

LIFE HISTORIES OF NEOTROPICAL BUTTERFLIES FROM TRINIDAD

5. *DYNASTOR DARIUS DARIUS*

(LEPIDOPTERA: NYMPHALIDAE: BRASSOLINAE)

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ABSTRACT.— The life history of *Dynastor darius darius* (Stichel) (Lepidoptera: Nymphalidae: Brassolinae) is described from material reared on *Aechmea nudicaulis* Linnaeus and other large bromeliad species in the family Bromeliaceae. The large egg is 2.0mm in diameter, finely ribbed vertically, greenish when first laid, turning pinkish on the second day. There are five larval instars. The mature larva is dark green with alternating lighter-green markings running lengthwise, and three beige-colored dorsal patches. The body is covered with short fine hairs. The bifid tails are short. There are four knobbed horns on each side of the head. The pupa is shaped like a snake head and is beige, chocolate brown, and misty gray in basic ground colors. The snake-head appearance is enhanced by the pupational orientation of the pupa, with ventral side uppermost and exposed to view as it hangs from the leaf. The complete life cycle of this rare brassolinae takes 62 days at ambient temperatures in Trinidad (9 days in the egg stage, 40 days in five larval instars, and 13 days as a pupa).

KEY WORDS: Argentina, biology, Brazil, Bromeliaceae, Costa Rica, *Dynastor*, hostplants, immature stages, larva, life history, Mexico, Panama, pupa.

This paper is the fifth 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 (Urich and Emmel, 1990a, 1990b, 1991a, 1991b). A discussion of the relevant geographical and ecological features of the island of Trinidad is given in the initial paper of the series (Urich and Emmel, 1990a). The rearing methods employed in these life history studies were described in the second paper of the series (Urich and Emmel, 1990b). All rearing was carried out near sea level in tropical lowland conditions at Sangre Grande, Trinidad, unless otherwise stated. Gravid females were confined in screened rearing cages at ambient temperatures, humidity, and natural daylight cycles. In the case of *Dynastor*, suspected or identified host plants in the family Bromeliaceae were placed with a female daily until the butterfly oviposited. Larvae were maintained on potted growing hosts, which were ground-dwelling bromeliads or freshly cut branches of tree bromeliads in the screened cages under the same regime. Pupae were likewise maintained in screened cages under ambient environmental conditions until adults emerged. The senior author kept a daily log of notes and descriptions of each stage.

There are three species of *Dynastor* in the American tropics, two of which occur in Trinidad. The life history of *Dynastor macrosiris* Westwood has been previously described in an earlier paper in this series (Urich and Emmel, 1991b). The present paper treats the life history of the second species of *Dynastor* on the island of Trinidad, *Dynastor darius darius* (Stichel). This butterfly is classified as a member of the subfamily Brassolinae of the family Nymphalidae (Ehrlich, 1958; DeVries, 1987), or in other works as a member of the family Brassolidae (Barcant,



Fig. 1. Adult female of *Dynastor darius darius* (Stichel) from Trinidad. (0.5x)

1970; D'Abbrera, 1984), *Dynastor darius* has the widest range of any species in the genus, and the life history of *darius* has been described previously from Panama (Aiello and Silberglied, 1979) and from southern Brazil (Burmeister, 1873; Muller, 1886).

The two species of *Dynastor* that occur on Trinidad, *D. macrosiris* and *D. darius*, also occur on the mainland of South America, along with a third species, *Dynastor napoleon*. A short note is in preparation on the life history of this third species in southern Brazil.

DESCRIPTIVE NOTES

EGG: A single egg was laid on 8 Apr 1983. The egg is globular and 2.0mm in diameter. The initial color is greenish, gradually turning pinkish on the second day after oviposition. The surface is finely ribbed from the micropyle area to the base of the egg. The egg hatched on 17 Apr 1983, or nine days after being laid.

LARVA:

First Instar: At full growth, the first instar was 10 mm in length from head to end of tail.

Head: The head is light brown in ground color, with a design resembling a small doll, brownish in color, with both arms extending outwards and slightly upwards, and with the legs opened at about an angle of 48°. A small triangular brown mark is also present between the open "legs." The head is covered with short black thin hairs curving slightly forward. The ends of these hairs are brownish in color.

