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A NEW HISPANIOLAN CALISTO (SATYRIDAE)

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INTRODUCTION

The endemic Antillean satyrid genus *Calisto* Lathy 1899 has its greatest species-diversity on the island of Hispaniola. Riley (1975) recognized fourteen species on that island (*pulchella* Lathy, *archebates* Ménétriés, *chrysaoros* Bates, *loxias* Bates, *arcas* Bates, *confusa* Lathy, *obscura* Michener, *lyceius* Bates, *traqius* Bates, *hysius* Godart, *montana* Clench, *eleleus* Bates, *grannus* Bates, and *micheneri* Clench). Elsewhere in the islands, Jamaica has a single species (*zangis* Fabricius) and Puerto Rico one (*nubila* Lathy). On Cuba occur *smintheus* Bates, *herophile* Hübner, and *biocellatus* de la Torre; on the Bahamas occur *sibylla* Bates (Clench, 1977: 184), as well as an endemic Bahamian subspecies of *C. herophile* (*appolinis* Bates). On Cuba and the Isla de Juventud (= formerly the Isla de Pinos) occur the nominate widespread subspecies of *C. herophile,* as well as *C. h. parsonsi* Clench in the Sierra de Trinidad and *C. h. bruneri* Michener from Moa in Provincia de Holguín. There are also three subspecies of *C. smintheus* on Cuba: *delos* Bates in the Sierra Maestra, *muripetens* Bates in the Sierra de Escambray, and *bradleyi* Munroe from the Sierra de Rangel (= Sierra del Rosario) in the western Provincia de Pinar del Río. *Calisto biocellatus* is poorly understood; it is known only from two specimens from Pico Cuba in the Sierra Maestra in Oriente (distributions of Cuban taxa from Clench, 1943; Michener, 1949). Riley (1975:53) suggested that *biocellatus* may well be an upland subspecies of *C. sibylla* (= *C. smintheus* as used herein); it differs from that species in larger size and darker coloration, a more prominent yellowish submarginal line on the unhw, and a small additional ocellus on the unfw in Cu_1-Cu_2.

Bates (1935:231) divided the genus into two sections; Munroe (1950) and Brown and Heineman (1972:51) added later-named species. The basis for this division is the point of origin of R_1 in relation to the fw cell. Section A includes four Hispaniolan species (*arcas, loxias, archebates, chrysaoros*). Section B is divided into six groups of which three (*hysius* group - *hysius, tragius, obscura, confusa, lyceius, micheneri, montana, grannus*), *eleleus* group (*eleleus*), and *pulchella* group (*pulchella*) are restricted to Hispaniola.

Of the Hispaniolan species, a few are widespread geographically and altitudinally and seem to be ecologically tolerant: *pulchella, confusa, obscura, hysius* and perhaps *lyceius* which is known from Isla Saona off the southeastern end of Hispaniola as well as from Monte Cristi, Provincia de Monte Cristi, in the extreme northwestern corner of the República Dominicana (Bates, 1935). I have never encountered *C. lyceius* and cannot comment further on its distribution.

Other species are restricted to uplands: in the high Cordillera Central occur *C. grannus, C. arcas,* and *C. micheneri.* A second suite of species is apparently restricted to the mountain massifs (La Hotte, La Selle, Baoruco) on the south island (see Schwartz, 1980, for a discussion of north and south island geographies and herpetofaunas): *archebates* (La Selle), *chrysaoros* (La Selle-LaHotte-Baoruco), *loxias* (La Hotte), *montana* (La Selle), *eleleus* (La Selle). Several of these putative distributions have been expanded into other south island mountain masses, however.

It is appropriate here to comment upon a statement of Hall (1925) concerning the occurrence of *C. archebates* at Puerto Plata on the northern Dominican coast; this record was repeated by Riley (1975:46). No specimens were collected by Hall, but his note (p. 165) that he saw "quite a number of specimens" "along the borders of sugar plantations" suggests strongly that he was in error in his identification, since *C. pulchella* is the dominant and conspicuous butterfly of such situations. However, *C. archebates* is one of the most easily identified Hispaniolan *Calisto* on the wing in the field and not easily confused with the equally large and equally distinctive *C. pulchella.* Another possibility is that there does (or did) exist a population of *C. archebates* in the adjacent Cordillera Septentrional (it should be recalled that *C. archebates* is known only from high elevations - 1525 m and higher - in the Massif de la Selle, some 230 km southwest of Puerto Plata and on the south island). However, I have searched for the species there without success. I view the Puerto Plata record of *c. archebates* with extreme suspicion.

