Journal of the Lepidopterists' Society
38(2), 1984, 102–113

NATURAL HISTORY NOTES FOR *TAYGETIS ANDROMEDA* (CRAMER) (SATYRIDAE) IN EASTERN COSTA RICA

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ABSTRACT. The early stages and a larval food plant are reported for the first time for *Taygetis andromeda* (Cramer), as studied in eastern Costa Rica. Various aspects of larval and adult behavior, including feeding and egg-placement, are also discussed for this widespread Central American satyrid. The larval food plant is a grass, *Acroceras zizanioides* (Graminae).

Taygetis andromeda (Cramer) is a common butterfly (Fig. 1) of forest and old secondary habitats from 0 to 1500 m on the Pacific and Caribbean watersheds of Costa Rica (A. M. Young, pers. obs.; P. J. DeVries, pers. comm.). The butterfly is also widespread throughout much of Central America and South America. It is one of four species of *Taygetis* reported from Central America, along with different species in Mexico, Central America, and South America which often exhibit distinctive patterns of range separation by habitat and elevation (Ross, 1976; Ebert, 1969; Lamas, 1967; P. J. DeVries, pers. comm.). While some fragmentary information on the early stages of South American *Taygetis* other than *andromeda* exist (Muller, 1886; d'Almeida, 1922), the present paper constitutes the first report of early stages and larval food plant for *T. andromeda*.

METHODS

The majority of observations were made at two localities on the Caribbean or Atlantic watershed of eastern Costa Rica: "Finca La Tigra," near La Virgen (10°23'N, 84°07'W; 220 m elev.), Heredia Province (described as "premontane tropical wet forest"); "Finca Experimental La Lola," near Siquirres (10°06'N, 83°30'W; 30 m elev.), Limon Province (described as "lowland tropical wet forest"). At "La Tigra" I observed *T. andromeda* adults on a pile of rotting bananas placed along a footpath through old secondary forest adjacent to a cacao plantation; the bait was used at wide intervals between 1977 and 1982 to observe this species and other butterflies. At "La Lola" I witnessed egg-placement (oviposition) behavior in *T. andromeda* and conducted a study of the early stages by confining recently deposited eggs in large clear plastic bags along with fresh cuttings of the larval food plant. These cuttings were replaced every two or three days, and the bag was kept tightly shut. A voucher specimen of the food plant was collected

FIG. 1. *Taygetis andromeda*, reared from eastern Costa Rica: dorsal (**left photo**) and ventral (**right photo**) aspects of the adult.

for determination. A careful check of early stages being reared was made to describe each stage, including estimates in days of duration for each stage. The bulk of the rearing was conducted at La Lola, with conditions in the rearing bag being of room temperature, which was the same as the air temperature in the nearby "La Lola" cacao plantation.

RESULTS

Adult Natural History

Taygetis andromeda adults readily come to rotting bananas on the ground in wet forest. Throughout the year at "La Tigra," there is usually a mix of "worn" and "fresh" butterflies, suggesting a continuously breeding population here. The butterfly is often seen on bait with several other butterflies, including *Morpho peleides limpida* Butler, *M. granadensis polybaptus* Butler (see also Young, 1982 for data on the abundances of these two species on banana baits at "La Tigra") (Morphidae), *Caligo memmon* Cramer, *Caligo atreus uranus* H.-Schaff. (Brassolidae), *Caerois* sp. (Satyridae), *Nessaea aglaura* Feld., *Myscelia ethusa* Bsdv., and *Prepona* spp. (Nymphalidae). Within the shaded forest understory, *T. andromeda*, in my experience, generally flies within one meter of the ground. Males are far more common at baits than females, a condition reflected also in the fact that males mostly

collected at baits are more commonly represented in museum collections for this species.

