

above the pool a steep (and impassable) fall. The stream at this point is about 5 m wide and is open, with a high canopy on the sloping banks, but with shrubs and bushes along the stream itself. The day was overcast in general, but the sun alternately appeared and disappeared. Generally, collecting was poor and at the site of capture of the *E. spanna* no other butterflies were seen. Just below the pool *Lycorea ceres* Cramer was moderately abundant but not (the usually common) *Greta diaphana* Drury. The estimated distance of this spot is 1 km from the path from the road to the stream, but this estimate may be too great. In any event, the pool is at the upper end of the stream beyond which it is difficult to continue.

The *E. spanna* flew across the stream; the flight was slow and ponderous and not darting, perhaps due to the greatly enlarged abdomen with eggs. The skipper landed on the top of a leaf of a streamside shrub about 1.5 m above the ground and adjacent to the pool; the wings were held open. The general impression of the skipper in flight was of *Colobura dirce* Linnaeus (doubtless due to the white underside pattern), but the flight was completely different from the rapid and darting flight of that species.

We are grateful to Kurt M. Iketani for his companionship and for taking the photographs of the specimen.

FRANK GALI, 156 S. Melrose Dr., Miami Springs, Florida 33166 AND ALBERT SCHWARTZ, Miami-Dade Community College, North Campus, Miami, Florida 33167.

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#### BATTUS ZETIDES IN THE REPÚBLICA DOMINICANA

The papilionid *Battus zetides* Munroe is endemic to the Antillean island of Hispaniola. Hall (1925, *The Entomol.* 58:162) considered the species "Apparently very rare" and recorded a single specimen from La Vega, República Dominicana as the only example with "exact" locality data, although there existed other specimens (with imprecise locality data—Haiti—in British collections). Riley (1975, *Field Guide to the Butterflies of the West Indies*, p. 140) gave the range in an anomalous manner: "Known only from Haiti, La Vega, and apparently very rare. Should also occur in the Dominican Republic." His statement of range is, of course, taken from Hall, but he has confused the two countries involved. Marión Heredia (1980, *Naturalista Postal*, 26/80) noted the capture of a series of specimens on 3 October 1976 at Las Auyamas, Polo, Provincia de Barahona, República Dominicana; he regarded these as the first specimens from that country, apparently unaware that Hall had mentioned the La Vega locality many years earlier. Considering the time of that record, it seems likely that it does not apply to the city of that name which lies at an elevation of about 100 m, but rather to the Cordillera Central south of La Vega. The Las Auyamas record is from an elevation of about 1000 m.

Additionally, Riley (1975:Pl. 18) figured a specimen of *B. zetides* without tails; whereas, Lewis (1973, *Butterflies of the World*, p. 23) figured a specimen with tails. This can be clarified immediately, since the plate in Riley is in error; the species is indeed tailed.

Between 19 June and 19 August 1981, we made collections of butterflies throughout much of the República Dominicana. The period of 13 July to 21 July we spent at the guest house of the Alcoa Exploration Company at Cabo Rojo. In this region there are two roads that ascend the mountains to the north: 1) Alcoa's private road to their bauxite mines at Aceitillar in the Sierra de Baoruco, and 2) the Dominican border road that parallels the Dominico-Haitian border from Pedernales (at sea level) to Los Arroyos on the southern face, and thence over the mountains (which here are a continuation of

the Haitian Massif de la Selle) to El Aguacate on the northern face. The maximum elevation reached by the Alcoa road is about 1220 m, that of the border road about 2362 m. Both offer an excellent vertical transect of the ecology of the region, going from xeric desert to mesic deciduous forest to upland pine (*Pinus occidentalis*) forest.

We were able, with the use of a jeep supplied us through the offices of Dr. Eugenio de J. Marcano of the Museo Nacional de Historia Natural de Santo Domingo, to reach Los Arroyos on the border road. This village and army post are at an elevation of about 1100 m. Much of the southern slope of the Massif de la Selle through which the border road passes was formerly rich mesic deciduous forest, but now most of this forest has been cut, and sloping fields and a few *cafetales* are the dominant vegetational features today. The road becomes barely passable above Los Arroyos, and on the day (15 July) that we reached that settlement, the higher slopes were already covered with heavy mist and drizzle at 1130 h, and it seemed pointless to proceed further. The junior author has crossed the main ridge between Los Arroyos and El Aguacate and formerly (and presumably even now) one reaches at high elevations (2300 m) a pine-clad plateau after passing through a wide horizontal band of deciduous forest within which Los Arroyos lies.

