

MILWAUKEE PUBLIC MUSEUM

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(Lepidoptera: Satyridae) from Hispaniola**

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**Frank Gali**  
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### Abstract

Five new species of the *Calisto lyceia* complex from the Republica Dominicana are described. *Calisto lyceia* is redescribed in order to facilitate understanding of differences among species. Detailed descriptions of the five new species (*C. crypta*, *franciscoi*, *hendersoni*, *schwartzi*, and *raburni*) are presented, as well as a discussion of geography and habitat. The complex is characterized by the red suffusion on the underside. A key is provided to distinguish the species from each other.

Twenty species of the endemic Antillean satyrid genus *Calisto* are known from Hispaniola (Munroe, 1950; Riley, 1975; Schwartz and Gali, 1984). Six species were described within the past two years (Schwartz, 1983; Schwartz and Gali, 1984). Three species (*C. micrommata*, *C. sommeri* and *C. neiba* Schwartz and Gali), with super-numerary unhw (underside hindwing) ocelli and two species (*C. clenchi* and *C. clydoniata* Schwartz and Gali) with scalloped edges of hw are apparently derived from common stocks.

Bates (1935) described several new species of *Calisto* from Hispaniola: *C. loxias*, *C. tragi*, *C. eleleus*, and *C. lyceius*. Among these and the other Antillean *Calisto*, only *C. lyceius*, *C. montana* Clench, and an unnamed form are suffused with red on the un. Munroe (1950) discussed this unnamed form of *Calisto* from Monte Cristi, in the extreme northwestern corner of the Republica Dominicana, which Bates (1935) had considered *C. lyceius*. Bates (1935) based his description on two males and one female from Isla Saona, off the southeastern end of Hispaniola, and a "strongly marked" male from Monte Cristi. Munroe (1950) discussed this unnamed form based on two female *Calisto* from the Museum of Comparative Zoology that differed from typical *C. lyceius* in being larger and in having the two middle white spots of the unhw reduced or absent; but without males, a definite conclusion was not made. However, Munroe (1950) suggested that an American Museum of Natural History (AMNH) series, which had not been available to Bates for examination, might represent this form.

In November 1982, a series of four males and six females of *Calisto* were borrowed from the American Museum of Natural History. These specimens were compared with a series *C. lyceius* from Isla Catalina taken Robert W. Henderson during January 1982. Although the Isla Catalina butterflies are themselves a new record for that island, and since there is so little material (2 paratypes) available from Isla Saona, I consider that the populations of these two southeastern Hispaniolan satellite islands are identical. If they do not prove to be so in the future, it will not affect the taxonomy of the other populations discussed herein, but rather will only affect the names of these two satellite populations.

One female specimen collected by R.W. Wisor in 1984 from Monte Cristi agrees with Munroe's (1950) description of an unnamed form of *lyceius*. Monte Cristi males (from AMNH) differ from typical *C. lyceius* with regard to the position of the unhw ocellus white pupil and the extent of the androconial patch. Numerous man-hours (22) spent at Monte Cristi and its vicinity yielded only one specimen (female). This individual agrees with the material from the American Museum (collected in 1930 and 1931). Although no males were recently taken, all of the above suggest very strongly that this population is a new species. Thus, this population affirms Munroe's (1950) suspicion that it is an unnamed form.

One other fact is pertinent: Riley (1975:Pl.3) figured a specimen of a male *C. lyceius* from near Monte Cristi. This illustrates an individual in the American Museum collection, that Riley actually shows a butterfly that is distinct from *C. lyceius* (as noted above), in ways that must be considered at the specific level. To understand the differences between the two, I must redefine *C. lyceius*, stressing those characters I find pertinent in defining the new species. Moreover, I will describe four other populations that are unquestionably new taxa and members of the *lyceius* complex. I will hold off comparisons until all the new members have been described. This should facilitate the understanding of differences among the species.

Schwartz and Gali (1984) pointed out that the gender of the name *Calisto* is feminine; thus adjectival trivial names must have feminine endings. Therefore *lyceius* (masculine) will be changed to *lyceia* (feminine), as well as all adjectival names proposed in this paper and heretofore.

#### *Calisto lyceia* Bates

Fig. 1 — male genitalia; Fig. 7 — un ♂ (AS 7425)

*Calisto lyceius* Bates, 1935. Occ. Papers Boston Soc. Nat. Hist., 8:240. Type-locality: Isla Saona, Rep. Dom.

*Male*: fw length 15-16 mm ( $x = 15.5$  mm.;  $N = 2$ ); upfw and uphw brown (Pl.15E12; all color designations from Maerz and Paul, 1950) without distinct markings; dark androconial patch defined and not parallel to the outer margin; anal spot barely discernible; unfw brick orange (Pl.13B15) extending just adjacent to basal submarginal band, except for brown above subapical ocellus, submarginal area, and along inner margin between Cu2-2A; small black subapical ocellus ringed with dull yellow and with two white pupils, one located centrally, the other basal and adjacent to ocellar ring; postmedian and submarginal bands barely discernible; unhw brick orange like fw except for submarginal band and subocellar areas; antemedian and postmedian lines faint; brown submarginal bands parallel with margin and not wavy tinged with off-white toward anal angle; black, oval hw ocellus with dull yellow ring and a single white pupil located anteriorly adjacent to, or on, the dull yellow ring; four small white dots in ocellar row above hw ocellus located in M3-Cu1, M2-M3, M1-M2, R5-M1, respectively; small anal spot black and topped above with pale white.

*Female*: fw length 15mm ( $x = 15$ ;  $N = 3$ ); upfw and uphw like males, without red tinge on uphw; un generally like males, including hw ocellus with white pupil located anteriorly adjacent to, or on, ocellar ring.