Body: Light green in ground color, with a thin mid-dorsal line that runs from the head back to a small oval spot about midway along the length of the body. Behind this spot, there is a break of about 1mm. Then the mid-dorsal line continues towards the two tails. This line is pinkish-brown in color. It ends abruptly at a point between the widely separated bases of the tails. The first half of the lengths of these two tails is the same base color as the body (light green). The outer halves of the tail are blackish and end in a point. The total length of the tails in this instar is 1.5mm.

On each side of the body is a thicker pinkish-brown line, below which are two additional and thinner lines of the same color running the length of the body. Fine colorless hairs are present across the body surface and spaced rather distant from one another. On hatching, the young caterpillar ate the eggshell. The first ecdysis took place on 20 Apr 1983, three days after hatching.

Second Instar:

Head: In this instar, the hairs on the head are virtually as described for the first instar. However, when looking at the head from the front, a dove-like figure is obvious. This design is brown in color and resembles a dove flying straight down. Four brown blotches are present, arranged in a square surrounding the dove-like figure (one pair on the top half of the larval head and the other pair at the bottom of the figure). On the posterior edge of the head is a brownish-black color.

Body: The basic color of the body at this stage is dark green, with thin whitish-green stripes running the length of the body. The small, oval, brownish spot situated on the dorsal surface of the body and located about midway between the head and the tail is now larger and maroon in color. Around this oval is a larger oval-shaped marking which starts interiorly as light yellow and merges into white shading at the outer perimeter. This white marking becomes longer towards the caudal side, with two extremely small protrusions at each side. Behind these protrusions by 2mm is an extremely small white rectangle. Finally, the tails are widely separated, and are beige in color up to halfway along their length of 1.75mm from their bases. These tails terminate as blackish points at the extremities. The total body length at this stage was 19mm. The second ecdysis took place on 24 Apr 1983, or four days after the first molt.

Third Instar:

Head: The head at this stage is reddish-brown, and bears the same markings as the second instar in the shape of a dove in white. Some observers might describe the markings of the head as that resembling a clown with arms extended parallel to the ground, and holding two club-shaped objects hanging downwards. The "clown" is in a sitting position, with legs opened widely, revealing white baggy pants and having the bound soles of the shoes facing the observer. Over the white suit of the clown is an inverted "V" at the chest level. There are eight

short horns extending upwards like a tiara on the sides of the head. All of the horns are brownish-maroon when seen from the front. These horns have white tips and from these tips arise clusters of fine, short, white hairs. When the horns are seen from the posterior side, however, they are all white. The last two horns at the bottom of the head on both sides are extremely short. Over the entire surface of the head arise hairs which have the same color as the markings as from which they arise, that is, either white or reddish-brown.

Body: At this stage, the basic color of the entire body is light green, with lighter green, thin stripes running the length of the body. Overall, the color pattern affords perfect camouflage against predators when the larva is resting lengthwise on the bromeliad leaf. The oval-shaped marking in the middle of the dorsal surface and located midway between the head and tails is now black in the center, with a maroon outline. Around this oval marking is a enamel-white oval, which is slightly longer at both head and caudal ends. These two ends of the white oval are sharply squared-off in pattern. Starting 2mm behind the white oval marking is a white rectangular-shaped mark, with a maroon spot touching it. The tails are pinkish in color at the bases, becoming lighter towards the tapered ends. The ends are tipped with black. Fine white hairs are arranged along both sides of the larva above the legs. The total length of the larva at this stage reached 23mm. The third ecdysis took place on 4 May 1983, or ten days after the second molt.

Fourth Instar:

Head: The head at this stage is dark brown. When viewed from the front, there are two white chicken-shaped figures arranged such that their crops touch and their necks point straight upwards. At the end of the "tails" of these chicken figures, two white marks are present as if a bit of white cardboard were attached to the end of each chicken's tail. These bits or marks run vertically and are parallel to each other. Between the two thin legs of the chicken is a white mark. Leading off from this mark are two moustache-looking marks which broaden it to curve outward just above the mandible. On the sides of the head are arranged eight knobbed horns, in a shape of a tiara. The two largest horns are at the crown of the head and as one moves down on either side of the head, the horns become smaller and smaller. From the white markings on the front of the head and the rest of the head surface, short hairs (of the same color as the areas from which they arise) are present. On all the horns, especially the outer knobs, are short thin whitish hairs; these arise from an area of brownish-maroon color, which is the same as the basic color of the head.