The Alcoa road, when it ascends the southern front range of the Sierra de Baoruco, reaches semi-mesic deciduous woods (as at Las Mercedes) which at about 915 m give way to pines. This pine forest continues upward to elevations of at least 1220 m; it is open, with grassy and shrubby undergrowth and in general appearance is unproductive. The road stops at the current bauxite mine at Aceitillar, but a dirt-and-rock road proceeds from there at least 12 km to the northwest and an elevation of 1130 m. The road passes several abandoned experimental mines and leads to a site called Las Abejas. Las Abejas is unique in this region, since it is upland mesic deciduous forest, apparently totally surrounded by pine forest: thus, a local enclave of deciduous forest in what is otherwise pine forest. One comes upon the Las Abejas area abruptly; the road has been traveling through pines at elevations of between 1100 and 1220 m, and then descends within a kilometer to 1130 m, in beautiful hardwood forest. The slopes are steep, and most collecting was done along the margin of the road; at Las Abejas itself, there is a wide and fairly level path that leads through the forest. Butterflies were abundant both along the road and within the forest, although the species diversity is rather limited. The region is seldom visited, and the forest seems relatively uncut. Because of the elevation, most profitable collecting must be done in the morning or early afternoon, since later in the day mist and drizzle or rain with overcast skies regularly brings an abrupt end to collecting.

On our first visit to Las Abejas on 18 July, we collected between 1130 and 1515 h; the temperature was 30°C, the weather alternately sunny and overcast. We collected along the sloping road noted above but not on the path through the forest. The senior author, within minutes of the beginning of our collecting, netted a *B. zetides* as it flew across the road. Several others were seen at this precise point, leisurely circling the tops of vine-covered trees about 10 m high and thus inaccessible. But we soon discovered that walking along the road up the slope was a ready source of specimens, where the butterflies were flying leisurely (but not seen feeding on the moderately abundant flowers). The insects seemed undisturbed by the presence of the collectors and were not unduly frightened (as are some papilionids) when attempts were made to catch them (i.e., there was no alarm behavior).

On a second visit on 19 July, we collected between 0900 and 1415 h; the temperature was 28°C and the weather was generally overcast and sunny in the morning, and overcast in the afternoon. On this occasion we collected not only along the road but also on the path through the forest. Along the latter, a few *B. zetides* were seen, especially in areas where there were openings or clearings, rarely within the woods proper. Along the road itself, we estimated that we saw 50 individuals. In fact, *B. zetides* is certainly at this locality a very common species of butterfly, if not the most common.

Our third visit was on 20 July, between 1430 and 1530 h. The day was cool and had been heavily overcast; only two *B. zetides* were seen and none collected. In fact,

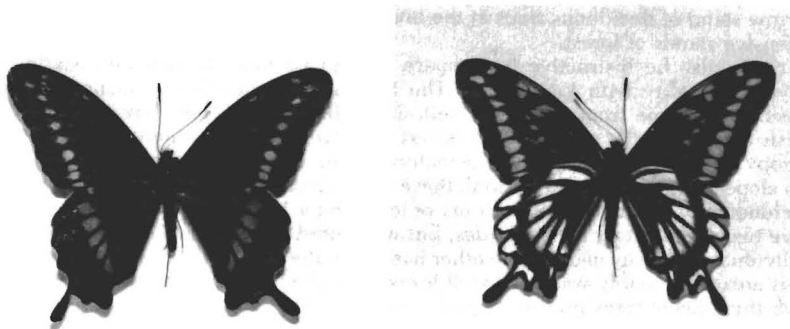


FIG. 1. Upper and lower views of male *Battus zetides* (6326 in collection of junior author).

butterfly activity in general was reduced to a bare minimum, both on the road and the path.

A total of 10 *B. zetides* was secured. Most of these were taken along the road where they were abundant. We have the impression that *B. zetides* is a butterfly of dense woods, but that it flies in sunny open areas (as along roads or in clearings in the forest). The flight is slow and deliberate and generally rather high (3.5 m) above the ground, but the butterflies descend to lower levels (2 m) or may fly as high as 10 m with some degree of regularity. Securing specimens is not difficult, but the collector must be patient and await descent of the butterflies to levels within reach. Attempting to enter the forest on steep slopes to catch an individual rarely met with success.

The series consists of six males (one of which is slightly flown) and four females (three of which are slightly to well flown). Contrary to Riley's (Pl. 18) illustration, the upperside band is not unicolorous on both wings; the upperside forewing band (upfw) is paler (Pl. 11L8; color designations from Maerz and Paul, 1950, A Dictionary of Color) than that of the upperside hind wing (uphw) (Pl. 11I11) which may be more orange (Pl. 10L12) in fresh specimens of both sexes (see Fig. 1). More flown specimens of both sexes have the up bands much more yellow, but even in these individuals the fw band is paler (Pl. 10G2) than the hw band (Pl. 10L4). In fresh specimens, the up both wings is a rich blackish chocolate. The us markings of both wings are as figured by Riley, and the silvery arrowhead-shaped markings stand in bold contrast to the yellow, red, and black ushw markings and ground color. Forewing lengths in males vary between 35 and 40 mm ( $\bar{x}$  = 36.0) and in females between 39 and 44 mm ( $\bar{x}$  = 42.0); thus, there is some sexual dimorphism in size, but it is not striking.