*Remarks*: *Calisto lyceia* has been known from Isla Saona off the southeastern end of Hispaniola. The series of *Calisto* examined is from Isla Catalina also off the southeastern end of Hispaniola. Two specimens of *C. lyceia* from the Museum of Comparative Zoology collection were examined from Isla Saona. One paratype is missing both fw, extremely worn, and the other agrees with Bates's (1935) description. Additionally, extensive field work by Robert W. Henderson on Isla Saona has produced no *C. lyceia*. Both specimens from Isla Saona and the series from Isla Catalina are similar; for this reason the material from Isla Catalina is considered *C. lyceia*.

The specimens from Isla Catalina were collected in a grassy meadow and on bushes therein.

*Specimens examined*: Rep. Dom. Isla Catalina, near naval base, 2 ♂♂, 2 ♀♀ (A. Schwartz colln.); Rep. Dom., Isla Saona, 2 ♂♂ paratypes 21988 and 21988 in collection of MCZ.

*Calisto crypta*, new species

Fig. 2 — male genitalia; Fig. 8 — un ♂ (AMNH)

*Holotype* male: *Republica Dominicana:Provincia de Monte Cristi*: near Monte Cristi, 13.iii.1931 (A.L. Stillman), American Museum of Natural History.

*Paratypes*: 3 ♂♂, 1 ♀, same data as holotype; 1 ♀, (AMNH colln.), R.D. Prov. de Monte Cristi, 1 mi. E Monte Cristi, 6.iii.1931; 1 ♀, (AMNH colln.), R.D., Prov. de Monte Cristi, Rio Yaque, 10 mi. S Monte Cristi, 25.ii.1931; 1 ♀ (AMNH colln.), R.D. Prov. de Monte Cristi, Manzanillo Bay, 27.ii.1931; 1 ♀, (AMNH colln.), R.D., Prov. de Dajabon Chacquey, 28.ii.1931; 1 ♀, (AMNH colln.), R.D. Prov. de Monte Cristi, 8 mi. E Monte Cristi, 28.ii.1930; 1 ♀, (AS colln.). R.D., Prov. de Monte Cristi, 1 km SE Monte Cristi, 16.iii.1984.

*Male*: fw length 16-17 mm. ( $\bar{x}$  = 16.2 mm; N = 5); upfw and uphw brown (Pl.15H11), without distinct markings; dark androconial patch sharply defined and parallel with the outer margin of wing; anal spot barely discernible; unfw brick orange (Pl.13L10) which extends to basal submarginal band except for brown above the subapical ocellus, submarginal area, and along the inner margin between Cu2-2A; large, black subapical ocellus ringed with dull yellow and with pupils, one displaced posteriorly and almost on dull yellow ring, the other located centrally; postmedian line barely discernible; brown submarginal bands parallel with margin; unhw slightly paler than fw except for brown subocellar area; brown antemedian and postmedian lines distinct; brown wavy submarginal bands with pale white toward anal angle; oval hw ocellus black and ringed with dull yellow, with a basally located white pupil; four white spots in ocellar row in M3-Cu1, M2-M3, M1-M2; R5-M1, respectively; anal spot black ringed with pale white.

*Female*: fw length 18-19 mm ( $\bar{x}$  = 18.8; N = 6); upfw and uphw generally paler than males, up without distinctive markings except for inconsistent red tinge on uphw; un generally like males, including unfw subapical ocellus with two white pupils, one located centrally, and the other displaced posteriorly just adjacent to dull yellow ring; unhw characters same as males.

*Remarks*: One female was secured along a roadside where *Uniola virgata* (Poaceae) and *Croton linearis* (Euphorbiaceae) were growing. Collecting was carried on between 1230-1400 h under bright and sunny conditions (T 28°C). At this same locality specimens of *Oarisma stillmani* Bell and Comstock were abundantly taken.

*Etymology*: The name *crypta* is from the Greek for "hidden," in allusion to the many years this has been an unnamed species.

During the summer of 1982, Albert Schwartz and I collected a series of *Calisto* suffused with red on the un, at the west slope of the Sierra Martin Garcia (ESE Canoa). I assumed that these were *C. lyceia*. However, careful examination of the specimens suggested very strongly that I was dealing with a new species.

In 1983 Schwartz and Joel W. Raburn, collected two series of *Calisto*, suffused with red on the un, one from Provincia de Peravia and the other from Provincia de Azua (both located in southwestern Republica Dominicana). These two samples are identical and resemble the population from the Sierra Martin Garcia. Although these three population generally agree with *C. lyceia*, the extent of the red suffusion does not agree with the basic condition in that it extends just adjacent to the submarginal bands from the base of the cell. However, a few intermediate individuals were encountered from Canoa, Sabana Buey, and Tabara Abajo. These individuals have red suffused on the un that does not extend to the submarginal bands as in *C. lyceia*.

One female from Duverge, 40 km E of the nearest of the above localities, was studied. No other individuals were seen there. No *Calisto* from this group has ever been collected from areas between the three localities, but it would not be surprising to find members of this group in intermediate areas. Since no material is available from the intermediate areas, I consider these individuals from the three localities as one species. For this new species I propose the name

*Calisto franciscoi*, new species

Fig. 3 — male genitalia; Fig. 9 — un (holotype)

*Holotype* male: *Republica Dominicana: Provincia de Azua*: Tabara Abajo, 5.iv.1984 (A. Schwartz), ex colln. A. Schwartz, now in collection of Allyn Museum of Entomology, Florida State Museum.