Body: At this stage, the basic body color is exactly the same as after the second molt. An elongated black oval mark is present about midway between the head and the tail on the dorsal surface. In the middle of this black mark is a beige mark conforming with the outer oval shape, and gradually blending through darker colors into the back. Surrounding the black oval mark is a beige marking, the inner portion of which is lighter beige than the outermost portion. On both the head and caudal smaller ends of the oval shape is a round, enamel-white spot in the shape of a ball. The one on the end nearest the head is perfectly round, but the one at the tail end has the shape of a baby's feeding bottle nipple, with a thin point of the nipple facing the tail. About 5mm posterior to the tip of the nipple mark is a small white spot with a beige mark touching the posterior end of the white spot. Surrounding the small beige and white marking is a ring of dark beige to maroon.

The tails at this stage are brownish-maroon, and the bases are widely separated. A line of thin white short hairs which are clustered close to each other run along both sides of the body for the entire length, just above the leg. These short white hairs rise from the body out of extremely small white spots, which are spaced relatively far apart. There are short hairs on the tail, facing slightly posteriorly, and these are of the same color as the tails themselves. The extreme ends of the tails are black.

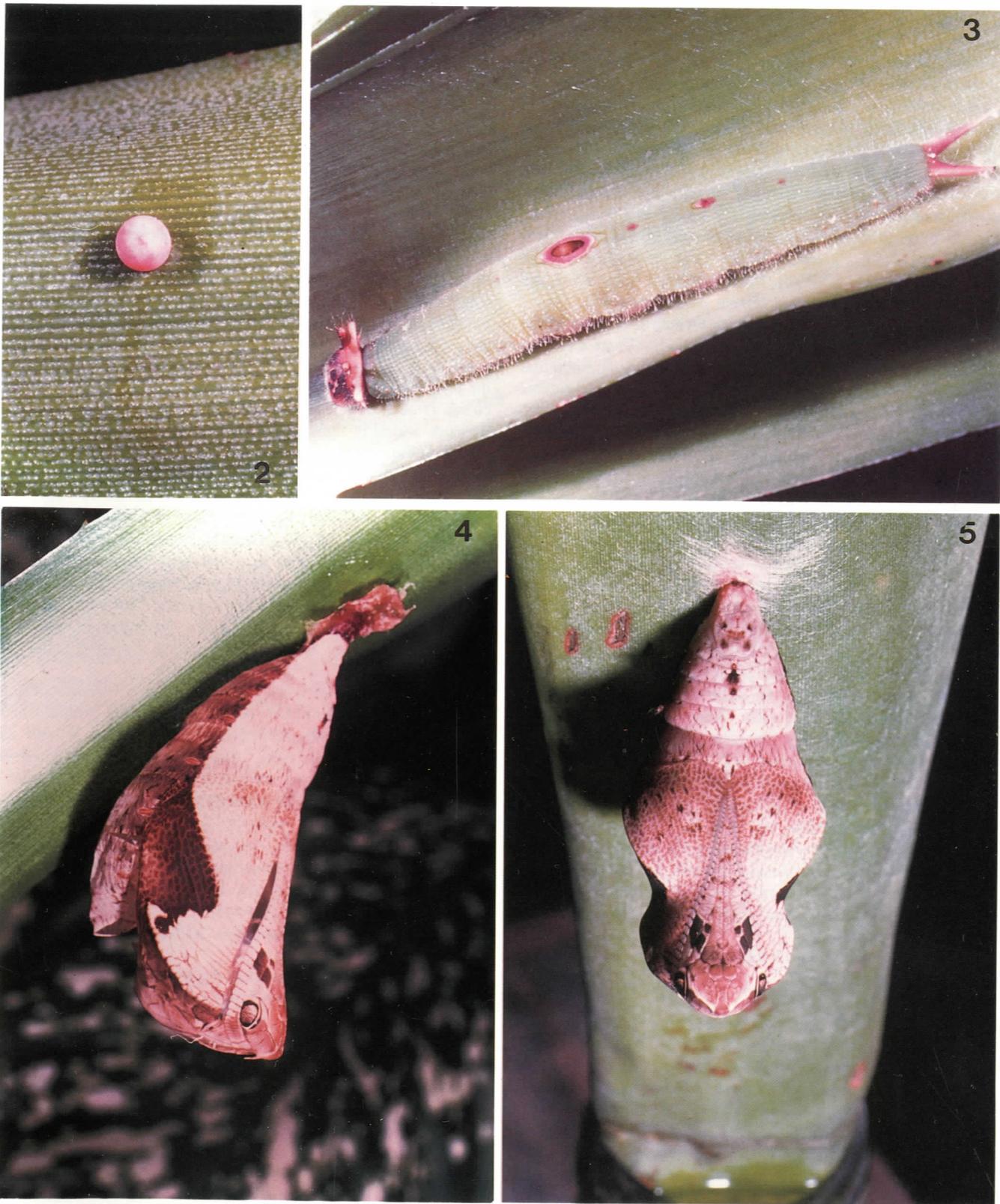


Fig. 2-5. *Dynastor darius darius*: 2. Egg; 3. Fifth-instar larva, dorso-lateral view; 4. Lateral view of pupa; 5. Ventral view of pupa.

The length of the larva at maturity in this instar is 48mm. The third ecdysis took place on 12 May 1983, or eight days after the third molt.

Fifth Instar:

Head: The ground color of the head at this stage is light beige. Viewed from the posterior side, the two lower horns on both sides are dark in color while the two hairs above these are black on the lower half of their length and beige in color on the outer half. Viewed from the front, all the horns appear to be black. The two largest horns at the top are completely black all around. Where the black from the two uppermost horns leaves the bases, the black curves outward towards both sides of the front of the head, leaving a beige-colored rough circle. From the tips of all the horns arise tufts of extremely fine white hairs. It should be noted also that across the entire rough circle of beige color on top of the head occur short, stiff-looking, beige hairs which are extremely closely packed and give a velvety look to the area.

Body: The base color of the body is dark green with alternating lighter green markings running the entire length of the body. These markings blend with the parallel venation of the bromeliad on which the caterpillar feeds, and afford perfect camouflage. At the center of the dorsal surface and extending slightly towards the head is a double-ended, boat-shaped marking, beige in color. Around this, and having the same shape, is a jet-black marking around it. Surrounding this black outline is a thin beige line, and to the outside of that is a thin, jet-black mark