

LIFE HISTORIES OF NEOTROPICAL BUTTERFLIES FROM TRINIDAD

4. *DYNASTOR MACROSIRIS*

(LEPIDOPTERA: NYMPHALIDAE: BRASSOLINAE)

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ABSTRACT.— The life history of *Dynastor macrosiris* Westwood (Lepidoptera: Nymphalidae: Brassolinae) is described from material reared on *Aechmea nudicaulis* Linnaeus in the family Bromeliaceae. The huge egg is 3.50 mm in diameter, ribbed vertically, and white when first deposited, later turning to pink with larval development. There are five larval instars. All are characterized by fleshy spines on the dorsal centrum, short on head and caudal segments and longest in the center. The bodies are striped lengthwise in alternating whitish green and darker green lines, with several dorsal maroon blotches. A bifid tail is present. The head has four knobby spines on each side. The pupae is shaded beige and chocolate brown, and strikingly resembles a lizard or snake head. The complete life cycle of this rare and very unusual brassoline takes 70 days (for a male) at ambient temperatures in Trinidad (12 days in the egg stage, 42 days in five larval instars, and 16 days as a pupa).

KEY WORDS: biology, Bromeliaceae, *Dynastor*, hostplants, immature stages, larva, life history, Panama, pupa.

This paper is the fourth in a series of publications describing the life history stages and larval foodplants of neotropical butterflies from the West Indies nation of Trinidad and Tobago. The relevant geographical and ecological features of the island of Trinidad are discussed in the initial report (Urich and Emmel, 1990a). Additional background details as to the rearing methods used in the life histories being described in this series of papers are given in the second and third paper of the series (Urich and Emmel, 1990b, 1991a). All rearing was carried out at sea level in ambient tropical lowland conditions at Sangre Grande, Trinidad, in screened rearing cages kept exposed to ambient temperature, humidity, and natural daylight cycles. The senior author kept a daily log of notes and descriptions of each stage. Color slides were taken in Trinidad of some of these life history stages by Hans Boos and provided to us by Julius O. Boos, while other photographs taken in Trinidad or elsewhere in South America or in the collections at Gainesville by Thomas C. Emmel are also included as illustrations in this series.

The present paper treats the life history of a rare and unusual species of the *Dynastor* genus: *D. macrosiris* Westwood (Lepidoptera: Nymphalidae: Brassolinae). Long considered one of the rarest butterflies in Trinidad (Barcant, 1970), *Dynastor macrosiris* is one of three species of *Dynastor* in South America. Only *Dynastor darius* ranges north into Central America. Its life history was described initially from Panama (Aiello and Silberglied, 1979). Its life history in Trinidad will be considered in a future paper (Urich and Emmel, 1991b).

DESCRIPTIVE NOTES

EGG: The egg that provided the life history described in this paper was

carefully squeezed from a freshly killed female that had been attracted to the lights at the senior author's home. The egg is remarkably large for a butterfly: 3.50mm in diameter (as compared to 0.75mm for the genus *Caligo*). The egg is white in ground color, gradually turning pink as the larva developed. The egg is vertically ribbed as in other members of the Brassolinae. The egg was "laid" on 11 Oct 1979 and hatched on 23 Oct 1979, or twelve days after being deposited by the female.

LARVA:

First Instar: At hatching, the first instar was 8mm in length.

Head: The oval-shaped head is black in ground color, and is covered with short black hairs.

Body: Off-white in ground color, with pink lines running the entire length of the body. On the first two segments behind the head, a black band approximately 3mm wide encircles the segments. There are two short tails at the end of the body; these are red in color, with a single black hair jutting out from each tail. From the midsection of the body arise two short, soft spines, which point straight upwards. At the back of each of these soft spines is a smaller soft spine. The first ecdysis took place on 2 Nov 1979, ten days after hatching.

Second Instar: At full growth, the second instar was 29mm in length.

Head: At this stage, the head is covered by short, black or gray hairs. The hairs of both colors are of the same length, but black and gray patches of these hairs alternate from one side of the head over the crown of the head and down towards the opposite side. It is easy to overlook the grayish hairs at this point and mistake the black hairs for separate tufts of hairs which curve from one side over the top of the head to the other side. On each side of the posterior margin of the maximum circumference of the head are four knobbed black horns. The largest of these is nearest the crown of the head. They diminish in length as they approach the ventral side. Each knobbed horn has a tuft of gray hairs at its terminal point. All together, the eight horns are arranged similarly to a tiara on a woman's head.