*Paratypes*: (all from Republica Dominicana): 1 ♂, 3 ♀♀ (from Museo Nacional de Historia Natural de Santo Domingo), 22.xii.1979, from type-locality; 1 ♂, (AS colln.), 9.iii.1984; 2 ♂♂, 2 ♀♀ (FG colln.), 10 ♂♂, 8 ♀♀ (AS colln.), 1 ♂, 1 ♀ (FG colln.), 5.iv.1984, from type-locality; 1 ♂, 1 ♀ (AS colln.), 5.iii.1984; 1 ♀, (AS colln.), 9.iii.1984; Prov. de Peravia, 4 km E Sabana Buey, 61 m; 1 ♀ (AS colln.), 5.iii.1984; Prov. de Azua, 1 km E Palmar de Ocoa, s.1.; 4 ♂♂, 5 ♀♀ (AS colln.), 3 ♂♂, 5 ♀♀ (AS colln.), 3 ♂♂, 5 ♀♀ (FG colln.), 31.vii.1982, Prov. de Barahona, 12 km ESE Canoa, s.1.; 1 ♀, (AS colln.), 22.vi.1983; 7 ♂♂, 5 ♀♀ (AS colln.), 1 ♂, 1 ♀, (FG colln.), 26.vi.1983; 1 ♂, (AS colln.), 10.iv.1984, Prov. de Barahona, 3 km NE Canoa, s.1.; 9 ♂♂, 5 ♀♀ (William W. Sommer colln.), 2 ♂♂, 3 ♀♀ (AS colln.), 2 ♂♂, 2 ♀♀ (Milwaukee Public Museum-MPM), 20.iv.1984, Prov. de Barahona, 8 km ESE Canoa, s.1.; 1 ♀, (AS colln.), 15.vii.1983, Prov. de Independencia, 2 km S Duverge.

*Male*: fw length ( $\bar{x}$  = 15-17 mm; N = 46); upfw brown (Pl.16E12) without distinct markings; androconial patch dark, covering the basal two-thirds of fw, not parallel with the outer margin, and well defined; uphw brown (like fw) with a black and white anal spot; unfw brown (Pl.16A10) except for brick-red (Pl.13A12) basodiscal area which extends just lateral to brown postmedian line; large, black, subapical ocellus ringed with dull yellow, ocellus with two pale white pupils, one located centrally, the other on yellow ring; brown submarginal bands running parallel, unhw brick-red (like fw) except for outer margin, submarginal, and subapical areas; fine postmedian and antemedian lines barely discernible; brown submarginal bands wavy and running parallel and tinged with beige toward anal angle; unhw black oval ocellus ringed with dull yellow, with two white pupils, one located centrally and the other basally adjacent to dull yellow ring; four white dots in postdiscal portion of wing in ocellar row in M3-Cu1, M2-M3, M1-M2, R5-M1, respectively; anal spot black and topped with pale white.

*Female*: fw length 17-19 mm ( $\bar{x}$  = 17.8; N = 45) upfw and unhw pale brown (Pl.15E11); uphw with inconsistent red-orange blush in postdiscal area with a distinct black and white anal spot; unfw dark brick orange (Pl.15E10) except for submargin, inner margin in Cu2-2A, along the fine edge of costa, and subapical portions of wing; large black subapical ocellus ringed with yellow, two white pupils within ocellus, one located centrally, the other adjacent to yellow ring; unhw like uphw dark brick orange except for brown submarginal and subocellar areas; unhw characters generally like males.

*Remarks*: In 1982, Schwartz and I stopped at the western base of the Sierra Martin

Garcia. This locality is reached by a winding road (8 km ESE Canoa) from the main highway. It is xeric with primarily *Acacia* scrub, and *U. virgata* towards the roadsides and mangrove swamps by the sea. Collecting was difficult due to the *Acacia* scrub and the very hot and humid weather.

A collector's impression of *C. franciscoi* is of a red-brown, fast flying butterfly which can quickly evade the collector, using the xeric woods as a haven. More individuals were taken on or near *U. virgata* and on a small low (10 cm) white flowering vine. We collected 7 ♂♂ and 10 ♀♀ on 31.vii.1982 between 0845 and 1200 h (T 33°C at 1000 h) at 12 km ESE Canoa, s.1.; the day was bright and sunny and humid, with little or no breeze. At 8 km ESE Canoa, 1 ♀ was collected on 22.vi.1983 between 0945 and 1145 h (T 32°C); the day was bright and sunny, and this individual was taken in grass tussocks; 8 ♂♂ and 6 ♀♀ were collected on 26.vi.1983 between 1000 and 1115 h (T 33°C). More individuals were seen than taken, and many more butterflies (especially pierids) in general were seen. Four ♂♂ and 5 ♀♀ were collected on 20.iv.1984 between 1040 and 1315 h (T 31°C); the day was overcast and most *C. franciscoi* were seen or taken on a tall (2 m) white-flowered shrub (*Melochia nodiflora*; Sterculiaceae). At 3km NE Canoa on 10.iv.1984 at 1020 h (T29°C), one ♂ individual was taken in open woods in tussocky grass; one other was seen feeding on *Croton* sp.

The series examined of *C. franciscoi* consists of 29 ♂♂ and 27 ♀♀ from the western base of the Sierra Martin Garcia, 14 ♂♂ and 11 ♀♀ for Tabara Abajo, 2 ♂♂ and 2 ♀♀ from Sabana Buey, 1 ♀ from Palmar de Ocoa, and 1 ♀ from Duverge. All the localities are xeric lowland woods, generally *Acacia* scrub and patches of *Uniola virgata*, with the exception of Durverge. The single female from Durverge, was collected on a weedy "mesic" hillside adjacent to an irrigation ditch. Collecting on 15.vii.1983 was between 1315 and 1330 h (T 35°C).

