

NOTES ON THE LIFE CYCLE AND NATURAL HISTORY OF
OPSIPHANES QUITERIA QUIRINUS GODMAN AND
ERYPHANIS AESACUS BUBOCULUS
BUTLER (BRASSOLIDAE)

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ABSTRACT. Details of the various life stages are presented for *Opsiphanes quiteria quirinus* Godman and *Eryphanis aesacus buboculus* Butler. These are two of the rarest Costa Rican brassolids, and this is probably the first photo-illustrated report on their life cycles.

This is the first article of a proposed series devoted to describing the early stages, larval host plants and adult behavior of the Brassolidae known to occur in Costa Rica. The object of these studies is to provide general information and a taxonomic guide to the eight genera (*Brassolis*, *Caligo*, *Catoblepia*, *Dynastor*, *Eryphanis*, *Narope*, *Opoptera* and *Opsiphanes*) of Brassolidae containing the 19 species reported from this country.

General Descriptions of Life Stages

Opsiphanes quiteria quirinus Godman

Egg (Fig. 1). Spherical, slightly flattened at base with numerous vertical ribs; diameter ca. 1.5 mm; light green when first laid, becoming dark green with three reddish brown concentric circles when fertile; hatches in 12 days.

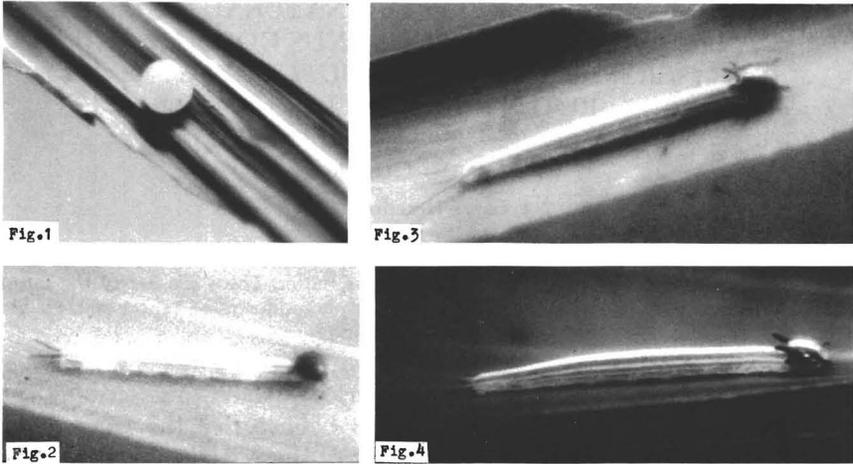
First instar larva (Fig. 2). Head capsule very dark brown, covered with small dark brown hairs and setae. Body cylindrical, cream-white in color with several longitudinal red bands and reddish brown forked tail. After feeding, color of body changes to light green with dark green longitudinal bands; forked tail turns to dark brown. Ca. 15 mm long. Moults in 10 days.

Second instar larva (Fig. 3). Head dark brown with yellow frontal patch on epicranial suture; bears four dark brown prominent projections or "horns" along superior and lateral borders; head also with whitish pubescence and pair of forward hair-tufts in blackish brown color appearing as conspicuous "mustache." Body with broad longitudinal lemon-yellow band on dorsum in quick succession with dark green and light green lateral stripes. Anal fork greenish gray. Ca. 24 mm long. Moults in 10 days.

Third instar larva (Fig. 4). Head with all four horns more developed, with vestigial horn at their bases. Yellow frontal patch now broader than in second instar and hair-tufts very conspicuous. Body retains dorsal yellow band, but other stripes turn to yellowish green and bluish gray. Ca. 39 mm long. Moults in 13 days.

Fourth instar larva (Fig. 5). Head capsule retains basically color pattern but now horns present light orange color with black tips. Dorsal yellow band of body divided by two fine light green stripes and rest of body retains same color of previous instar. Ca. 53 mm long. Moults in 18 days.