Egg-Placement Behavior and Larval Food Plant

On 22 July 1982 at 1400 h, I observed *T. andromeda* ovipositing in an approximately 100 m^2 patch of grasses (canopy height 0.5–1.0 m) in a "light gap" within the "La Lola" cacao plantation. The butterfly alighted cross-wise on a broad blade of the bamboo-like grass used as a larval food plant here. The butterfly then curled the abdomen around to the underside and placed a single egg on the blade. She then flew off and repeated the behavior on nearby individuals of the same plant. The larval food plant, which is also the egg-placement site, is the grass *Acroceras zizanioides* (H.B.K.) Dandy (Graminae), as determined from fresh specimens by Dr. Richard Pohl. This grass species is common in the lowland and premontane wet forest regions of Costa Rica (R. Pohl, pers. comm.). An egg is seldom affixed to the same general area of a grass blade both in the field and when a butterfly is confined to a plastic bag with fresh cuttings of *A. zizanioides* (Fig. 2). Under confined conditions, several eggs are sometimes placed on a single grass blade (Fig. 2), and I obtained a total of 15 eggs in four days by this method. Many eggs are also scattered singly on grass blades under this condition. In the field, *T. andromeda* is active in the late afternoon and at dusk; possibly, the butterfly is also nocturnal, but this behavior has not been studied. During other hours of the day, the butterfly is readily "flushed out" from palmaceous undergrowth in wet forest.

Early Stages

Egg. The egg is spherical, about 1.3 mm in diameter and very pale (almost white) green (Fig. 2). With a 10× hand lens, a very fine surface sculpturing, somewhat resembling the "hexagonal" pattern reported for the egg of *T. ypthima* by Muller (1886), is barely visible. Within a day or two of hatching, the black head capsule of the larva is clearly visible (Fig. 2), and the rest of the egg assumes the pale green color of the larva.

First instar larva. The first instar is about 7 mm long just after hatching, and the body is cylindrical and straight, with a gradual tapering towards the posterior end (Fig. 3). The head capsule is shiny black and conspicuously "lobed" laterally making it wider than the trunk (Fig. 3). The head capsule has six prominent horn-like protuberances arising laterally from the lobed areas (Fig. 4). These are structures that disappear in later instars (Fig. 4). The frontal area of the head capsule has some small black setae, as also noted by Muller (1886) for *T. ypthima*, and a conspicuous patchwork of irregular "fissures" to either side of the epicranial suture. The trunk is pale green and covered with almost translucent fine setae. The forked tail points upward at an angle of about 35°; each fork shaft is pink with a black tip. The terminal trunk segment and anal plate are white.

Second instar larva. Just after the molt from the first instar, the larva is about 10 mm long. The trunk region is now uniformly light green with several longitudinal yellow stripes. The head capsule is strikingly different from that of the previous instar: it is bilobed in general appearance, and light green with yellowish stripes (Fig. 3). The larva