During the spring of 1984, Schwartz, Robert W. Henderson, and Randolph W. Wisor collected additional series of *C. franciscoi*. These include 13 ♂♂ and 12 ♀♀ from Provincia de Azua (Tabara Abajo), 1 ♂ from the same Provincia (Palmar de Ocoa), 1 ♂ and 2 ♀♀ from Provincia de Peravia (Sabana Buey), and 1 ♀ from the Provincia de Independencia (Duverge).

A visit to the type-locality (Tabara Abajo) on 5.iv.1984 revealed that at this site and particular point in time the species was most easily and abundantly encountered in a small patch of *Acacia* along a rail fence (field irrigated) with a very few flowers (*Bidens pilosa*) on which *Calisto*, *Oarisma stillmani* and *Burca* sp. were feeding in both morning and afternoon. Collecting on this date was between 0945 and 1140 h (T 31°C) and 1315 and 1430 h (T 37°C). One individual had previously been taken at the type-locality on 9.iii.1984 in tussocky grass, with two other individuals seen in an organpipe cactus "forest."

The second locality (Sabana Buey) for *C. franciscoi* was visited by Schwartz and Wisor on 5.iii.1984; they collected between 1245 and 1330 h and 1400 and 1515 h (T 33°C). Here *C. franciscoi* was relatively uncommon and was collected on a hillside with cacti and grass tussocks.

The third locality (Palmar de Ocoa) for *C. franciscoi* is approximately 8 km from Sabana Buey and was visited on 5.iii.1984 between 1140 and 1215 h (T 34°C). The individual was taken from a "mesic" spring run; however, in general the locality is extremely xeric.

*Etymology:* *Calisto franciscoi* is named in honor of my father Francisco Gali, who has provided a special source of guidance, understanding, and support; for this I

express my gratitude and love in the inadequate gesture of naming this species for him.

During the fall of 1983, female specimens of *Calisto* were collected by Schwartz and Raburn that appeared to be a new population from the Valle de Neiba. The suspicion was affirmed during the spring of 1984, when Schwartz and Henderson found these *Calisto* abundantly in the Valle de Neiba (at the same locality); these individuals resemble *C. lyceia* but are actually quite different. The population is distinct from *C. lyceia* in ways that I consider to be at the specific level. For this population I propose the name

*Calisto hendersoni*, new species

Fig. 4 — male genitalia; Fig. 10 — un (holotype)

*Holotype* male: *Republica Dominicana: Provincia de Independencia*: 4 km E El Limon, 2.iv.1984 (A. Schwartz), ex colln. A. Schwartz, now in collection of Allyn Museum of Entomology, Florida State University.

*Paratypes*: 10 ♂♂, 9 ♀♀ (AS colln.), 2 ♂♂ (MPM), 2 ♂♂, 2 ♀♀, (FG colln.), 2.iv.1984; 3 ♀♀ (AS colln.), 2 ♀♀, (MPM), 16.x.1983, all from the type-locality.

*Male*: fw length 14-15 mm ( $\bar{x}$  = 14.9; N = 14); (Pl.16A5) without distinct markings; dark androconial patch sharply defined and not parallel with outer margin; unfw dark brick-orange (Pl.13A12) extending from basal portion of wing just adjacent to basal submarginal band; small subapical ocellus black, ringed with dull yellow with two white pupils, one located centrally, and the other basal on, or just outside of, dull yellow ring; postmedian line and submarginal bands faint; unhw dark brick-orange (Pl.13A10) except for light brown subocellar area and along outer margin; fine brown antemedian and postmedian lines; distinct brown submarginal bands parallel with outer margin, tinged with beige toward anal angle; oval black hw ocellus ringed with yellow, with a central pupil, and a basally located white pupil, virtually on yellow ring; four white dots in ocellar row in M3-Cu1, M2-M3, M1-M2, R5-M1, respectively; anal spot black and topped with pale white.

*Female*: fw length 16-18 mm ( $\bar{x}$  = 16.9; N = 14) up slightly paler than males, uphw tinged with red blush; un generally like male except females have wavy submarginal bands and distinct unhw white pupils.

*Remarks*: The series examined of *C. hendersoni* includes 14 ♂♂ and 11 ♀♀, all from the same locality in the Valle de Neiba (El Limon). The Valle de Neiba is bounded on the north by the Sierra de Neiba and on the south by the Sierra de Baoruco. The locality consists primarily of *Acacia* scrub and stands of *U. virgata*. Some individuals were collected as they landed on grassy tussocks. Most *C. hendersoni* were collected on two white-flowered plants (*Pithecellobium circinale*; Fabaceae) and (*Melochia nodiflora*; Sterculiaceae) in open *Acacia* woods. The weather was hot and sunny on 2.iv.1984 between 1100 and 1340 h (T 33°C) and on 16.x.1983 between 0940 and 1130 h (T 33°C).

*Etymology*: *Calisto hendersoni* is named in honor of Robert W. Henderson; he accompanied Schwartz during part of the spring of 1984 and collected specimens from the type-locality. In addition, he has enthusiastically collected on Isla Saona and Isla Catalina for Schwartz and me.

During the fall of 1983, Schwartz and Raburn collected a series of *Calisto* from the Sierra de Baoruco. These butterflies are large and quite distinct from *C. lyceia*, although the basic characters of the complex are present. For this population I propose the name

***Calisto schwartzi*, new species**

Fig. 6 — male genitalia; Fig. 11 — un (holotype)

*Holotype* male: *Republica Dominicana: Provincia de Pedernales*: 1 km N Aceitillar, 1281 m; 6.x.1983 (A. Schwartz), ex colln. A. Schwartz, now in collection of Allyn Museum of Entomology, Florida State Museum.

*Paratypes*: 16 ♂♂, 1 ♀ (AS colln.), 2 ♂♂, 2 ♀♀ (MPM), 2 ♂♂, 2 ♀♀ (FG colln.), 6.x.1983, from type-locality.