Fifth instar larva (Fig. 6). Shape of head, as in preceding three instars, basically rectangular, with broad pale yellow band along epicranial suture, in quick succession to very broad chestnut brown longitudinal band on each epicranium. Color pattern of body similar to previous instar; dorsal band now becoming lemon-yellow; spiracles orange-brown, and forked tail yellowish green. Ca. 104 mm long. Duration: 16 days.



FIGS. 1-4. *Opsiphanes quiteria quirinus*: 1, egg, ca. 1.5 mm diameter; 2, first instar larva, ca. 15 mm long; 3, second instar larva, ca. 24 mm long; 4, third instar larva, ca. 39 mm long.

Prepupa. Prepupal larva loses color pattern of body and changes to translucent green. Ca. 65 mm long. Duration: 2 days.

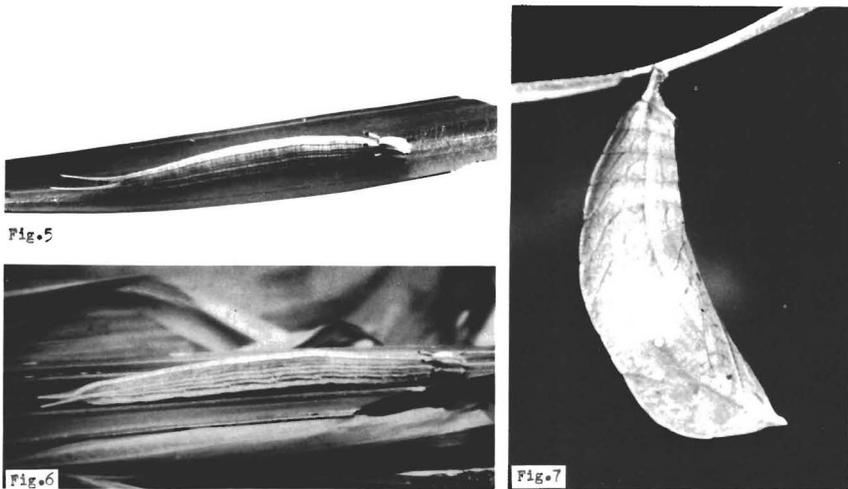
Pupa (Fig. 7). Pupa grass green; "boat shaped," laterally compressed at wing cases, with head slightly bifid; thin brownish green lines, one along dorsal angle, another lateral from cremaster to middle of wing case and another ventral line from cremaster to end of antennae; dorsal line gives rise to number of lateral lines in angle directed posteriorly to spiracular border; spiracles pale orange; each wing case ventrally with small dark brown spot and laterally with golden spot. Ca. 45 mm long. emergence in 22 days.

Adult. Male (Figs. 8, 9). Body very robust and brownish red. Forewing blackish brown with ochreous-orange transverse band and two white subapical spots; basal area reddish brown. No pupilate subapical ocelli and three undulate blackish brown submarginal lines, with a complicated design in discocellular area; posterior part of ochre-orange band clearly visible near margin between median veins. Hindwing brick-red with three ochre-orange spots between radials and before terminal margin, which is dark brown; outer margin dark brown and very dentate; under surface darker; large spot on radial sector and smaller one, greenish ochre, near anal angle; entire surface of wing covered by very complicated design of black, brown and yellow-ochre lines and patches which turn darker near outer margin; discal cell with conspicuous black-brown spot, which is most characteristic detail of total design.

Female (Figs. 10, 11). Forewing blackish brown with white subapical spots larger than in male; outer margin somewhat undulated; transverse band very wide and of glossy cream-white color; basal area with reddish brown color and hindwing, which is more rounded in shape, with same color as male; under surface somewhat paler than male; band of forewing entirely visible; but hindwing paler than on male, yet with basically same pattern, except in black-brown patch of discal cell, which is more reduced. Span: Ca. 80 mm, male and 97 mm, female.