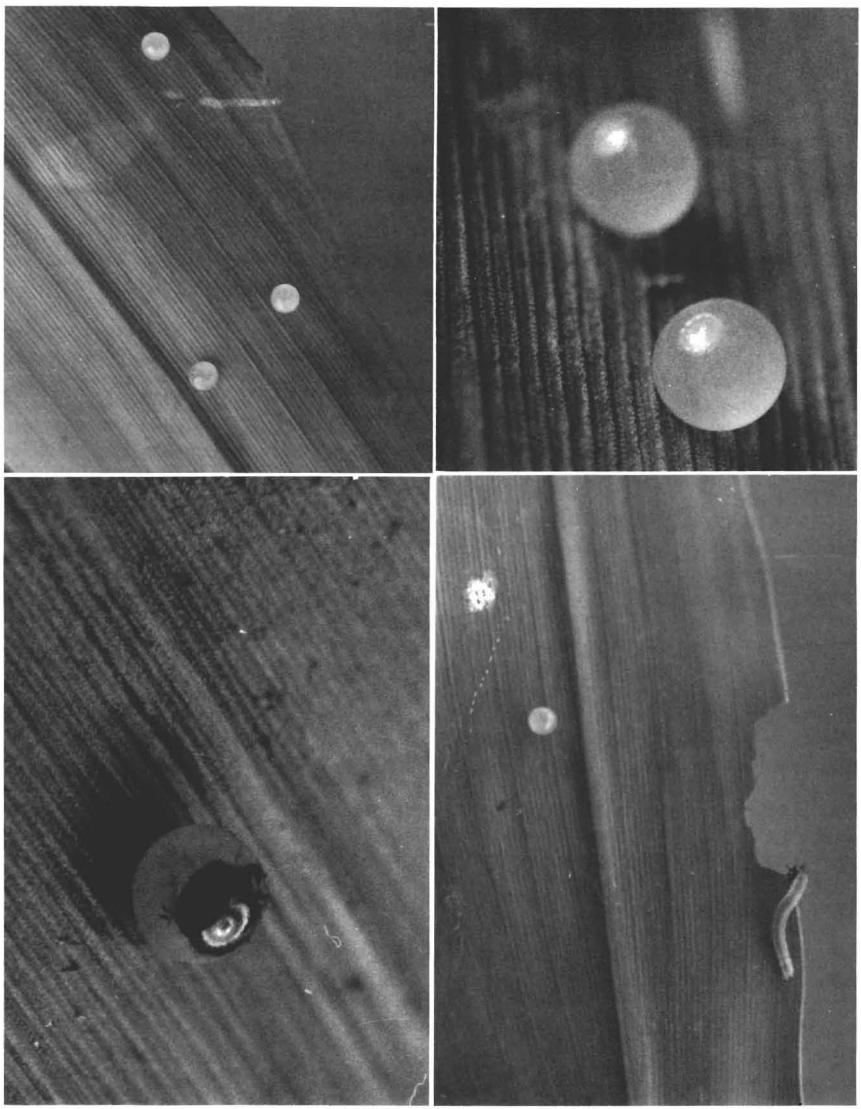

FIG. 2. Egg stage of *Taygetis andromeda*, and first instar larva feeding; clockwise, from upper left photo: three eggs scattered on a single grass blade of the larval food plant, *Acroceras zizanioides* (Graminae) as the result of female butterfly ovipositing in captivity; close-up view of one egg; egg position by female ovipositing in the field, and first instar larva feeding at the edge of a grass blade; first instar larva in initial stages of hatching.

reaches a length of about 16 mm in three days (n = 6 larvae measured), whereas the first instar larva grows to 9 mm in the same amount of time.

Third instar larva. The general appearance of the third instar larva is very similar to that of the previous instar, but the body assumes a thicker profile, and the annulets on the body segments are more prominent. The strongly bi-lobed head capsule (Fig. 4) is now pink, with the protuberances being sculptured and adorned with setae. The basic color pattern and head capsule structure (Fig. 4) of this instar is retained in the subsequent two instars. The third instar larva grows to about 28 mm in three days (n = 4 larvae measured).

Fourth instar larva. This instar (Fig. 5) is very similar to the previous one, and it attains a body length of about 32 mm in five days (n = 4 measured). The head capsule is directed more anteriorly now and bears a pair of very prominent protuberances or tubercles (Fig. 5). The trunk is very noticeably arched (Fig. 5).

Fifth instar larva. This instar is similar to previous ones (Fig. 6) but with considerable change in the configuration of the ornate head capsule (Fig. 4). As in the previous two instars, the background color of the trunk region is bright green with brown latero-ventral (supraspiracular) longitudinal stripes. The head capsule is tan frontally and with a dark brown thick vertical stripe on each side (lateral area). The tan color of the head capsule in the fifth instar larva replaces pink in the previous two instars. The posterior edges of the two prominent "horns" (Fig. 6) are tan, while dark brown both laterally and frontally. The dark brown areas of the "horns" extend down the sides of the head capsule. The broad, latero-ventral stripe on the trunk begins at the first body segment, being at first very faint on the first two segments, and then becoming much darker on later segments. This "stripe" is really a composite of two thick, dark brown lines surrounding a thin, central tan or cream-colored line, the latter barely visible, even with a 10× hand lens. Dorsally the trunk bears another complex pattern of longitudinal stripes: thick lines of green alternate with faint streaks of pink, and the forked tail is also green, and about 5 mm long. The pinkish red longitudinal bands run dorsally; each band is tapered, about 20 mm long and 2 mm wide at the thickest point, and extends from the third to terminal abdominal segments. On the fourth segment, the band on each side is adorned with small, irregularly-shaped black markings, each composed of two parts: a larger oval area anteriorly, followed by a smaller one. Dorsally the thoracic area bears a transverse "ring" of irregular, black markings at the posterior edge of the third segment. This band blends into a few thin longitudinal black lines extending from the third segment anteriorly to the head capsule. The tapered profile, segmental annulets, and overall arched trunk region make the fifth instar very easy to recognize, along with the description of stripes (Fig. 6). The trunk region is covered with a fine, light brown or tan down of setae. The fifth instar grows to about 55 mm in 12 days (n = 4 measured).