*Male*: fw length 17-19 mm ( $\bar{x}$  = 19.8; N = 21); upfw brown (Pl.15E8); androconial patch dark, diffuse, covering basal and discal portions of fw; uphw with black and white anal spot; unfw light brick-red (Pl.5F11) except for pale brown submarginal area, subapical portion of wing, along fine edge of costa, and along the inner margin in Cu2-2A; large black subapical ocellus, extending from M3 to between M1-R5, ringed with yellow, ocellus with two pupils, one located centrally, the other adjacent to yellow ring; brown submarginal bands wavy, basal or medial band the broader of the two, both extending from costa to Cu2; bold brown postdiscal line extending from just inside the costa to Cu2; unhw brown (Pl.15L10), lighter toward the outer margin and light orange-brown scaling on anal margin; small black oval ocellus located in Cu1-Cu2, ringed with yellow, ocellus with a small white pupil basally located on outer edge of yellow ring; four white spots not in ocellar row located in M3-Cu1, M2-M3 more basally located, M1-M2, R5-M1, respectively; smooth fine brown postdiscal line extending from just below Cu2 to inner costa; postmedian line irregular and barely discernible; submarginal bands broadly spaced, irregular, and interrupted toward apex of hw, and joining together at anal spot with off-white coloration between lines in area below hw ocellus; anal spot black and topped with white.

*Female*: fw length 18-21 mm ( $\bar{x}$  = 19; N = 5); upfw brown (Pl.15H12) with dark brown (Pl.15A9) covering the post discal and basal portions of fw; uphw dark brown (Pl.15H12) lighter toward outer margin, and with a distinct orange (Pl.13J10) post-discal area; uphw with a black and white anal spot; unfw and unhw like males except for frequently smaller four white spots on unhw.

*Remarks*: *Calisto schwartzi* is known from the south slope of the Sierra de Baoruco at an elevation of 1281 m. The Sierra de Baoruco lies on the eastern end and on the northern "shore" of the south paleoisland (Schwartz, 1980). The two paleoislands were once separated by a marine strait, which is now the Cul de Sac-Valle de Neiba plain. It separates the Sierra de Baoruco-Massif de la Selle from the north island Sierra de Neiba-Montagnes du Trou-d'Eau.

The road that ascends to the type-locality is owned by the Alcoa Exploration Company. The type-locality is located several feet from the main road along a path 1 km from El Aceitillar. *Calisto schwartzi* was collected in stands of a "bunch grass" within pine woods, feeding on a low purple-flowered composite (*Herodotia mikanoides*; Asteraceae). The butterflies were very common at this locality, and were active between 1215 and 1345 h; the day was bright and sunny (T 28°C).

*Etymology:* *Calisto schwartzi* is named in honor of Albert Schwartz, who has exemplified himself as a source of friendship and knowledge during my field work in 1981 and 1982, and equally as important, away from the field. His enthusiastic and dedicated approach to work on Hispaniola has made a tremendous impact in my work.

In 1984, Schwartz and Raburn visited the Dominican portion of the Massif de la Selle, where a single red-brown *Calisto* was collected. The rounded shape of the fw and the un pattern made this individual unequivocally distinct from *C. lyceia* and other members of the complex in ways that I consider to be at the specific level.

#### *Calisto raburni*, new species

Fig. 5 — male genitalia; Fig. 12 — un (holotype)

*Holotype* male: *Republica Dominicana: Provincia de Independencia*: 7 km NE el Aguacate, 519 m, 6.vii.1983 (A. Schwartz), ex colln. A. Schwartz, now in collection of Allyn Museum of Entomology, Florida State Museum.

*Paratypes*: fw length 17 mm ( $\bar{x}$  = 17; N = 1); upfw and uphw brown (Pl.15F9); upfw with large androconial patch occupying most of basal two-thirds of wing, not well defined; upfw apex rounded; unfw brick red (Pl.6L11) in subocellar and postdiscal portions of wing (appears as a red inverted triangle); un slightly paler than up, with very distinct postmedian and subocellar lines; two wavy submarginal bands along the outer margin, the more basal band broader towards the inner costa; large black ocellus between M1-M3, ringed with yellow, with two white pupils, the anterior displaced anteriorly of center, the posterior adjacent to yellow ring; unhw dull brick red (Pl.6J10); unhw with a fine brown postmedian line and two dark red-brown irregular submarginal bands without distinctive color between them except beige toward anal angle; unhw ocellus small and ellipsoidal between M3-Cu1, and ringed with pale yellow, with a basal white pupil on the outer edge of ring; in addition a small white dot in M2-M3, and a distinctly larger more basal dot in M1-M2; anal spot black and topped with pale white.

*Female*: unknown.

*Remarks*: The holotype was secured along a road through transitional forest on the northern slope of the Massif de la Selle. Although the Massif de la Selle is located primarily in Haiti, this range extends into the Republica Dominicana. The holotype was seen by Schwartz as he stopped in the middle of the grassy road, approximately 200 m from the main road. The butterfly oriented itself broadside to the sun, and was easily secured by Schwartz. Raburn and Schwartz collected on 6.vii.1983 between 1030 and 1500 h (T 29°C), under overcast with occasional sunny conditions. Forests above those at the type-locality are rich mesic deciduous forest; those at the type-locality are rather xeric. No other individuals were seen at this locality on twelve visits.

*Etymology*: The species is named in honor of Joel W. Raburn, who unfailingly accompanied Schwartz during the summer and fall of 1983 and who was a major contributor to the success of those trips.

#### Comparisons

With the description of five species of *Calisto*, all suffused with red on the underside, it is pertinent to compare these populations with *C. lyceia*. *Calisto lyceia* is geographi-

cally far removed from the outer species of the group at Isla Catalina and Saona on the southeastern end of Hispaniola. *Calisto crypta* appears closest in characters, followed by *C. franciscoi*, *C. hendersoni*, *C. schwartzi*, and *C. raburni*, respectively.