Subspeciation in Hispaniolan *Calisto* appears to be very slight, despite the fact that several species are restricted to montane masses; this is all the more surprising when one considers that "Ringlets are decidedly sedentary butterflies, closely tied to their birth places and little given to wandering" (Riley, 1975:43). Brown and Heineman (1972:103) affirmed that "the distribution of . . . satyrid species is a mosaic of discrete colonies, each an independent unit." Of the widely spread species, *C. pulchella* has an upland subspecies (*darlingtoni* Clench) in the Cordillera Central, and *C. hysius* currently is regarded as having a distinct subspecies (*batesi* Michener) on the north island. The relationships of *C. h. hysius* and *C. h. batesi* are uncertain, and there is increasing geographic evidence that they might more properly be considered separate species. Riley (1975:50) considered *C. confusa debarriera* Clench an upland "form" (in the Massif de la Hotte), whereas Brown and Heineman (1972:51) regarded it as a distinct species. None of the highland species has named subspecies, probably primarily because adequate material from a variety of localities or mountain ranges has not been available.

TAXONOMIC ACCOUNT

A case in point is *C. chrysaoros.* Described from Roche Croix, Dépt. du Sud, Haiti, at an elevation of 5000 ft. (1525 m), this species has been recorded from the La Selle-La Hotte complex in Haiti, but not from the adjacent Sierra de Baoruco. However, Riley (1975:Pl. 3, Fig. 14) figured a specimen from Monteada Nueva, a well-known locality in the eastern uplands of the Sierra de Baoruco in the República Dominicana. Thus this species is known from all three south island mountain ranges. Moreover, Riley overlooked two records (Bates, 1939:49) of *C. chrysaoros* from the Cordillera Central. There are three specimens, collected by P.J. Darlington, from the "foothills of the Cordillera Central S. of Santiago" and one from "between Constanza and Valle Nuevo, 6000 ft." in the interior of Provincia de la Vega in this same range. Bates even suggested that these specimens differed from south island *C. chrysaoros*; indeed, they are isolated from that species by about 150 km and the intervening lowland xeric Valle de Neiba plain.

During the summers of 1980 and 1981, specimens of *C. "chrysaoros"* were collected by Frank Gali, A.A. Gineika, Jean E. Sommer, and myself. These include 21 males and 13 females from the Cordillera Central south of Constanza at elevations between 1373 m and 1647 m, one male from Provincia de Santiago de Rodríguez at an elevation of 549 m, and two males and one female from the Sierra de Baoruco at an elevation of 1220 m.

Thus, I have at hand specimens from both the Cordillera Central on the north island and the Sierra de Baoruco on the south island, the latter to be considered true *C. chrysaoros* (although they are removed some 275 km east of the type-locality). As might be surmised, the north island material is distinct from that on the south island. It may also be that the Baoruco material differs from topotypical La Hotte *C. chrysaoros*, but long series from the entire length of the Tiburon Peninsula may be long in coming. I also have a photograph of the dorsal and ventral surfaces of the holotype of *C. chrysaoros* in the Museum of Comparative Zoology (MCZ), thanks to the efforts of Arthur C. Allyn and Lee D. Miller of the Allyn Museum of Entomology. All specimens are in my collection (AS) except those collected by Sommer (WWS) in 1981; these are in her husband's collection. The habitat and habits of *C. chrysaoros* (and its north island relative) differ strikingly from those of other Hispaniolan *Calisto*; these differences will be discussed below. It is of interest to point out that, of the three species listed by Bates (1935) in his *archebates* group, two (*archebates, chrysaoros*) are distinctive in that they have bold and contrasting unhw patterns, whereas the third member (*loxias*) lacks this feature but resembles *archebates* in having a transverse band very like that of *archebates* but without the contrasting pale color.