Eryphanis aesacus buboculus Butler

Egg (Fig. 12). Round and white when first laid, with numerous ribs; when fertile, turns to rosy white color with broad maroon ring, which is not closed at one side for space of $\frac{1}{2}$ mm. Diameter ca. 2.3. mm. Hatches in 12 days.



FIGS. 5-7. *Opsiphanes quiteria quirinus*: 5, fourth instar larva, ca. 53 mm long; 6, fifth instar larva, ca. 104 mm long; 7, pupa, lateral aspect, ca. 45 mm long.

First instar larva (Fig. 13). Head rounded, basically reddish brown and covered with fine pilosity. Body yellowish orange with red longitudinal bands; with dark brown forked tail; ventral surface red. After feeding, bands of body turn very multicolored; with green dorsal band limited by two yellow-orange stripes at sides and deep maroon band in quick succession with bluish white band on each side. Ca. 18.5 mm long. Moults in 9 days.

Second instar larva (Fig. 14). Head basically quadrate with three pairs of short in-curved horns and particular color pattern of several whitish and greenish brown longitudinal stripes. Body retains essentially same color and forked tail appears more developed. Ca. 28 mm long. Moults in 11 days.

Third instar larva (Fig. 15). Head with horns more developed showing finely textured surface; whitish and greenish brown color pattern persists. Body retains same color as in second instar but now there appears four or five fleshy points along dorsum. Ca. 44 mm long. Moults in 9 days.

Fourth instar larva (Fig. 16). Head retains same shape and color pattern. Body brownish white with broad dorsal line of greenish brown; retaining false spines on dorsum, but now more developed and skin (including forked tail), with very particular texture of tiny protuberances resembling "chicken skin"; between dorsal line and spiracular bands, body also with pair of thin longitudinal dark brown stripes. Ca. 80 mm long. Moults in 11 days.

Fifth instar larva (Fig. 17). Head large and broad; dirty white in color but now covered with fine pilosity. Body light brown-yellow, slender striped with greenish brown lines and longitudinal row of short dark brown lines on each side, just beyond spiracular band; below this band, larva with longitudinal border of short hair, lighter in color than on rest of body; ventral surface reddish brown. During this instar red scent gland of larva, located in front of the prothoracic legs, particularly visible. Ca. 118 mm long. Duration 26 days.

Prepupa. Prepupal stage very short, requiring two days; characterized by paler and semi-translucent color of body which becomes shorter than fifth instar, larva adopts hanging position for pupation usually attached at tip of fresh rolled leaf of host plant.

Pupa (Fig. 18). Elongated, dirty rosy white with fine pattern of pale grey-brown stripes and patches resembling dried and rolled leaf of bamboo; abdominal segments thickening gradually from A10 to A4; wing cases very compressed, extending from T1 to A4; dorsally, pupa with diffuse grey-brown line and row of fine dark brown points at each

side; these points particularly visible on A1 to A4; also, with two more longitudinal lines of same color, one subdorsally with dark brown spot on A4 and another laterally just along spiracular band; cremaster and head cristulae appear darker than rest of pupa; head cristulae apposed and somewhat incurved ventrally; middle of each wing case and just over lateral stripe with small and somewhat diffuse yellow-ochre spot. Ca. 56 mm long. Adult emerges in 20 days.

Adult. Male (Figs. 19, 20). Forewing blackish brown with median area of blue-violet tone; tone also present on hindwing forming band along submarginal area, from subcostal vein to middle of wing and small patch on discal section. Hindwing also with rounded yellowish spot at inner margin with scent scales and black patch between this spot and end of blue-violet submarginal band.

Female (Fig. 21). Paler than male. Forewing with ochreous submarginal band forked anteriorly; with very translucent zone from basal to submedian area and design of underside clearly visible; this zone with pale blue-grey reflection; this pigmentation occurring from the basal to the median area, delimited by broad bluish-brown band from postmedian to outer margin; the inner margin with pale brownish gray color; on underside (Fig. 22), color pattern between male and female very similar, basically with details that permit identification of this species from others of genus, such as well marked and colored designs of gray, black, white and ochre patches and lines and presence of double eyespot on hindwing. Wingspan: 170 mm, male; 112 mm, female.