The most convenient way to compare these new species is first to compare *C. lyceia* with *C. crypta*, closest in characters, and follow in sequence as above.

The primary character which distinguishes *C. lyceia* from *C. crypta* is the relation of the androconial patch to the margin of fw. In *C. crypta* the androconial patch is sharply defined and distinctly parallel with the outer margin. Conversely, the patch in *C. lyceia* is defined but rounded and does not parallel the outer margin. Upperside and un colors and characters are quite similar for both species except for the following: unhw ocellus white pupil is located adjacent to (virtually in contact) or on the dull yellow ring in *C. lyceia*, whereas in *C. crypta* the white pupil is located basad without contact with yellow ring; *C. crypta* female fw length is 18-19 mm, as compared with 15 mm. for female *C. lyceia*, a very obvious size difference even at a glance. Otherwise females are also quite similar in color and characters.

*Calisto franciscoi* has dark brick orange unfw and unhw, the color running from the base of the cell lateral to the postmedian line. In *C. lyceia* the unfw and unhw are a lighter brick orange, the color extending from the base of the cell adjacent to the basal submarginal band. In *C. lyceia* the unfw ocellus has two white pupils, one located centrally and the other basally but not in contact with the yellow ring. In *C. franciscoi*, the one unfw white pupil is located centrally, and the other basally on the yellow ring. The submarginal bands are wavy in *C. franciscoi* and not wavy in *C. lyceia*. In *C. franciscoi*, the unhw ocellus has two white pupils located centrally and the other basally adjacent to the yellow ring. However, in *C. lyceia* the basally located white pupil is on, or adjacent to, the yellow ring in addition to the central white pupil.

*Calisto hendersoni* may be recognized by its dark brick orange unfw and unhw color which extends from the base of the cell to the basal submarginal band. In *C. lyceia* the unfw and unhw are a lighter brick orange but are similar to *C. hendersoni* in the extent of the color. Additionally, *C. hendersoni* is characterized by the position of the upfw ocellus white pupil basally on or just outside, the dull yellow ring. Male *C. hendersoni* have fw lengths of 13-15 mm (versus 15-16 mm in *C. lyceia*), and female *C. hendersoni* have fw lengths of 16-18 mm (versus 15-18 mm in *C. lyceia*).

*Calisto schwartzi* is easily distinguished by its size (17-19 mm males and 18-21 mm females) and dark diffuse androconial patch covering the basal and discal portions of fw. Both of these characters are seen only in *C. schwartzi*. *Calisto lyceia* is smaller in size (15-16 mm in males and 15 mm in females) and the extent of the androconial patch (virtually restricted to the cell). Several other differences are pertinent. In *C. schwartzi* the unfw and unhw are brick red, as compared with brick orange in *C. lyceia*. The pattern differences include wavy, broader submarginal bands and larger ocelli in *C. schwartzi*. Additionally, the unhw ocellus white pupil is located basally on the outer edge of the yellow ring. In *C. lyceia* the unhw ocellus white pupil is adjacent to, or on, the dull yellow ring, and never outside the ring. Moreover, in *C. schwartzi* the unhw four white spots are not in an ocellar row, with the dot in M2-M3 more basally located. Whereas in *C. lyceia*, the unhw four white dots are consistently positioned in an ocellar row.

*Calisto raburni* is the most distinctive member of the *C. lyceia* complex. Along with the pattern differences, a unique character in *C. raburni* is the rounded upfw

apex not found in other members of this group. In *C. lyceia* the androconial patch is defined and conspicuous, whereas in *C. raburni* the androconial patch is large and not well defined. *Calisto raburni* is brick red on the underside as compared with brick orange in *C. lyceia*. Additionally, the color appears as an inverted triangle in *C. raburni*. *Calisto lyceia* unfw color pattern extends just adjacent to the basal submarginal band. The submarginal bands are much broader in *C. raburni*, especially the basal band. On the unhw, the ocellus is small and ellipsoidal with a basal white pupil on the outer edge of the yellow ocellus. In *C. lyceia* the unhw ocellus is larger, oval and with a basal white pupil within the ocellus. Also, the unhw four white dots are in an ocellar row. This characteristic is absent in *C. raburni*. *Calisto raburni* has two white dots and a distinct dash; this character is atypical of the *lyceia* complex.

#### Discussion

The *lyceia* complex is composed of six species whose range is widespread geographically and altitudinally in the Republica Dominicana. No member of this group has been encountered in Haiti; however, habitat situations in Haiti are certainly ideal for some of the members of this complex. The complex is characterized by the red suffusion on the underside; in addition, two members (*C. raburni* and *C. schwartzi*) have characters that differ from other members within the *lyceia* complex.

The *lyceia* complex can be divided into two groups geographically, corresponding to the north and south paleoislands into which Hispaniola was once divided. The north island species (*C. lyceia*, *C. crypta*, and *C. franciscoi*) seem to be more closely related to each other than they are to the south island species. *C. crypta* and *C. franciscoi* occupy xeric "coastal" areas, and *C. lyceia* is found on two xeric islands (Isla Saona and Isla Catalina).

I examined two specimens collected by L. Dominguez in the Museo Nacional de Historia Natural de Santo Domingo, from Puerto Frances Viejo, which is a mesic coastal area found on the Peninsula de Samana (in the extreme northwestern portion of the Republica Dominicana). The specimens seem to agree in characters with *C. lyceia*; however the specimens were not available for careful scrutiny, and thus it is futile to attempt further discussion until more specimens from the area become made available, and further examination of material is once more possible.