In the following description and discussion, the term "ocellus" is used only in the sense of a *complete* eyespot, *i.e.*, a dark "iris," with a central pale dot-like "pupil," the dark "iris" surrounded by a pale ring. All modifications or other more or less circular markings are referred to as "spots" or "dots."

One last remark is necessary before proceeding. In a situation as occurs in *C. "chrysaoros," i.e.*, populations which are completely separated from each other at high elevations on two montane massifs, the question automatically arises of what the relationships of these two populations are — species or subspecies? Male genitalia help very little in this case (see beyond). But there is no question that the two populations are separated from each other by territory that is completely inhospitable to either, and they do differ consistently in at least one character. Considering that the status of other Hispaniolan *Calisto* taxa remains in question in the same fashion as does that of these two populations, the conservative course in this instance is to name the north island population as a species distinct from *C. chrysaoros* (*sensu lato*, including all populations from the La Hotte-La Selle-Baoruco massifs, which may not be *intra se* identical). For this reason I propose that the northern population be named

Calisto galii, new species

Fig. 1c-f (males), h-j (females); male genitalia (Fig. 2)

Diagnosis. Males: Fw length 16 - 18 mm ($\bar{x}$ = 16.8 mm); upfw dark brown (Pl. 16C12; all color designations from Maerz and Paul, 1950), uphw paler (Pl. 14I19) with the unhw pale brown (Pl. 14G9) with an ocellus outlined in yellow and a single slightly eccentric (displaced costad) white pupil, the ocellus lying in R_5-M_3 but primarily in M_1-M_3, the edge only into Rs-M_1, the pupil in M_1-M_2; unhw pattern consisting of two bold pale "lines," the discal line crossing and encompassing the cell end, its inner margin rather irregular, that portion between the cell and the inner margin yellowish tan, that from and including the cell to the outer costal margin clear white; a second "line" from near the origin of M_3, slightly yellowish, and composed of four more or less discrete units: 1) a small hook-shaped spot in M_3-Cu_1, 2) a larger spot capping an ocellus in Cu_1-Cu_2; 3) a reversed comma-shaped spot in Cu_2-2A, whose tail (4) continues into the anal lobe only between 2A and 3A. The hw ocellus is small, outlined with a yellow to almost orange circle, with a distinctly eccentric pupil displaced discally. Two or three pale markings marginad to the discal pale line, in M_2-M_3, M_1-M_2; if only two markings are present, that in Rs-M_1 is absent; these markings consist of an ocellus or dot in M_2-M_3, an ocellus or dot in M_1-M_2, and a dot in Rs-M_1. If the marking in M_2-M_3 is an ocellus, that in M_1-M_2 is an ocellus also; if the first of these is a dot, the second likewise

is a dot (see Fig. **1d** and **1e**). The third marking (in Rs-M_1) is most often absent if the lower markings are dots rather than ocelli. A more or less circular white dot at about the midpoint of the costal margin.

Females: Fw length 17 - 20 ($\bar{x}$ = 18.2); upfw slightly paler (Pl. 16C10) than in males, uphw concolor with upfw but at times with a slight dull orangish wash; if an unhw pale pattern is present (see below), it is barely discernible on the uphw. The underside is in general slightly paler than the upperside (see details); the unfw ocellus is like that in males. There is an irregular pale brown outer margin to both wings, outlined submarginally by darker brown, slightly arched (in each space) vague lines; on the unfw there is a slightly darker brown band encompassing the outer half of the wing and including the ocellus (= ocellar band); more proximal to this band the wing is darker brown. The same general pattern persists on the unhw except that the break between the ocellar band and the wing bases coincides with the discal pale line, and in some specimens there is a distinctly pale grayish area proximad to the paler brown border filling M_3-Cu_1. To summarize these features briefly: the un coloration consists of a marginal pale brown band, separated from a discal pale brown and wider band by a series of dark brown slightly arched lines, which is in turn followed by dark brown wing bases.