Pupa. The larva assumes a "J" position, undergoing little change in color, but with a contraction of body length to about 30 mm, and then molts within a day to the pupa stage (Fig. 7). The pupa is leaf-green all over and very stout in profile; it appears to be "dusted" with a waxy, whitish coat, more evident in some areas than in others. The pupa is 21 mm long by 9 mm thick (dorso-ventral axis through the thoracic area) and 9 mm wide (laterally, also through the thoracic area). A pale fulvous ridge defines the rear marginal areas of the forewing, and there is a pale, whitish blue thin line just below the spiracle area. The spiracles are marked with black. The abdominal area has dorsal, faint, multiple, longitudinal streaks of light green alternating with dark green lines. Of these, the medial, light green line is the thickest. There is a pair of pale yellow dots marking the beginning of two lateral thick whitish lines on the abdomen. These dots are on the first abdominal segment. The lateral and dorsal areas of the thorax have doublets of small, raised, pale yellow, dots; similar dots also occur immediately adjacent to the wing pads. The thoracic area bears a prominent longitudinal ridge which is pale fulvous at the apex. The dorsal area of the head capsule is slightly bi-lobed in the transverse plane. About ⅓ down the leg-case area from the head, there are two lateral pairs of irregularly-shaped white blotches followed by a pair of raised black dots. The wing pads also have several raised dots: one fulvous dot in the subcostal cell of the forewing; one black dot at the distal end of this cell; a whitish blotch between two radials; a small white dot on