*Calisto hendersoni*, occurs on the northern "shore" of the south island, in the Cul de Sac-Valle de Neiba plain — the modern division of the two old islands. Strictly speaking, *C. hendersoni* is closer to the south than the north island but is more closely associated with the three north island species.

Although *C. hendersoni* is not a coastal area butterfly, it does occur in a hot, xeric, and lowland habitat comparable with the situation inhabited by the north island species. The species of the complex are xerophiles, inhabiting the rigorous terrain of Cactus and *Acacia* forest where collecting is difficult.

It is interesting to note the local occurrence of *Oarisma stillmani*, *Atalopedes nabokovi*, Bell and Comstock and members of the *lyceia* complex. At three localities, (Monte Cristi and environs southeast, Canoa at the base of the Sierra Martin Garcia, and El Limon, Valle de Neiba), these species have been taken together. Other collecting sites where *O. stillmani* and a *lyceia* complex member occurs without *A. nabokovi* are: Isla Catalina, Tabara Abajo, and Sabana Buey (Llanos de Azua), and the *lyceia* complex members from the above localities occur in extremely xeric scrub forest, consisting of *Acacia*, cacti, and with the xerophytic grass *Uniola virgata*. *U. virgata*

almost always harbors all three. Seasonal changes may account for absences — it is usually hot and dry, and often very humid.

*Calisto raburni* and *Calisto schwartzi* are restricted to the south island, *C. raburni* on the Dominican portion of the Massif de la Selle, *C. schwartzi* on the Sierra de Baoruco. Both *C. raburni* and *C. schwartzi* occur at higher elevations than typical for the complex, *C. schwartzi* occurring at a higher elevation than *C. raburni*. *Calisto schwartzi* occupies pinewoods habitat, whereas *C. raburni* occupies transitional forest. Thus, both species occur in xeric habitats, but extremely different from the xeric lowland situation found for the other species of the complex. *Calisto raburni* is radically different in pattern and fw shape from *C. schwartzi* and other *lyceia* complex species. One might with some justification consider *C. raburni* a species derived from a stock other than *C. lyceia* complex species. But the question: of typical stock? Is *C. raburni* a highly differentiated species from the *lyceia* complex? I chose to consider *C. raburni* as a species of the *lyceia* complex based on the red suffusion on the underside of *C. raburni*.

There remains the problem of relationship between *C. montana* and *C. lyceia* complex. The description of *C. montana* (Clench 1943:24) suggests the basic character of the *lyceia* complex (red on the underside in the cell) but differs in other details of coloration and pattern. Since no new specimens were available for examination (the name is based only on the male holotype), further comparison will not be pursued.

#### Genitalia

All species of the *lyceia* complex are apparently members of Bates's 1935) *hysia* group. Schwartz and Gali (1984) suggested that *Calisto* that are closely related or have diverged from each other minimally insofar as male genitalia are concerned may be quite different with regard to coloration and pattern. This is apparently the case with the species of the *lyceia* complex, with the exception of *C. raburni*.

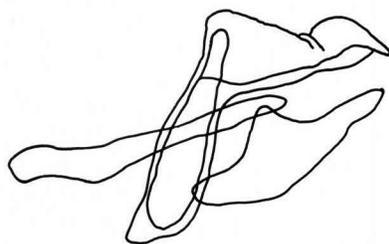
*Calisto raburni* male genitalia are the most distinctive. The uncus is slightly smaller in proportion to the tegumen and there is a deep pretegmenal groove. The posterior part of the tegumen is acutely angled and curves downward to continue as the vinculum. The other species of the *lyceia* complex are rounded at the posterior portion of the tegumen, with the exception of *C. schwartzi* which has the posterior portion of the tegumen more like that of *C. raburni*. In *C. raburni*, the "neck" of the uncus is slender and curved in comparison with the other *lyceia* complex species. Additionally, the uncus is sinuate dorsally in contrast to the dorsal arch of the other species. The penis is short and stout with minimal bowing. The saccus is thin and bowed posteriorly. Other species in the complex have thin, short, and simple sacci, but *C. schwartzi* has a small wedge-shaped saccus. The valvae, in *C. schwartzi*, are simple, rounded toward the middle, and smaller in proportion to those of other species of the complex.

Male genitalia of *C. lyceia*, *C. franciscoi*, *C. hendersoni*, and *C. crypta* are essentially the same in characters, except for the size of the uncus. (Note: no *C. crypta* male was available with a penis). In all four species, the uncus is strongly arched dorsally and separated from the tegumen by a small pretegmenal groove, like the *hysia* group. However, in *C. franciscoi* the uncus is elongate and proportional in size to the tegumen. *Calisto hendersoni* and *C. crypta* have much smaller unci in proportion to the tegumen. The penes are moderately slender and bowed in *C. franciscoi* and in *C. hendersoni*; however, in *C. lyceia* the penis is thin, elongate, sinuate posteriorly,

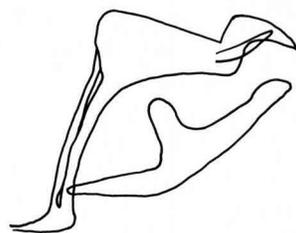
very different from those of the other species of the *lyceia* complex. The valvae are simple and fairly broad toward the middle in all *lyceia* complex species with the exception of *C. raburni* (already described) and *C. schwartzi*. *Calisto schwartzi* valvae are relatively slender and not very broad toward the middle. The penis is elongate (largest of the *lyceia* species) and bowed.