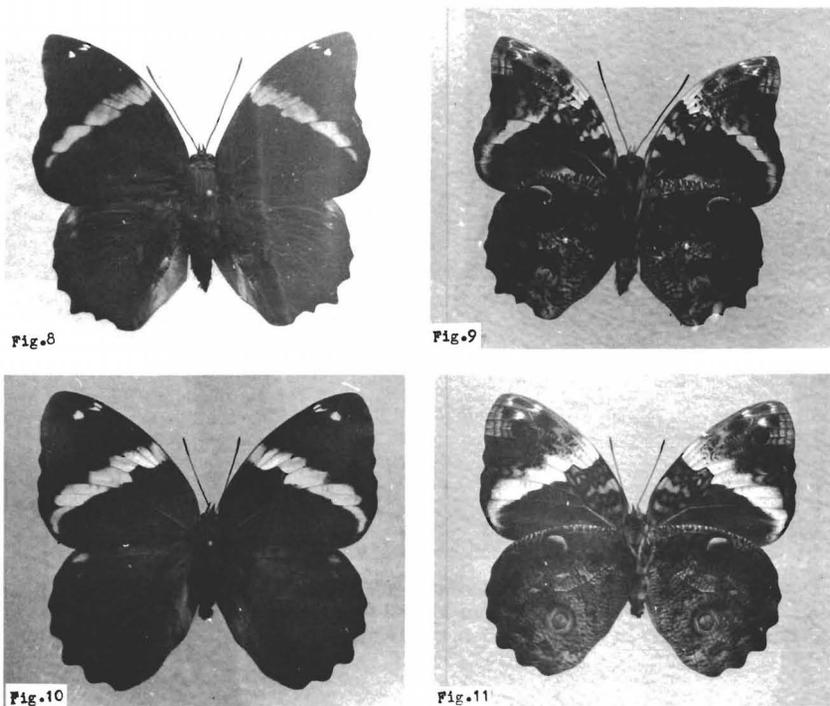
Natural History

According to Fruhstorfer (*in* Seitz, 1924), *Opsiphanes quiteria quirinus* Godman occurs from Guatemala to Panama; nevertheless, it is considered a very rare butterfly. In Costa Rica this species occurs from sea level to about 1000 m in the wet forests but is very seldom seen. It flies generally in the afternoon, mostly in the forests, but sometimes it is possible to observe a specimen flying across open areas.

O. quiteria quirinus represents one of the largest species of the Costa Rican *Opsiphanes*, occurring together with *O. cassina fabricii* Boisduval and *O. invirae cuspidatus* Stichel, and they probably share larval food plants (those in the Palmae family). I once saw a female of the former species ovipositing on a palm of *Geonoma* sp. in an inaccessible place in the forest at Estación Agua Fría at the Tortuguero National Park in the Province of Limón (20 m) and again at Colonia Virgen del Socorro, Province of Heredia (800 m), on the palm, *Prestoea allenii* H. E. More. According to these observations the female lays the eggs singly on the leaf but about four to six per plant. The larva is very cryptic while on the host plant, resting on the underside of the leaf during the first and second instars and later, in a "silk bed" that the caterpillar constructs with the semi-rolled tip of the leaf.

The adult is a very fast flier and feeds (as do all the species of the genus) on sap and rotting or decaying fruits.