The unhw pattern is variable in females, but the specimens can be categorized into three groups (of which group 1 is the most common): 1) the basic male unhw pattern (Fig. **1h**); 2) the basic unhw male pattern reduced (Fig. **1i**); and 3) almost complete absence of the unhw male pattern (Fig. **1j**). These will henceforth be referred to as maximum, moderate, and minimal female patterns. In maximally patterned females (10 specimens), the unhw pattern is essentially identical to that of the males, with the exception that the discal pale line is white (no yellow at its marginal end) and not so strikingly white (more matte white) than in males. The hw costal spot is uniformly present. Of the series of three markings below the discal line, these are (10 specimens) dots in M_2-M_3; in six specimens the marking in M_1-M_2 is a dot, in four others there is no marking in this space, and in Rs-M_1 a dot is present in three specimens and absent in seven. Note that ocelli are never present in M_2-M_3 or M_1-M_2, and that no marking in Rs-M_1 is the modal condition.

In moderately patterned females (two specimens - AS 3999, WWS 747), the unfw and unhw ocelli are present and well defined, as is the pale brown marginal area and the paler submarginal (= ocellar) band. The pale unhw discal and marginal bands are tan and almost concolor with the ground color but nevertheless are obvious. The discal band is especially incomplete. The white costal spot is barely indicated (tan) in one specimen and absent in the other. There is in both specimens a bold white dot within the arch of that portion of the submarginal pale line in Cu_2-2A.

In the single minimally patterned female (AS 6002), all pale unhw elements are suppressed (including the costal white spot) with the exception of a bold white submarginal dot in Cu_1-2A.

HOLOTYPE ♂: REPUBLICA DOMINICANA: PROVINCIA DE LA VEGA: 18 km SE Constanza, 1586 m, 5.vii.1980 (A.A.Gineika), *ex colln.* A.Schwartz, now in the Allyn Museum of Entomology.

PARATYPES (all from República Dominicana, Prov. de la Vega). AS 3721-23, 3725-31 (9 ♂, 1 ♀), 18 km SE Constanza, 1586 m, 4.vii.1980, A.A.Gineika, A. Schwartz; AS 3760, 3765-66, 3769, 3772-73, (3 ♂, 3 ♀), 18 km SE Constanza, 1586, m, 5.vii.1980, A.A.Gineika, A. Schwartz; AS 3984, 3993, 3995-96, 3999, 4001, 4003, 4008, 4012, 4020 (4 ♂, 5 ♀), 10 km SE Constanza, 1647 m, 9.vii.1980, A.A.Gineika, A.Schwartz; AS 6001-02, 6005-06, WWS 747-48, 753 (3 ♂, 4 ♀), 10 km SE Constanza, 1647 m, 3.vii.1981, J.E.Sommer, A.Schwartz.

Associated specimen: Rep. Dom.: Prov. de Santiago Rodrîguez: Loma Leonor, 18 km SW Monción, 549 m, 3.viii.1981, F. Gali (AS 6796).

Comparisons. When Bates (1939:49) first reported *C. "chrysaoros"* from the Cordillera Central, he commented that his four specimens differed "from the typical specimens from the La Hotte and La Selle mountains of Haiti in having the under side

of the hindwing fuscous rather than brown, and in having the white median band of this wing somewhat nearer the similar band over the ocellus." Later, in his revision of *Calisto*, Munroe (1950:219), refering to Bate's comments, suggested "It is possible that there are two subspecies." Monroe had examined 16 specimens of *C. "chrysaoros,"* including the 12 specimens (10♂, 2♀) from the type-series, and presumably the four specimens reported upon by Bates (1939).