**A Key to the Species of the *Calisto lyceia* Complex**

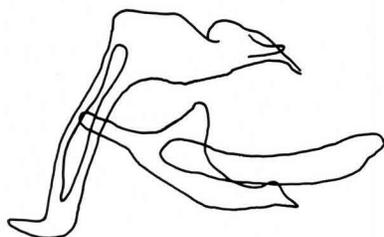
- 1. UPFW androconial patch sharply define . . . . . 2.
- 1'. UPFW androconial patch diffusely or not sharply defined . . . . . 5.
- 2. UPFW androconial patch parallels outer margin . . . . . 3.
- 2'. UPFW androconial patch does not parallel outer margin . . . . . 4.
- 3. UNHW ocellus pupil within yellow ring; female FW length 18-19 mm . . . . . *C. crypta*
- 3'. UNHW ocellus pupil on pale yellow ring; female FW length 15-16 mm . . . . . *C. lyceia*
- 4. UNFW brick red blush extends past UNFW ocellus to basal-submarginal lines; UNHW with basally located white pupil, virtually on yellow ring . . . . . *C. hendersoni*
- 4'. UNFW brick red does not extend past UNFW ocellus . . . . . *C. franciscoi*
- 5. FW rounded; UNHW with 3 white dots not in row, the dot in M2-M3 distinctly larger and more basally located; UNHW ocellus very small and ellipsoidal . . . . . *C. raburni*
- 5'. Male and female FW length 17-19 mm and 18-21 mm, respectively; UNHW with 4 white dots in row except that in M2-M3; UNHW ocellus with a small white pupil, located basally on outer edge of yellow ringe . . . . . *C. schwartzi*



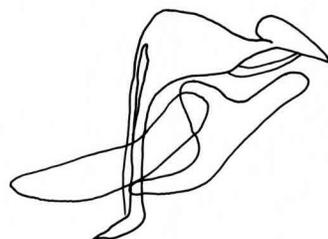
**Figure 1.** *C. lyceia* (AMNH).



**Figure 2.** *C. crypta* (AMNH).



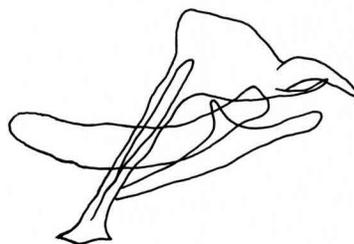
**Figure 3.** *C. franciscoi* (FG 1261).



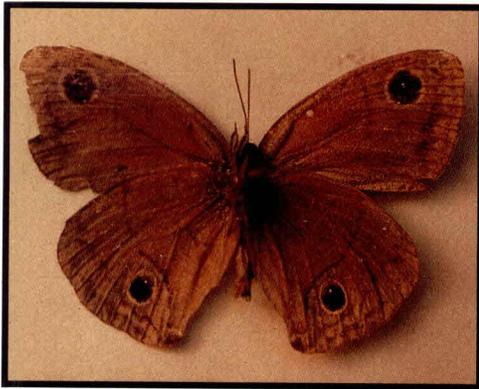
**Figure 4.** *C. hendersoni* (AS 13169).



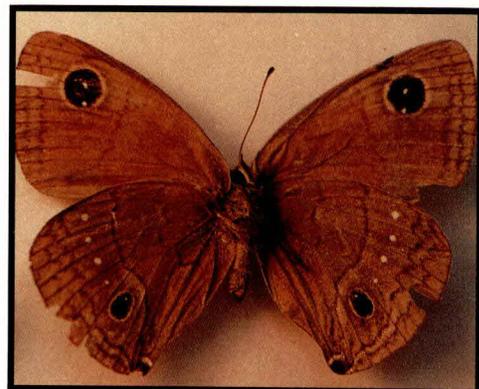
**Figure 5.** *C. raburni* (AS 10309).



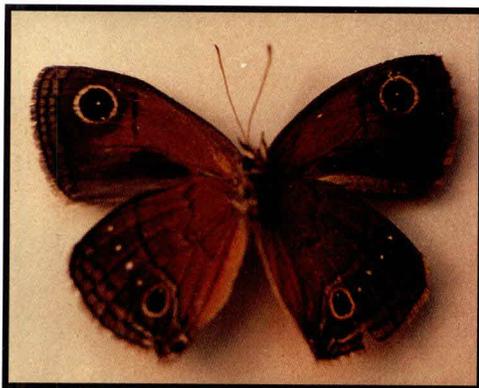
**Figure 6.** *C. schwartzi* (AS 11336).



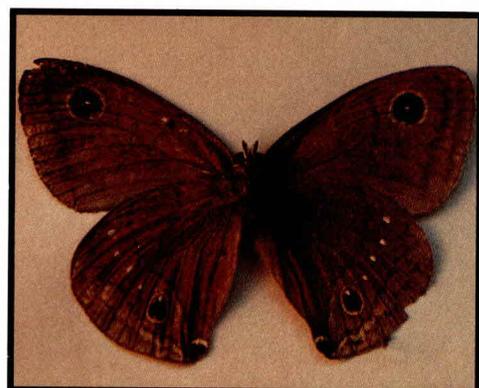
*Figure 7. C. lyceia* (AS 7425).



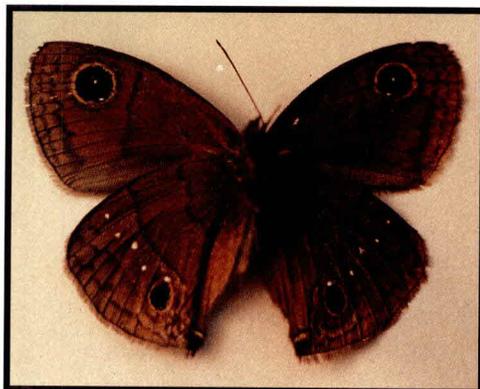
*Figure 8. C. crypta* (holotype).



*Figure 9. C. franciscoi* (holotype).



*Figure 10. C. hendersoni* (holotype).



*Figure 11. C. schwartzi* (holotype).



*Figure 12. C. raburni* (holotype).

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