Body: The first segment behind the head is dark maroon (almost

black) in color, with about eight small white blotches on this colored band around its circumference. On the posterior edge of this 2mm-wide maroon band occurs another dark ring with a series of much smaller white dots in it.

The remainder of the body of this larval stage has a ground color of whitish-green lines alternating with darker green lines, extremely close in proximity and running the length of the body. The pattern provides superb camouflage to the larva and when this caterpillar is at rest (generally with the length of the body parallel to the host plant leaf), the alternating lines as described above blend perfectly with the parallel vascular bundles in the leaf.

At the approximate dorsal midsection of the length of the body is located a boat-shaped maroon-colored blotch, with a second such blotch located at about 3mm posteriorly to the first one. Between these blotches are markings of thin whitish lines, though only at the mid-dorsal location on the larva. Between the anterior part of the large maroon blotch and the posterior part of the head is a maroon protrusion, which is the exact shape of one of the spines present along the edges of the bromeliad foodplant. Three more such soft spines arise from the large maroon blotch. The anteriormost and the middle spine are brownish at their bases, while the posteriormost is yellowish at the base. Another such soft spine arises from the smaller maroon blotch and is yellowish in color. Between the posterior end of this last dorsal blotch and the base of the tails is a very short maroon spine.

The mid-dorsal point on the dorsal surface along the length of the body, both between these blotches and running through these blotches, are the alternating light and dark thin lines which resemble vascular bundles in the leaves of this monocotyledon. The soft spines on the mid-dorsal ridge of the dorsal surface start short at the head end and increase in length to the midsection, then becoming smaller towards the posterior end.

When this larval instar is quiescent on the center of one of the curved green hostplant leaves, which bears maroon-spiked spines at the edge, the larva generally rests with the head downward so that the alternating lines of the body blend in with the leaf surface. The camouflage is even further enhanced by the following. When the caterpillar is viewed from the sides, the spines suggest the edge of the leaf of this bromeliad, with the light maroon tail of the larva simulating the terminal spine on the leaf. The tail even occurs at the same angle as the terminal leaf spine!

The second ecdysis took place on 10 Nov 1979, eight days after the first molt.

Third Instar:

Head: The head reaches an even more complicated pattern and sculpturing than previously. At this stage, the head is 7mm in width. There are eight horns, four arising from each side of the center of the head. The two largest horns towards the top are dirty yellow in color; the lower pairs of horns are dark brown to black, being reduced in length as one approaches the ventral surface. All eight horns end in oval knots and are tufted with short beige hairs. The hairs on the largest knobs are lighter beige and those on the other two pairs are darker, matching the darker ground colors of those knobs.

Looking at the frontal portion of the head from directly in front of the larva, a whitish design like the figure of a person without a waist, with legs spread out at about 35° and the feet turned directly outwards on each side, appears. These two feet-like designs are thicker than the outlines of the so-called human figure. From the top section of this human body design arise two lines which stretch laterally. At the top of this body occurs an oblong headlike design. To the outside of each foot is a maroon-colored oblong mark surrounded by a thin whitish outline of white, giving the appearance of a pair of eyes. At the center of the body of this figure is a maroon patch with an inverted "V", the apex of which ends at about the lower chest. The two bottom ends of this "V" end at about halfway down the length of the legs of the figure.

Body: Alternating light and dark green lines run the length of the body as in the previous instar. The tails are greenish on the outside surfaces but salmon-colored to the inside. From the top, the tails resemble the figure "U", with the bottom of the "U" at the point where they diverge from the body being greater in width than the distance between the two tips.

Located just behind the head is a maroon-black soft spine. Posteriorly 3mm arises another spine of the same color but twice as long and somewhat darker. Another 3mm posteriorly is a soft whitish line with a maroon-colored base, and a very small spine of the same coloration touching the front of the large spine at its interior end. The large white spine curves slightly towards the posterior end of the caterpillar. Posterior to this large white spine is another spine which is slightly larger than the one in front of the large spine. This spine also touches the large spine, but is completely white. At about 7mm further posteriorly occur two spines slightly shorter than the white spine. These are maroon in color and just behind this one is another deep maroon-black spine. A maroon-colored marking with white decorations occurs on the dorsal surface between the second spine and the last spine described above. The anterior end of this oval maroon marking ends in a point.

Behind the oval maroon marking are two more spines, both arising from the similar maroon oval but narrower in shape and with a black mark in the middle. These two spines are maroon in color, each having a light mark to the front of the base of that spine. At about 5mm further back and closest to the base of the tails is a maroon spine that seems to curve forward instead of posteriorly like the rest of the spines.

The third ecdysis took place on 19 Nov 1979, ten days after the second molt.