I have seen a photograph of the male holotype (MCZ 21986), and it forms the basis of my Fig. **1a**. I have also examined two males (AS 6241, 6251 - Fig. **1b**), and one female (AS 6254 - Fig. **1g**) from Las Abejas, 11 km NW Aceitillar, 1220 m, Prov. de Pedernales, Rep. Dom., 18.vii.1981, F. Gali, A.Schwartz. Additionally, Riley (1975:Pl. 3, Fig. 14) has a painting of a male from Monteada Nueva, Prov. de Barahona, Rep. Dom. Riley (1975:46-47) gave the most complete diagnosis of southern *C. chrysaoros*: both he, and Bates in the original description, noted that in females (Bates) the "creamy band on underside of hindwing absent: this wing instead with a diffuse pattern of brown shadings; anal ocellus minute" and (Riley) "in the female these [pale] bands are absent and there is instead a small or minute anal ocellus and some postdiscal white dots." My own Las Abejas female likewise shows virtually no unhw pale markings; all that remain are the ocellus in Cu_1-Cu_2, the most costal portion of the (white in males, very pale tan in this specimen) discal line, extending into R_5-M_1, and a small comma-shaped mark in Cu_2-2A, its tail extending into the anal lobe. No specimen or illustration of *C. chrysaoros* shows the conspicuous white costal dot of *C. galii*, and this at once distinguishes the two species (although it is absent in female *C. galii* with moderate or minimal unhw patterns). Two other pattern differences are pertinent. In *C. chrysaoros*, the inner edge of the pale discal line is more nearly straight than it is in *C. galii*. In the latter species, this edge tends to be irregular or scalloped between the veins. Secondly, in male *C. chrysaoros*, that portion of the discal pale line that crosses the cell more closely approximates the pale figure of the lower pale line in M_3-Cu_1, thus giving a more Y-shaped aspect (note the common name "White Y Ringlet" proposed by Riley), than in *C. galii* where these two segments of the pale ventral pattern are more widely separated. The degree of variation in the ocellar-dot complex marginal to the discal pale line seems to be the same in the two species; the shape and relative size of the androconial patch (see Bates, 1935:235) likewise are very similar in the two species. Male *C. chrysaoros* have fw lengths of 18 and 19 mm (versus 16 - 18 mm in *C. galii*), and one female *C. chrysaoros* has a fw length of 20 mm (17 - 20 in *C. galii*).

Regarding the male genitalia, Bates (1935:233) said of *C. chrysaoros* that "The uncus is longer, and the pre-tegumental groove is comparatively broad and shallow. The side lobes are thin, spinelike; the valves are simple." Fig. 2 shows the male genitalia of *C. galii*. Until genitalic preparations of male *C. chrysaoros* are available, comparisons cannot be appropriately made. In at least the simple valves and the spine-like side lobes, *C. galii* resembles *C. chrysaoros*.

Remarks. As presently understood, five species comprise the *archebates* group of *Calisto: archebates, loxias, chrysaoros, galii,* and *arcas*. Of these, Munroe (1950) considered *archebates, loxias,* and *chrysaoros* (and thus by inference *galii*) to be a compact group, with *arcas* a separate group in his Section I. *Calisto arcas* differs from the other related *Calisto* in its "strikingly modified" genitalia and in pattern. In fact, the patterns of *archebates, loxias, chrysaoros,* and *galii* are all deriveable from a basal *archebates* pattern. *Calisto archebates* is bodily patterned on the unhw (see Riley, 1975:Pl. 3, Figs. **1a, 1b**) with a prominent yellow (in males) to dull yellowish tan (in females) stripe, extending transversely from the costal margin to the inner margin; the line gradually expands at the inner margin, with its more proximal edge at about the mid-point of the inner margin, and its more distal edge at the anal angle. The unhw pattern of *C. loxias* is very similar, but the band is: 1) not boldly contrasting and 2) only barely outlined with dark pigment along both edges. The band is broader at the costal margin and less expanded at the inner margin than that in *C. archebates*. If the basic *archebates* pattern is hollowed centrally, leaving only its margins, one arrives at the *chrysaoros-galii* pattern. It thus seems possible that *C. archebates* is ancestral to two

lines of evolution in this complex of species: *C. loxias* on one hand and *C. chrysaoros-C. galii* on the other.

The remaining member of this complex, *C. arcas,* is a large butterfly (fw 24 - 27 mm), unusual in that there is an up pattern in both sexes as well as a paler ocellar band in both sexes on the un, and there are two small (separate, not in adjacent spaces) ocelli in M_1-M_2 and Cu_1-Cu_2. The presence of an ocellar band in both sexes suggests the similar condition in female *C. galii.* The other features of *C. arcas* show little resemblence to the remainder of the complex, and there is little doubt that *C. arcas* has had a long independent history from the balance of the *archebates* group.