encircling the entire pattern. About 6mm posteriorly from this marking is a small boat-like mark similar in shape to the large one just described, and jet-black in color. The length of this mark is about 0.75mm in length. Continuing posteriorly, there is another of these complicated markings on the mid-dorsal line; this is a jet-black, double-ended, boat-like mark with a beige blotch at the pointed end nearest the head. At about 5mm further towards the tail from this black mark, there is an extremely small darkish spot.

Along the entire length of the body are extremely short, fine reddish hairs. Over the whole of the body are small white dots, and the hairs arising from these are of the same color. Running the entire length of the body, and just above the legs, the hairs thicken in intensity, thus appearing as a thick beige-colored line just above the legs.

The tails are short. From where they start outwards from the body, they are thick and chocolate in color, tapering gradually and becoming beige-colored. The outer points are black in color. On the tails themselves are extremely small white markings that start relatively large at the bases of the tails and get smaller towards the tip. Short, fine white hairs arise from these white spots, and a single line of short and fine beige-colored hairs are arranged along the inside edges of the tail at the caudal end of the body.

This larval stage pupated on 27 May 1983, fifteen days after the fourth instar molted to fifth instar.

PUPA: The length of the pupa from the head to the cremaster is 40mm, and the greatest width at the wingcases is 18mm. The larvae of this species pupate on the underside of a bromeliad leaf and choose a leaf which is hanging at approximately an angle of 45°. The dorsal side of the pupa touches the leaf and the ventral side stands outward (uppermost), a behavior which has not been noted in any other butterfly genus by the authors. This peculiar pupation orientation enhances the snake-head resemblance resulting from the pattern and coloration centered on the ventral side of the pupa (it also means the emerging adult cannot readily grasp the leaf with its legs).

When one looks at the pupa from the ventral side, which is facing away from the surface of the leaf, it appears that the dorsal surface touches almost along its entire length on the undersurface of the leaf. Our description of the pupa starts at the tail end. The pupa starts with a caudal width of about 2mm and gradually becomes wider as one progresses forward through the abdominal segment (about 15mm long

and about 12mm wide). The color of these abdominal areas is strongly influenced by dense but lightly marked small black dots. Between every "square" of four dots is a dark beige marking. About 1.5mm forward onto the thorax is a small, upsidedown, heart-shaped black mark. At the caudal side of this heart is an extremely small and thin dark beige ring. At the top of the heart-shaped figure is another darker, beige, small circle, which has a thicker outline than the more caudal one. About 2mm forward from this mark is yet another small, dark beige mark. The segment on which this dot is marked curves inward around the side and onto the dorsal surface.