Fourth Instar:

Head: In this instar, the width of the head is 11.5mm. The same decoration on the front of the head appears in this instar except that in the third instar, the human-person figure was hairless. Now, short beige hairs are present, arising from the figure's outline.

Body: Directly behind the head is a dark maroon to black collar. Between the head and the first thorn-like object on the dorsal surface is a dark round small spot. The next thorn-like spine arises from a black oval on the dorsal surface and appears to divide into two points near the tip. This spine is also blacker. The next three thorn-like spines arise from the top of the body from an oval blotch, this blotch being pointed at both the anterior and posterior ends. These three thorns rise from a single base; shortly above the base, each of these thorns separates into a double point.

To the posterior side of this black blotch is yet another black blotch with black thorn-like spikes, each ending in two points. These arise at the anterior end of the black blotch. Following posteriorly through four more thorns, and arising from the back end of this black blotch, is a group of three black thorn-like spines. In this grouping, the most anterior one is very short. The second thorn-like spine is flattened sidewise and curves posteriorly towards the three thorns in that cluster. This one is 2/3 the length of the first one whose point curves towards the front of the body. Following posteriorly another 6mm, a further black thorn-like spine arises from a black oval shape on the body at that point. An irregular brown line curves around the inner curve of these black oval blotches. Just inside this brown line is another irregular broken black line. In the center of each of the two oval shapes is a smaller green oval shape. Inside the green oval are two irregular oval lines of brown, and finally two green, extremely small ovals. These curve slightly towards the front of the larva.

Midway between this complicated black marking and the base of the tail is a faintly colored, light maroon spot. The tails from above appear to be like the letter "U" with the bottom sides of this letter bulging outward slightly on both sides of the larva just before the point where

they are attached to the tail portion of the body. The inside of the "U" is shaped like a "V", so that the two tails appear to be fused together on the inside. In addition to this characteristic, the tails are flattened from top to bottom, and curve slightly upwards, ending in two pointed tips. They appear to be slightly concave on the inside surfaces. The inside of each of these fused tails is a dark brownish maroon color, with the outside edge being a blotchy, dingy, yellow. The extreme ends of the tips of these tails are reddish-yellow.

The general body color has not changed throughout the life cycle so far. In this instar, it is again the usual white and green alternating lined pattern running the length of the body, simulating closely the parallel venation of this monocotyledon. At each side, running the length of the body and located just above the legs, are eight small maroon spots, representing the abdominal spiracles.

The fourth ecdysis took place on 23 Nov 1979, four days after the third molt.

Fifth Instar: At full growth, the fifth instar was 111mm long, with the widest body portion being 15mm.

Head: The sole clue to the molting of this larva from fourth to fifth instar was that the thorn-like protrusions on the dorsal ridge were noticeably larger. Otherwise, the larva was very similar to the fourth instar. In *Dynastor darius* reared in Panama, the number of instars varied from five to seven before pupation, and thus Aiello and Silberglied (1978) found that larval size could not be used to identify instar number.

This larval stage began with a length of 90mm. By this stage, the larva was superbly camouflaged when perched on a bromeliad leaf. With its head near the point of the elongated concave leaf, the larva rested with the rest of the body in such a position that alternating light greenish lines and darker lines on the body ran parallel with those on the leaf. But even more amazing is the fact that the thorn-like protrusions on the body made the larva appear to be another thorn-edged leaf that was overlapping the curved hostplant leaf, with thorns on both sides.

At a length of 90mm, the larva has a total of 19 thorn-like spines, with five maroon spots that represent rudimentary or very low-profile thorns. As the larva continues to grow thicker and longer to an eventual length of 111mm, some of the rudimentary thorn-like spikes get longer and may be recorded as spines. On 27 Nov 1979, Urich described the groups of thorns and rudiments, posterior to the head, at this stage of the fifth instar as follows:

1st group	2 spines	no rudimentary thorns
2nd group	3 spines	one at front of cluster rudimentary
3rd group	4 spines	no rudimentary thorns
4th group	4 spines	small hump ahead of this group
5th group	3 spines	one rudimentary ahead of this group
6th group	3 spines	one rudimentary ahead of this group
7th group	2 spines	one rudimentary ahead of this group
Total:	21 spines	4 rudimentary, and one hump between the third and fourth group

On 30 Nov 1979, eleven days after the fourth instar molt, the larva ceased to eat. The larva remained inactive, resting on the underside of a leaf for the next two days. The color of the body became more yellowish and the skin appeared to be opaque in nature. The larva shrunk in length but increased in width, the body segments becoming more easily detectable. The larva attached itself by the cremaster to webbing spun on the leaf, and hung downward for two days.