The presence of a bold unhw pattern in *C. archebates, C. chrysaoros,* and *C. galii* (in contrast to all other *Calisto*) may well be correlated with the habits and habitats of the species. I have collected specimens of all three species and certainly the least orthodox in behavior and habitat are *C. chrysaoros* and *C. galii.* A brief summary of these activities is pertinent.

I. *C. galii*

1) 18 km SE Constanza, 1586 m; 4.vii.1980 - T = 25° - 30° C; 1015 - 1330 h; 5.vii.1980 - T = 24° C; 1100 - 1230 h. This locality is on the old road between Constanza and Valle Nuevo. The area consists of two small but open tumbling creeks which cross the road and continue down the mountain slope. Away from the banks of the creeks were patches of dense vine-entangled hardwoods; the surrounding area in general is pinewoods and cultivated fields. *Calisto galii* is common here, but difficult to secure since they live exclusively within the dense tangled woods in deep shade. The flight is high (most *Calisto* are ground-huggers) and very erratic, similar to that of hesperiids or bees. Perch sites (where in typical *Calisto* fashion the butterflies land and immediately orient themselves broadside to the direction of the sun to achieve maximum isolation) were on low herbs and shrubs. On the second visit to this locality (5.vii.1980) the weather was alternately sunny and overcast, ending with a light shower. *Calisto galii* was active during overcast periods but no individuals were seen during or after the rain. On the first visit, the weather was consistently bright and sunny with a noticeable wind, which did not affect *C. galii* since they were sheltered from it in the woods. On both occasions at this site, it was fruitless to attempt to push into the woody growth to pursue the butterflies; rather, we waited near the edge of the woods until an individual perched, usually briefly, at the woods' edge.

2) 10 km SE Constanza, 1647 m: 9.vii.1980 - T = 28° - 30° C; 1000 - 1445 h; 2.vii.1981 - T = 30° C; 1100 - 1230 h. This locality is at the intersection of the old and new roads between Constanza and Valle Nuevo. On the first visit (9.vii.1980) we collected about 0.5 km away from the road in and along the margin of a large abandoned mountainside cabbage field which was bordered on one side by a narrow (1.5 m) creek with steep sides and a narrow band of very dense hardwoods, vine-entangled, along its margins. On the second visit we collected in a small isolated patch of woods at the intersection itself; the size of the wooded patch was not determined but it is quite small. It too is very dense, and collecting had to be done along one short path into the woods and along their margins which were bushy and shrubby. On the first visit weather was alternately bright and sunny and warm or dull and overcast for the entire time we were collecting; on the second visit the weather was consistently bright and sunny. Both along the creek in 1980 and in the wooded patch in 1981, *C. galii* was relatively common but inaccessible due to its habit of staying within dense wooded growth. One had to wait for perching individuals along the margins of the woods to effect captures.

3) La Nevera, 37 km SE Constanza, 2227 m (no specimens collected); 10.vii.1980-T = 18° C; 1300 - 1400 h. The weather was cool, very breezy, and alternately either sunny or overcast and misty. Butterflies were very uncommon at this locality but one *C. galii* was seen under the following circumstances which illustrate very well the habits of the species. La Nevera is a broad open montane meadow with tussocks of grass a little less than 1 m in height. The area around the meadow is pinewoods and no stands of hardwoods are present. A man-made square-sided 1.5 m deep ditch has been cut into the rock across the meadow, but the position of this ditch is not obvious upon casual in-

spection. It is clogged with living shrubs, bushes, and vines so that it is in effect a micro-hardwood-forest. While I was standing next to this ditch, I saw flying directly at me a *C. galii,* at grass-top level; the flight was direct and very rapid, perhaps due to the windy conditions. Without hesitation the butterfly plunged into the overgrown ditch at my feet and was not seen again. This episode tends to re-enforce the habitat preference of this species — *C. galii* occupies dense and shaded situations in otherwise open areas.