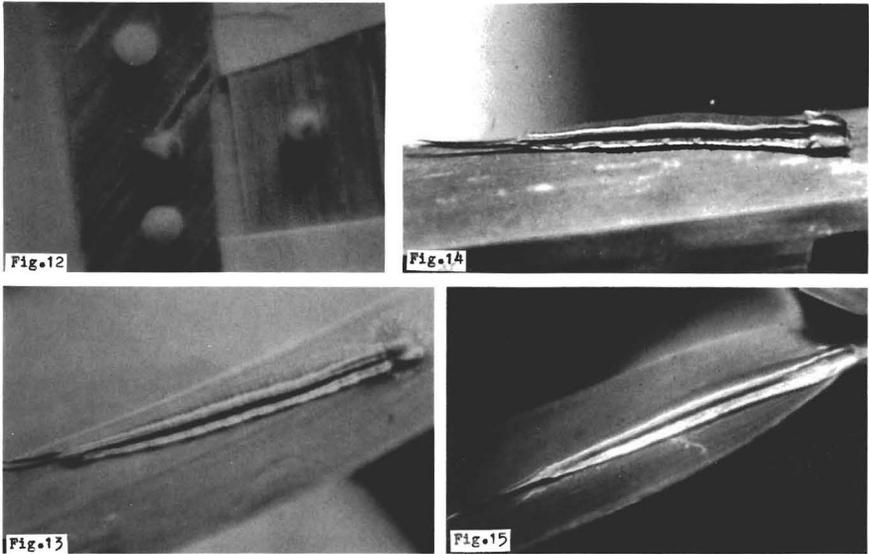
Eryphanis aescacus buboculus Butler has a wide distribution in the Costa Rican forests, and it occurs from 500 to about 1200 m. Nevertheless, with this wide distribution it represents a rare species with very restricted flying areas in association with water courses and bamboo thickets. Little is known of the adult behavior of this butterfly, but



FIGS. 8-11. *Opsiphanes quiteria quirinus*: 8 & 9, male, dorsal and ventral aspects, 80 mm wingspan; 10 & 11, female, dorsal and ventral aspects, 95 mm wingspan.

some observations, principally at Hacienda Santa María at the Rincón de la Vieja National Park in the Province of Guanacaste (900 m), reveals that *E. aesacus buboculus* is basically a crepuscular flier. It flies at dusk, essentially a courtship activity, which is characterized by territoriality behavior of the males along the river edges. The blue-violet iridescence of the male wings during their rapid flight is very conspicuous. The female receives the courting male on the surface of broad leaves, always on the river edges and particularly near the water falls. They are active at dusk for a period of about one hour and curiously halt all activity and disappear when bats begin to fly.

I suspect, as a result of a number of experiences using butterfly traps and banana bait, that the feeding habits take place mainly in the morning. *E. aesacus buboculus* feeds on sap and rotting fruits. I observed specimens feeding on decaying fruits, and only once did I see a female feeding on a bunch of fruits of *Ruagea caoba* (C. DC.) Harms (Meliaceae), approximately four meters above the ground near the Río Sarapiquí bridge on the way to Colonia Virgen del Socorro.



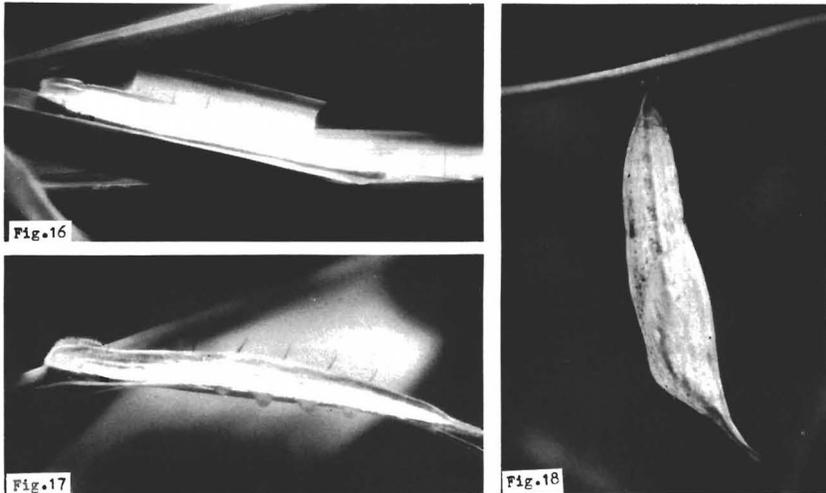
FIGS. 12-15. *Eryphanis aesacus buboculus*: 12, eggs on *Bambusa vulgaris*; 13, first instar larva after feeding, ca. 18.5 mm long; 14, second instar larva, ca. 28 mm long; 15, third instar larva in resting position, ca. 44 mm long.