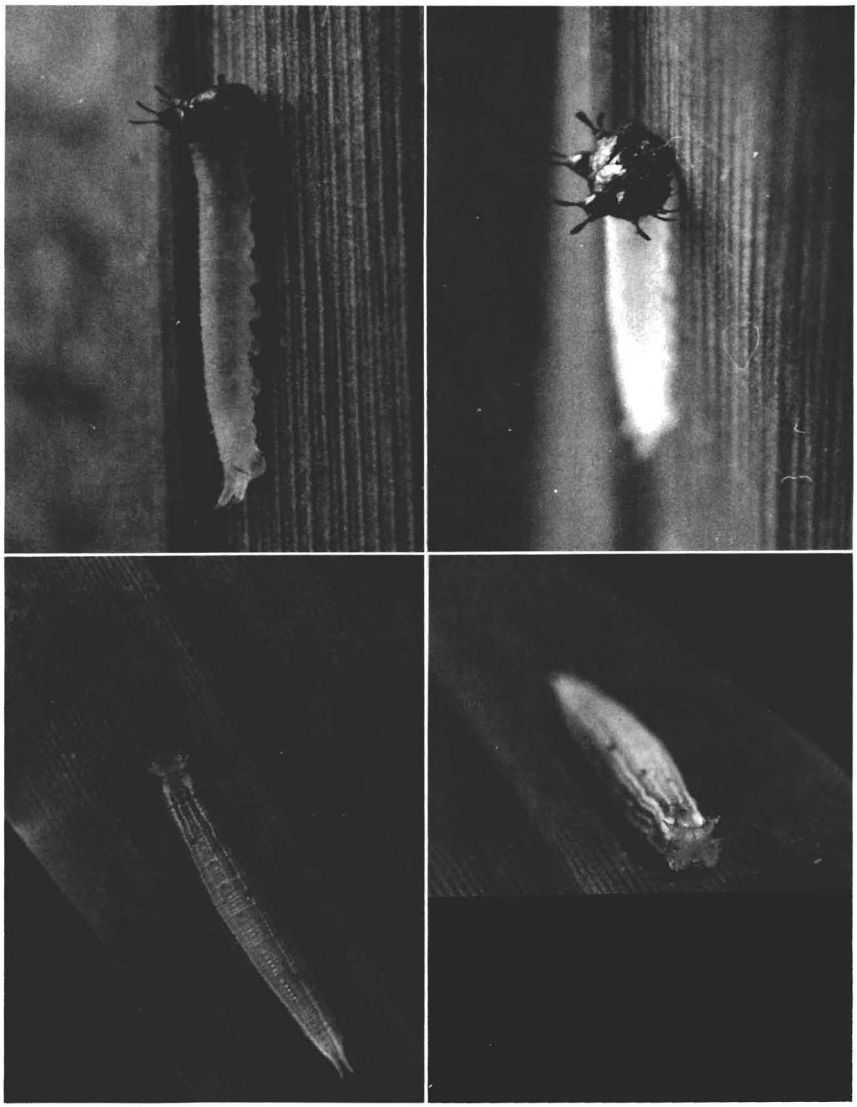

FIG. 3. First and second-instar larvae of *T. andromeda*, emphasizing overall body profile and some details of the head capsule. Clockwise, beginning with upper left photo: lateral view of first-instar larva; head capsule of first instar; frontal view of head capsule in the second instar larva; dorsal view of second instar larva.

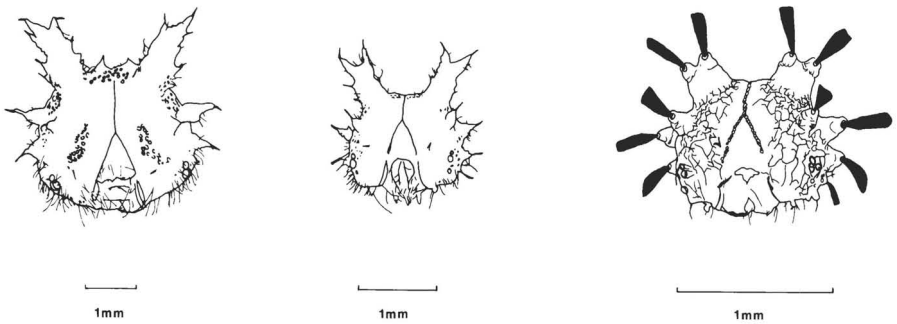

FIG. 4. Schematic drawings of head capsules, all frontal aspects, for three larval instars of *T. andromeda*. From right to left: first, third, and fifth instars, respectively. All three drawings made with drawing-tube attachment to Wild MS binocular microscope.

the subcostal vein near the apex of the wing. The cremaster is green with a brown "hook" for attachment. For three pupae, all adults eclosed (Fig. 7) by 0800 h. On the afternoon and evening prior to eclosions, the pupa darkens considerably, this process beginning in the wing pads. Eclosion is very rapid, with the butterfly fully expanding its wings within ten minutes after leaving the pupal shell.

Egg and Larval Natural History

The life cycle requires about 48 days from egg to adult, with the egg lasting seven days, the larva about 26 days, and the pupa 15 days. As with many other Neotropical butterflies in which individual eggs are scattered among many food plant individuals in an area of habitat, the first instar larva of *T. andromeda* devours its emptied egg shell down to the base immediately upon hatching. In those Lepidoptera which cluster eggs on the food plant, such behavior is conspicuously absent, a trait that appears to function to prevent cannibalism of late-hatching eggs by the larvae of early-hatching eggs in the same cluster. After devouring the egg shell, the larva moves to the edge of the same grass blade and begins feeding on plant tissue and does so from the ventral surface of the blade (Fig. 3). All instars, but most noticeable in the first instar, have the habit of "shooting out" fecal pellets to a distance of about 1–5 cm from the feeding site. When eating, larvae of all instars perch on a thin silk matting on the food plant. The bulk of feeding in all instars is nocturnal, and individual larvae construct silken strands to and from feeding sites. Older instars (instars IV–V) often rest on grass stems rather than on blades when not feeding. The long, slender body profile of the earlier instars (I–III) give the larvae a cryptic appearance on grass blades; the arched appearance so evident in the older instars (IV–V) may enhance their crypsis while perching