4) 18 km SW Monción, 549 m; 3.viii.1981; T = 38° C; 1315 - 1445 h. This locality lies at the intersection of the Monción-Loma Leonor road where it crosses the Río Toma. The ravine in which the river lies is densely wooded, but surrounding areas are pasture and cut-over pine and hardwoods. Only one *C. galii* was seen and collected here. It was taken by Gali while it perched on a bush 1.5 m above the ground in semi-dense woods. Search for more individuals on this and the following day revealed no others; the specimen is fresh, and it seems unlikely that it originated elsewhere. The elevation is very low for the species, but the habitat here and at Loma Leonor, 1 km away, is even more so, with stands of dense hardwoods and pine. No *C. galii* were secured there. Although the specimen (AS 6796) has not been designated a paratype, it is a male that agrees in all details, including the mid-costal margin white dot, with other *C. galii* from much higher elevations and removed some 100 km to the southeast.

II. *C. chrysaoros*

1) Las Abejas, 11 km NW Aceitillar, 1220 m; 18.vii.1981; T = 23° C; 0920 - 1115 h. This locality is a run-off ravine with a dense stand of hardwoods along the ravine, including an understory of blackberries, surrounded with pinewoods; the slope is very steep and the thorny blackberries made collecting very difficult. Several *C. chrysaoros* were seen here as they landed on the blackberry leaves to sun; we collected only three specimens and these were during the early part of the collecting period (until about 1030 h) after which no more were observed. When disturbed from their low perching sites, the butterflies flew erratically into the dense woods with determination but without haste. To enter the narrow band of woods to search for them would have been futile in every way — slope, understory, vines, and density of the woods themselves. What is striking about this locality is the very narrowness of the ravine; we could with some difficulty traverse its entire length (about 150 m); yet *C. chrysaoros* was not uncommon there.

Even more striking is that 1 km further along the same road and at an elevation of 1130 m, we collected *within* a large stand of virtually undisturbed deciduous forest, dense and well-shaded, with a rich shrubby and bushy understory. Although other species of *Calisto* were secured along a path through this forest (which is very extensive), we saw no *C. chrysaoros* on the same day (1130 - 1515 h; T = 30° C) as we encountered the species at the locality discussed above. Certainly nothing exemplifies one of the opening statements in the present paper — that species of *Calisto* are a mosaic of discrete colonies, each an independent unit (Brown and Heineman,1972). Why *C. chrysaoros* should be absent at one (apparently highly suitable) locality and common a kilometer away in (to our eyes) a much less suitable one is puzzling.

III. *C. archebates*

I have collected 34 specimens of *C. archebates* from four localities in the Massif de la Selle and the Montagne Noire in the Dépt. de l'Ouest, Haiti, as follow: Forêt des Pins, 1373 - 1525 m; 13.vii.1979; Kenscoff, 1678 m, 26.vi.1978; Obléon, 1617 - 1678 m, 25,vi 14,vii,1978, 1.vii, 9.viii.1979; Peneau, 1464 m, 18.vii.1977, 14.viii.1978, 1.vii, 9.vii.1979. The details of these localities are summarized in Schwartz (MS). At least in Haiti, "The habitat for the species is short grassy areas in pinewoods; despite this generalization, *C. archebates* is extremely local and appears to be absent from large areas which seem suitable, both ecologically and altitudinally. On 26.vi.1978 at [Kenscoff and Obléon], the butterflies were locally extremely common in low grass in pinewoods and in similar exposed situations along the road. Many more were seen than were collected. On a return visit to these precise localities on 14.viii.1978, no *C. archebates* were observed. Flying times were from 1100 h to 1230 h." These upland areas have been much cutover and disturbed in Haiti, and these habitat observations may not be true of the species elsewhere. Still, *C. archebates* survives in wooded (albeit pine rather than deciduous

woods) upland areas, may be locally very abundant, but is surely very seasonal.

I have no information on *C. loxias* (into whose known range I have not been) or *C. arcas* (which occurs in a region that I have visited frequently and where I have especially looked for this species without success).