My observations of the oviposition habits of *E. aesacus buboculus* are restricted exclusively to my greenhouse work. The female used for this study laid fourteen eggs, from four to six per day. Eggs were laid in pairs or triplets on the leaves of *Bambusa vulgaris* Schard. ex Wendl. (Gramineae), used as a substitute for *Olyra caudata* Trin. (Gramineae), which is the primary natural food plant, at least for the area of Colonia Virgen del Socorro; although, it is possible that *E. aesacus buboculus* is using a wide spectrum of host plants of the Gramineae, including *Chusquea scabra* Sods. & Cald., which is also present there.

The larvae of *E. aesacus buboculus* are very cryptic when on the host plant, especially in the fourth and fifth instars. They rest at the end of the leaves and become very agitated when disturbed, separating and erecting their forked tail and secreting an odorous substance by means of the scent gland located in front of the prothoracic legs. The pupa is also very cryptic. Presently, I do not have any information about specific or generalized parasites for this brassolid.

Discussion

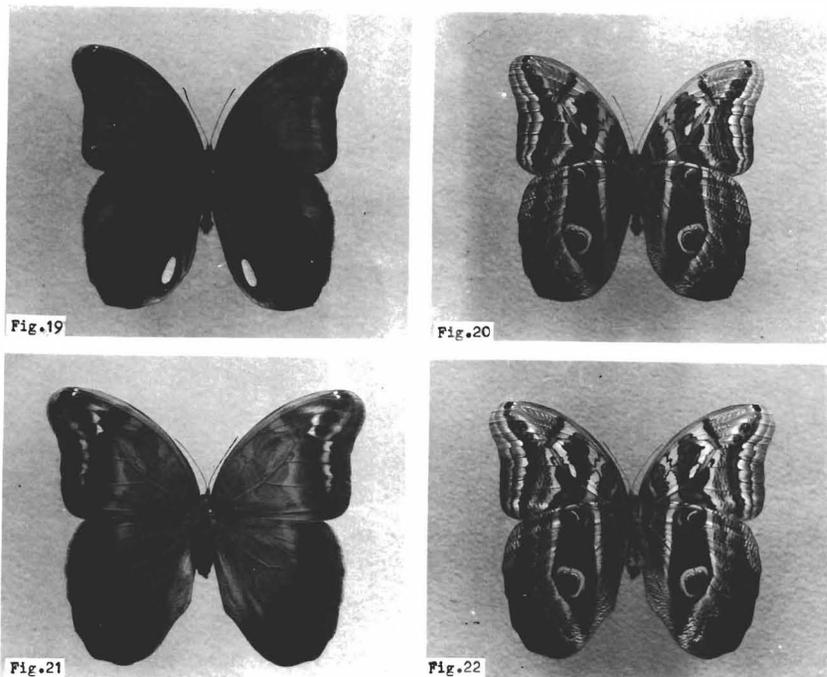
What impressed me is the scarcity of data published about the Brassolidae, especially in respect to the description of early stages and food plant records. It represents a serious problem for the correct identifi-



FIGS. 16–18. *Eryphanis aesacus buboculus*: 16, fourth instar larva, ca. 80 mm long; 17, fifth instar larva, ca. 118 mm long; 18, pupa, lateral aspect, ca. 56 mm long.

cation of the species in a given locality. I still have many problems establishing the exact location of some species in this family, and the possibility of obtaining new data on Brassolidae for Central America looks almost impossible. Fruhstorfer's (*in* Seitz, 1924) data on the early stages are still the most complete information available, but they are insufficient and some of the adult species descriptions are not precise. That is the case with the description of the *O. quiteria quirinus* female, which is different from the original of Godman and Salvin (1879–1901). There are some short papers available that offer some help in establishing a relationship between Central and South American species, with short descriptions of the life cycles as in Rothschild (1916), but it is extremely urgent that there be a complete revision of the Brassolidae.