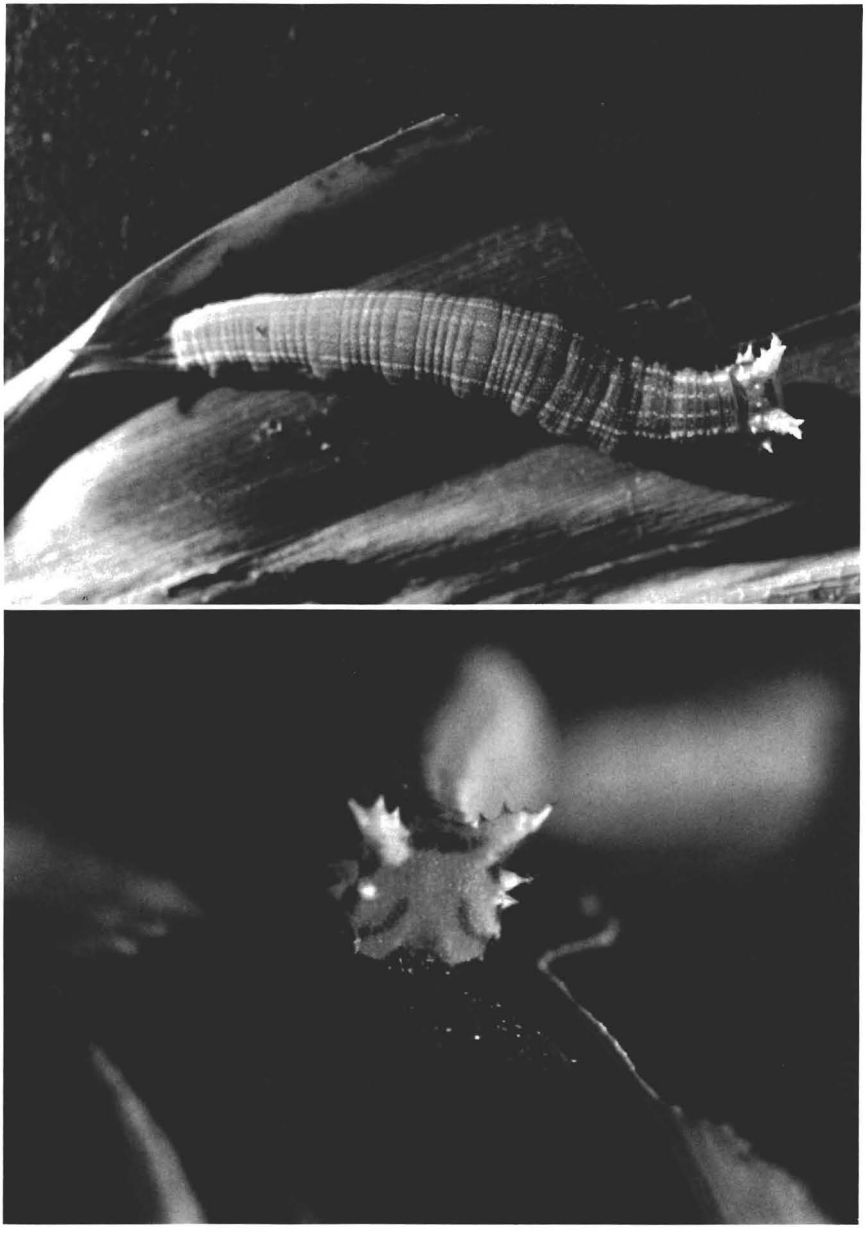

FIG. 5. Fourth instar larva of *T. andromeda:* dorsal aspects (**above**); details of the head capsule, frontal aspects (**below**).

