispaniola. *Bulletin of the Allyn Museum*, 85:1-18.
- SCHWARTZ, A., AND J. Y. MILLER. 1985. A new species of hairstreak (Lycaenidae) from Hispaniola. *Bulletin of the Allyn Museum*, 99:1-6.
- SCHWARTZ, A., AND W. W. SOMMER. 1986. A new subspecies of *Synapte malitiosa* (Lepidoptera: Hesperidae) from Hispaniola. *Florida Scientist (Biological Sciences)*, 49(1):18-22.
- SCOTT, J. A. 1986. *The butterflies of North America, a natural history and field guide*. Stanford University Press, Stanford, 583 pp.
- SWOFFORD, D. 1985. PAUP (Phylogenetic Analysis Using Parsimony), a computer software package made available by the Illinois Natural History Survey and the author.
- SYKES, L. R., W. R. MCCANN, AND A. L. KAFKA. 1982. Motion of Caribbean plate during last seven million years and implications for earlier Cenozoic movements. *Journal of Geophysical Research*, 87:10656-10676.
- WILLIAMS, C. A. 1986. An oceanwide view of Palaeogene plate tectonic events. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 57(1):3-25.



Johnson, Kurt and Matusik, David. 1988. "Five new species and one new subspecies of butterflies from the Sierra de Baoruco of Hispaniola." *Annals of the Carnegie Museum* 57, 221–254. <https://doi.org/10.5962/p.215185>.

View This Item Online: <https://www.biodiversitylibrary.org/item/216919>

DOI: <https://doi.org/10.5962/p.215185>

Permalink: <https://www.biodiversitylibrary.org/partpdf/215185>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: In Copyright. Digitized with the permission of the rights holder

Rights Holder: Carnegie Museum of Natural History

License: <https://creativecommons.org/licenses/by-nc-sa/4.0/>

Rights: <https://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.