The ventral areas across the thorax and wing covers are beige-colored, with irregularly thin short lines running at right angles to the segmental markings. The beige pattern element continues sharply outwards once again and gradually curves towards the back of the pupa. It then turns extremely sharply, with a neat curve towards the extreme tip of the pupa. Between the narrowest portion of the beige-colored marking, there is a pair of irregular oval markings just touching the antennal lines on the pupal shell. The segments of the antennae are clearly visible. Where the beige color curves back and upwards coming nearer to the head, it curves in such a way as to show the dorsal side of the head looking forward, which is light chocolate in color with scale-like markings similar to those on a snake head.

On both sides of the snake-like head and at a point where the dorsal and ventral sections of the color pattern merge are two false convex "eyes" with a shiny gray glaze color. They are oval in shape, and these ovals run vertically. Around these gray ovals are a light beige color arranged like the "highlight" in a vertebrate's eye, with a black line surrounding the pupa which appears to represent an eyelid. In the bottom of each false eye runs a very thin beige line which dips to form a small, rounded-bottom, cup-like shape. The portion of color between the antennae appears to be slightly darker than the entire ventral beige-colored central portion described above.

The dorsal side of the pupa at all areas where it is separated from the distinct light beige color of the ventral surface is dark chocolate in color, especially where the beige curves inwards, revealing at both sides a portion of the dorsal side color. This dark chocolate coloration seems to end abruptly where the wingcases are situated. The color then changes to a misty gray, with double or parallel lines running the length of the pupa. At the area where the light beige is separated from the dorsal dark chocolate color, and at the segmented portions of the abdomen, short tapered chrome-shaped chocolate markings are present. When the pupa is viewed from the side, at a point where the light beige color curves downward and outward on both sides and just before this beige pattern ends in a sharp point, an oval dark chocolate mark is present on each side.

It should also be noted that where the misty gray light color approaches the head area, scale-like markings similar to those on the head of a snake are clearly visible.

The pupal stage lasted thirteen days and the adults hatched on 9 Jun 1983.

ADULT: This large, dark brown to black, brassoline butterfly is immediately distinguishable by the odd, somewhat rounded, wing shape. It has a series of large white spots across the apical half of the forewing, and two white spots near the leading edge of the hindwing. The latter hindwing spots are often shaped somewhat like a question mark and are tinted pale blue in color. The female is much larger than the male, reaching 13cm (5 inches) in wingspan whereas the male is about 7cm (3.75 inches) in wingspan. The underside of the hindwing is a mottled yellowish-brown, with the forewing a darker brown.

The adults of this species are found from Mexico to Argentina to tropical America, and the typical subspecies is found from northeastern South America to Argentina. In Trinidad, the

butterfly prefers riverbeds in the rain forest and flies primarily at dusk. Barcant (1970) aptly notes the characteristic behavior: "Though flight is fast and in the fading light only its light spots can be seen, his path is restricted to about 50 yards of the river where he will fly up and down until the darkness of night catches up with him. Usually only one, at the most two, are seen at a given place on any one evening." In Costa Rica, adults frequent the bromeliad foodplant which is planted as fence rows or cultivated in gardens, and thus the host plant and butterfly may be found even in urban areas (DeVries, 1987). The adults of this species occur from sea level up to several hundred meters elevation on Trinidad, and up to 1,000m elevation in Costa Rica.

As far as is known, the rudimentary proboscis of *D. darius* and the other *Dynastor* species does not permit feeding in the adult stage. No visitation to fruit, or other sources of nutrition, have ever been noted by observers. Thus the adult probably has a very short lifespan, unless they subsist on abdominal fat bodies such as those stored by other members of the Brassoliniinae, as a result of food reserves built up during the larval stages.

HOSTS: *Aechmea nudicaulis* Linnaeus and other large bromeliad species in the family Bromeliaceae on Trinidad.

GENERATION TIME (egg to imago): 62 days.

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