It is pertinent to comment on the apparent local occurrence of this species. We also collected less than a kilometer southeast of Las Abejas. The area was pine woods, but we found a narrow run-off ravine which had a local stand of deciduous trees and a dense understory of blackberries (*Rubus* sp.). The elevation was 1220 m, thus slightly higher than Las Abejas, and at the top of the hillslope along which we collected and observed such an abundance of *B. zetides*. We collected at this second locality on 14 July (0930–1330 h; T = 30°C; bright and sunny in morning, overcast after 1200 h) and on 18 July (0920–1115 h; T = 23°C; weather alternately sunny and overcast). No *B. zetides* were seen at this locality, although there was a great deal of local butterfly activity both in the pines and in the ravine. Note that our second visit to this locality (16 July) was the same day as our first visit to Las Abejas, where *B. zetides* was common. Although there may be a variety of factors at work, certainly the most obvious is the richness and much greater areal extent of the forest at Las Abejas in contrast to the

narrow stand of deciduous trees at the ravine. It may well be that *B. zetides* demands extensive stands of forest.

It may also be instructive to compare the old La Vega locality and Marión's Las Auyamas locality with Las Abejas. The former lies much lower (assuming that the specimen(s) came from La Vega itself, an unlikely possibility) but is in a basically mesic area (presently much cultivated but with *cafetales* and *cacaotales* and their high-canopy shade-trees). If the La Vega material came from south of that city on the northern slopes of the Cordillera Central, these slopes today are open pine woods with some deciduous forest in wide ravines (as below Buena Vista). The latter may well be or have been satisfactory for *B. zetides*, but we visited this area in June 1981 and saw no individuals. Las Auyamas on the other hand is in the uplands of the Sierra de Baoruco. This area presumably was once well forested, since there are still extensive *cafetales* with their shade trees present (=pseudoforest). The junior author visited the Las Auyamas area on 4-6 August 1980, but the weather conditions, due to the passage of Hurricane Allen, were not propitious for butterfly collecting. Still, the area about Las Auyamas seems suitable for *B. zetides* and rather comparable to that at Las Abejas.

We are grateful to the staff of the Alcoa Exploration Company, especially to Sr. Alfredo Lebrón and Sr. Victor García, for allowing us to stay at their facility at Cabo Rojo; without the loan of the jeep from the Museo Nacional under the directorship of Dr. Marcano, the trip to Las Abejas would have been more arduous, and we are grateful to him and his staff for their assistance. The illustration is the work of Kurt M. Iketani; we acknowledge his efforts with pleasure.

FRANK GALI, 156 S. Melrose Dr., Miami Springs, Florida 33166 AND ALBERT SCHWARTZ, Miami-Dade Community College, North Campus, Miami, Florida 33167.

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#### PUPAL SIZE AND EGG PRODUCTION CHARACTERISTICS IN *ROTHSCHILDIA FORBESI* (SATURNIIDAE)

*Rothschildia forbesi* Benjamin occurs in the United States in the Rio Grande Valley, Texas. According to Ferguson (in R. B. Dominick et al., 1972, The Moths of America North of Mexico, fasc. 20.2B, Bombycoidea) there is only limited information available on the biology and early stages of this species. During 1981 I used a series of 23 wild *R. forbesi* pupae, and five of the subsequent adult females to collect data for methods development modeling. The *R. forbesi* were used simply because they were available for study at the time a modeling data set was needed. However, the data that were collected, aside from being used for methods development research, provide fundamental information on pupal dimensions and egg production characteristics for this little-studied species.

Pupal sex was determined by examining the genital openings, which were very distinctive in the *R. forbesi* pupae studied. Males had a single opening on the venter of the 9th abdominal segment; and females had single openings on the venter of the 8th and the 9th abdominal segments. All pupal sex determinations were confirmed at adult emergence. Pupal weights and dimensions, determined as described by Miller et al. (1982, J. Lepid. Soc. 36:207-216), are summarized in Table 1. Mosher (1916, Ann. Entomol. Soc. Amer. 9:136-158) described pupae of *Rothschildia orizaba* (Westwood) and *R. cincta cincta* (Tepper) (the latter under the name *R. jorulla*; see C. Lemaire, 1978, Les Attacidae Américains, Attacinae, Neuilly-sur-Seine, France), indicating that *R. orizaba* pupae were 23-27 mm in length and about 50 mm in circumference; while