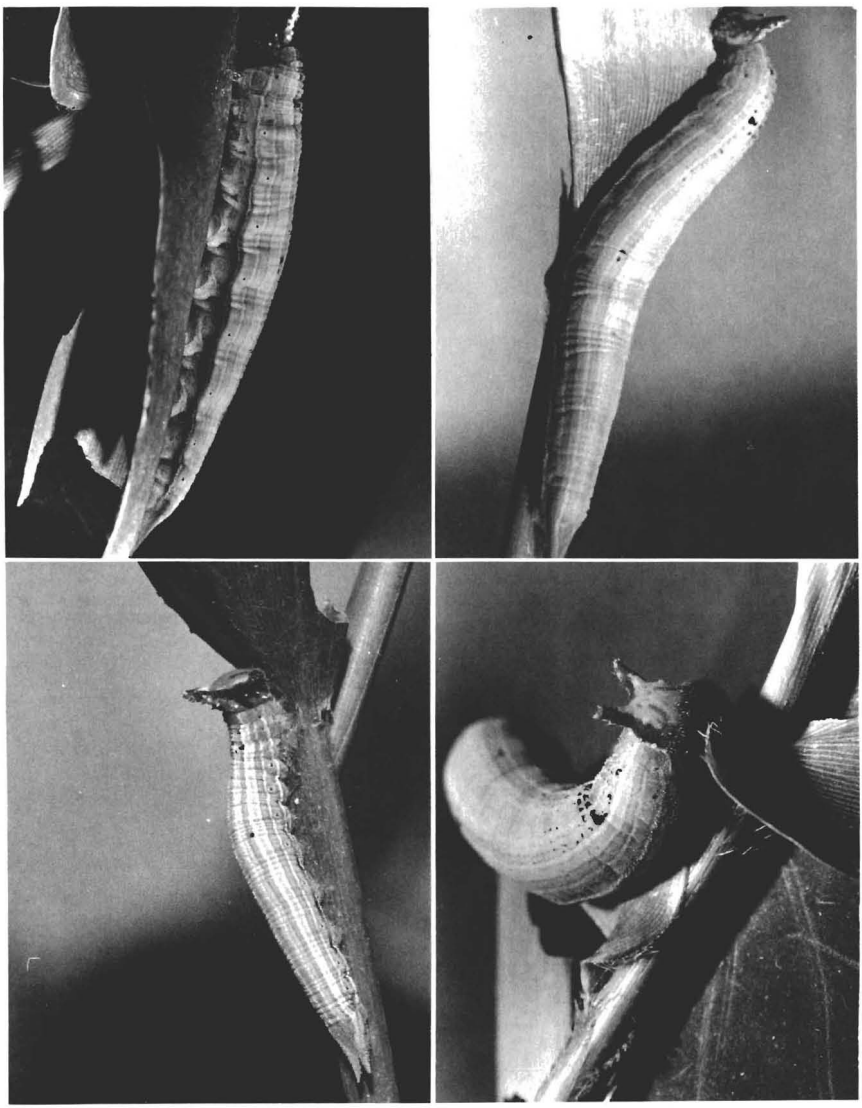

FIG. 6. Fifth instar larva of *T. andromeda*. Various aspects of perching and feeding behavior (**top two photos**); general body profile, head capsule, and silk mat perching (**lower two photos**).