O. quiteria quirinus feeds on palms, but it is necessary to have more data about the species of palms used. I can supply this information as regards the palms of the genus *Geonoma* and *Prestoea*, in addition to a life cycle study on *O. invirae cuspidatus* using the same host plants. Also, there are more complete works on the common *O. cassina fabricii* as in Young and Muyschondt (1975), in which the palms *Cocos* and *Bactris* are reported as hosts for this species. Therefore, I suggest the possibility that *O. quiteria quirinus* uses a broad spectrum of species in the Palmae as host plants. I reared separately three larvae of *O. quiteria quirinus* on *Chrysalidocarpus lutescens* H. Wendl, which is an introduced species of palm (L. J. Poveda, pers. comm.; Holridge



FIGS. 19–22. *Eryphanis aesacus buboculus*. 19 & 20, male, dorsal and ventral aspects, 107 mm wingspan; 21 & 22, female, dorsal and ventral aspects, 112 mm wingspan.

and Poveda, 1975), and I obtained the same satisfactory results as on *Prestoea*. I also have *C. lutescens* at my home in Barva, Province of Heredia (1200 m), and it is constantly frequented by *O. cassina* females for oviposition.

In respect to the *Opsiphanes* caterpillars, it is necessary to mention the paper of Young and Muyschondt (1975), since these authors are in error when they predict that the eversible gland located in front of the prothoracic legs of *Caligo* and *Morpho* caterpillars is absent in *Opsiphanes* spp. I have observed that this gland is present in *O. cassina fabricii*, *O. invirae cuspidatus* and *O. quiteria quirinus* larvae, and is probably present in all the *Opsiphanes* larvae, including those of the old description of Müller (1886), which was disputed in Young and Muyschondt's article.

Eryphanis aesacus buboculus, according to Fruhstorfer's report (*in* Seitz, 1924), occurs from Nicaragua to Colombia. The distribution reports for the Costa Rican area come from very different habitats in the North, the Pacific and the Atlantic slopes and to some extent due to this circumstance, I suspect that this species uses many genera in

the Gramineae as host plants. According to Poveda (pers. comm.) and to Standley's (1937) report, *Olyra caudata* is considered a very rare species, and the identification of this plant was very difficult. To support my theory, I reared some larvae of *E. aesacus buboculus* on *Chusquea scabra* with satisfactory results. Also, I received a report from Miguel Serrano (pers. comm.) of *E. aesacus aesacus* H.-Schaffer being reared on *Bambusa vulgaris* in El Salvador during 1967.

At Colonia Virgen del Socorro, I discovered that *E. aesacus buboculus* uses *Olyra caudata*, together with the satyrid *Oxeoschistus puer-ta submaculata* Butler and Druce, and curiously, this satyrid shares *Chusquea longifolia* Swallen with the brassolid *Opoptera staundingeri* Godman and Salvin at the Monte de la Cruz, Province of Heredia (2000 m). I hope that future studies with these species can further help us understand their relationships.

Another case of affinity occurs with the early stages and adult behavior observed for *E. aesacus buboculus* and *E. polyxena lycomedon* Felder. The only places where I have reports of the co-existence of these two species are from P. J. deVries (pers. comm.) at Turrialba, Province of Cartago (600 m), and from R. L. Hesterberg (pers. comm.) at Finca El Rodeo, Province of San José (500–600 m). Malcolm Barcant (1970) gives some short references on the adult behavior of *E. polyxena polyxena* Meerb. from Trinidad-Tobago, and it is also very interesting to observe that a close relationship exists between the habits of this species and those of the Costa Rican species of *Eryphanis*.

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