This larval stage pupated on 4 Dec 1979, eleven days after the fourth instar molt.

PUPA:

As may be seen in the accompanying figures, the pupa is rather

strongly sculptured in the thoracic area. The overall appearance is of a small snake or lizard head.

The entire dorsal surface of the pupa from the cremaster to the head is chocolate brown. When viewed from behind while hanging from a leaf, only a chocolate brown color pattern can be seen. Viewing this pupa from the ventral side or concave area, the pupa is beige in ground color, with small markings of chocolate colorations splattered throughout that side. When viewed laterally, it is noted that the beige coloration of the ventral side curves about two-thirds of the distance from the cremaster on both sides, ending in two short cream or ivory-colored markings. This beige-colored curve and ivory markings provide great contrast against a dark chocolate color which becomes darkest where the ivory meets it. When viewed laterally, the beige and chocolate colors run the length of the abdominal section, with a clean line separating between the chocolate and ivory coloration of the dorsal and ventral sides of the abdominal section. When viewed from the side, the shape of the bottom of the pupa is that of a lizard's head turned and hanging downward, with two oval ivory-colored spots having beady-looking round black spots that simulate the eyes of a lizard. In addition, in the last short ivory point extending slightly upward into the chocolate of the dorsal side is a slanting eye-like mark of chocolate color on each side.

At the ventral side near the head end, as the pupa hangs, are two eye-like chocolate-colored blotches located in the basal area. This is apparent when viewed from the ventral side. The varying shading of the thorax gives the appearance of a lizard or snake head. The outline of the curve at the top of the snout is a lighter ivory in color, and is accentuated by the dark chocolate color which from that point curves upward towards the rear thorax section of the pupa. Viewed ventrally, the abrupt ending of the dark chocolate brown of the dorsal side curving around each side accentuates the point at which the head of the reptile ends and the rest of the body of the pupa begins.

Just above these two black marks which can be seen from this angle, the rather flattened surface curves outward symmetrically on both sides and then back in towards the part of the abdomen directly behind the thoracic section of the pupa. The pupa narrows gradually to terminate at the cremaster.

The pupa hatched on 20 Dec 1979, producing a male sixteen days after pupation commenced.

ADULT: This very large, uniformly black brassoline has a wingspan of about 110mm in the male and 130mm in the female. Otherwise, the sexes are nearly identical. On the forewing, there is a white spot at the apex and three or four very indistinct cream-colored splashes of scaling in the form of a median transverse bar. Near the apex and along the margin of the hindwing are shadings of the light bluish coloration. On the underside, the hindwings and the inner half of the forewing are colored yellowish-brown in ground color with many black lineal striations. The apical half of the forewing is uniformly gray-brown splashed with white, and is marked with two large eyes which are bordered towards the body with yellow.

The species primarily flies at dusk in lowland forested valleys, although most specimens in Trinidad have been females attracted to light. Some idea of its rarity may be had by the fact that through 1981, only a dozen or so females had been collected in Trinidad in the past century and only two males had been collected (Urich and Boos, 1981). A short one-page note on the metamorphosis of *Dynastor macrosiris* Westwood was published by Urich and Boos (1981), but the larva and pupae were not described. Only a timetable of moltings for each stage of the life cycle was given. The present paper is the first to both describe the life history from Urich's notes and illustrate the larval and pupal stages.

This *Dynastor microsiris* is particularly remarkable because of the discovery (Urich and Boos, 1981) that the adults have a rudimentary proboscis like that of the genus *Brassolis* and thus do not feed during their adult lives. This fact makes it impossible to bait them to traps with rotting food or other lures that are successful with other Brassoliniinae and their relatives.

HOSTS: *Aechmea nudicaulis* L., a large bromeliad species in the family Bromeliaceae. In feeding on this host, the larva consumed the entire leaf, including the spines. In Panama, Aiello and Silberglied (1978) found that *Dynastor darius* ate only another member of the Bromeliaceae, pineapple (*Ananas comosus*), of the leaves of eight monocot species offered.

GENERATION TIME (egg to imago): 70 days. This contrasts with 80.9 days (range 73-88 days) for 8 individuals of *Dynastor darius* reared from oviposition to adult eclosion in Panama by Aiello and Silberglied (1978).

ACKNOWLEDGMENTS

The publication of this series of life history papers is supported in part by the Lepidoptera Research Fund at the University of Florida Foundation, and the Division of Lepidoptera Research, University of Florida, Gainesville, Florida.

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