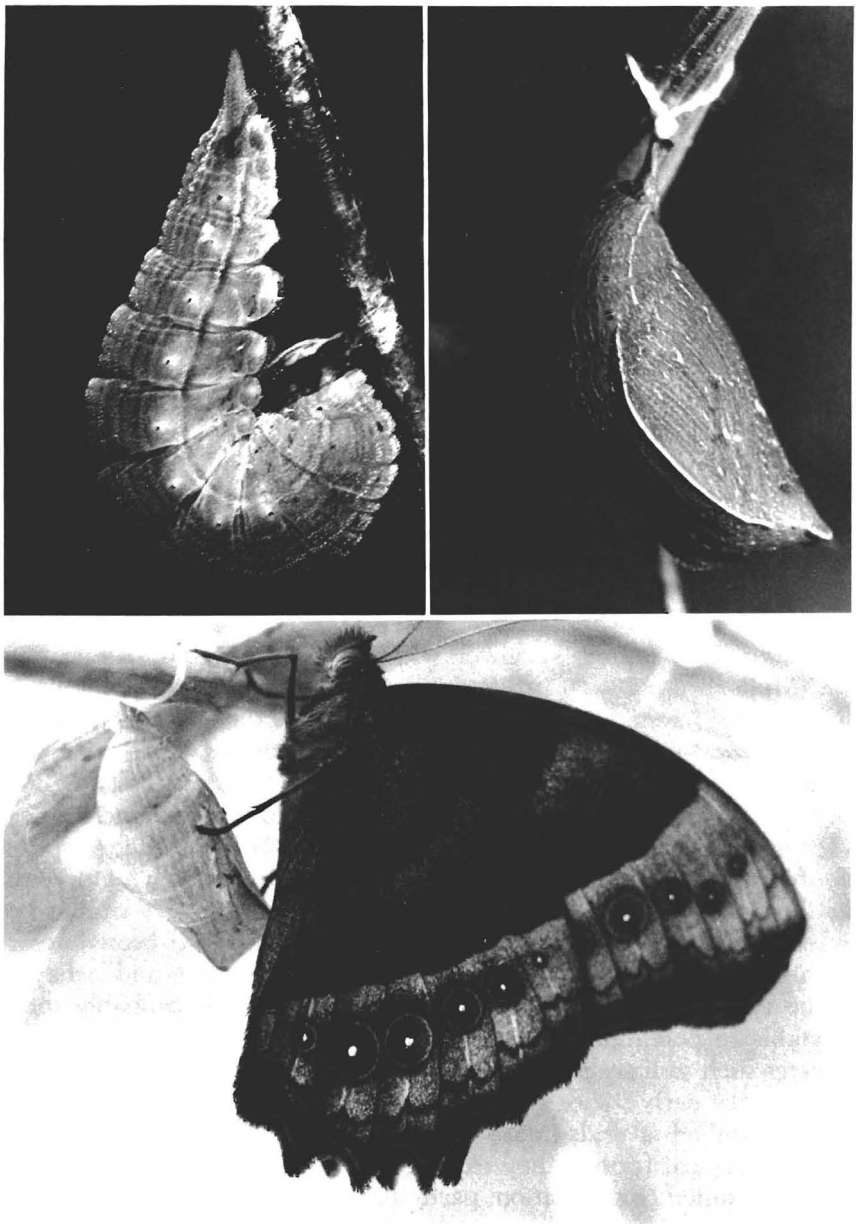

FIG. 7. Pupation and eclosion in *T. andromeda*. **Above:** prepupal position and pupa. **Below:** freshly-eclosed adult perched on the empty pupal shell.

on grass stems. When gently prodded with forceps, larvae of all instars quickly regurgitate a dark green fluid from their mouthparts; presumably, this fluid is a mixture of digestive fluids and partly-digested food plant tissues.

DISCUSSION

The observations on early stages and food plant association of *T. andromeda* presented here generally agree with what is already well documented for other satyrids, including the euptychiines to which this genus belongs. The satyrids in general, for example, are associated with monocotyledons as larval food plants (Ehrlich & Raven, 1965). The observed occurrence of *T. andromeda* in both old secondary forest understory and grassy areas in cacao plantations in eastern Costa Rica point to a butterfly that is already documented as being associated with a variety of tropical habitats (Ross, 1964, 1976). Although I report only one food plant species in this paper, the widespread occurrence of *T. andromeda* throughout Central America (e.g., Monroe et al., 1967) suggests that other grasses might also be utilized as larval food plants by this butterfly.

The description of the first instar larval head capsule for *T. ypthima* by Muller (1886) agrees very well with my description for *T. andromeda* (Muller's fig. 28a, b in Plate 13). Other descriptions of instars in Muller (1886) generally agree with my findings for *T. andromeda.*

While most satyrids are diurnally-active butterflies, some Neotropical forms such as *Taygetis* are crepuscularly-active, and possibly nocturnal. *Taygetis* is commonly found at rotting fruits in lowland tropical wet forest in Costa Rica near dusk (Young, 1972). With the exception of a few species, most *Taygetis* are believed to rely upon olfactory and tactile courtship signals, since wing color patterns are very similar between the sexes (Forbes, 1952). Certainly, the subdued brown coloration of this large butterfly and the cryptic appearance and behavior of the early stages together suggest an insect that is probably quite palatable to potential predators, including arthropods and small vertebrates such as lizards.

While the early stages of *T. andromeda* are similar to those of most other described satyrids (many papers in this journal for both temperate and tropical forms), they exhibit some differences which warrant further detailed consideration, particularly for comparisons with other species of the genus.

ACKNOWLEDGMENTS

This research is a by-product of grants from The American Cocoa Research Institute, and the Friends of the Milwaukee Public Museum. P. J. DeVries and Lee D. Miller

offered constructive comments on an earlier draft of the manuscript. Tammy McCarthy prepared Fig. 4. The comments of two anonymous reviewers were most helpful in providing a focus to the discussion section.

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