In summary, at least *C. chrysaoros* and *C. galii* are unique in their preference for inhabiting wooded situations; all other *Calisto* that I have taken are denizens of open grassy areas, or woodland margins, not within deep shaded and dense hardwood stands. It may be that the vivid and contrasting white un pattern allows species-recognition between members of these two species in what is basically a dark and shaded situation. The absence of brick-red, typical of so many species of *Calisto,* is noteworthy. Such a color would be easily and quickly "lost" within dark shaded woodlands. Despite my observations on *C. archebates* in Haiti (where it occupies open grassy areas), I suspect that it too may be an inhabitant of densely wooded areas where that habitat still persists in the Massif de la Selle, and that its occurrence in open areas is a forced response for survival in areas where hardwoods have largely been removed by man.

Etymology. Calisto galii is named in honor of Frank Gali, who during my field work in 1981 in the República Dominicana, was a source friendship, companionship, and enthusiastic cooperation; it is indeed a pleasure to honor him by the inadequate gesture of naming this species for him.

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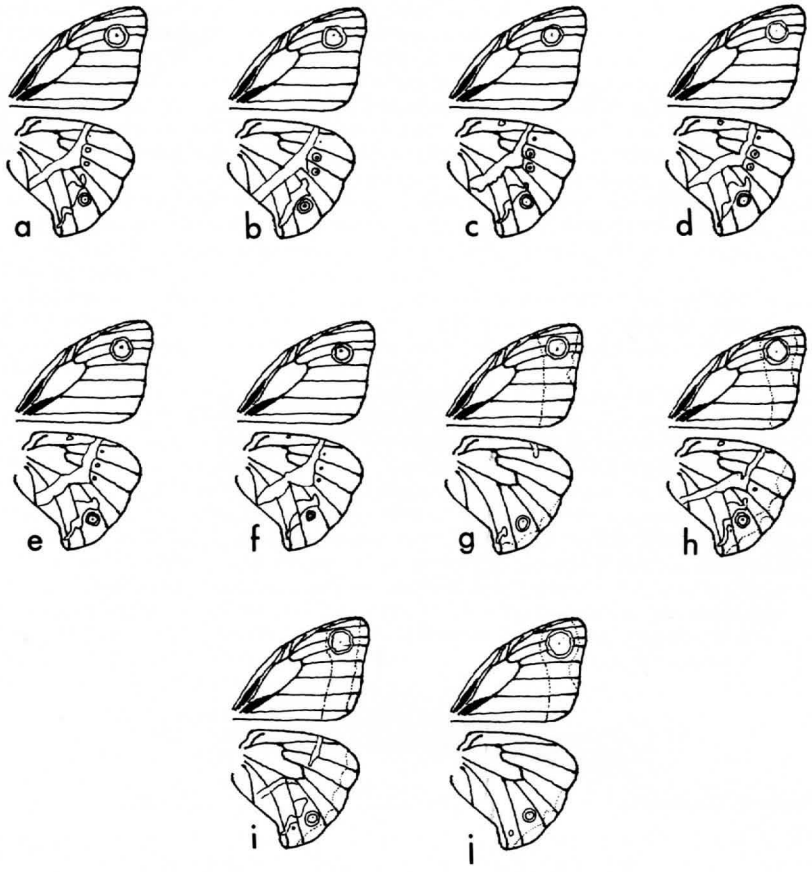

Figure 1. Underside views of *C. chrysaoros* and *C. galii*; top row, males, bottom row, females, as follow: a) *C. chrysaoros* holotype (MCZ 21986); b) *C. chrysaoros* (AS 6251) -Las Abejas, Prov. Pedernales, R.D.; c) *C. galii* holotype (AS 3768); d) *C. galii* (AS 3727) -18 km SE Constanza, Prov. la Vega, R.D.; e) *C. galii* (AS 4001) - 10 km SE Constanza, Prov. la Vega, R.D.; f) *C. galii* (AS 6001) - 10 km SE Constanza, Prov. la Vega, R.D.; g) *C. chrysaoros* (AS 6254) - Las Abejas, Prov. Pedernales, R.D.; h) *C. galii* (AS 3993), maximum pattern - 10 km SE Constanza, Prov. la Vega, R.D.; i) *C. galii* (AS 3999), moderate pattern - 10 km SE Constanza, Prov. la Vega, R.D.; j) *C. galii* (AS 6002), minimum pattern - 10 km SE Constanza, Prov. la Vega, R.D.

Figure 2. Genitalia of male *C. galii* (AS 4012).

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