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Observations on the Biology of *Pyrrhopyge amyclas amyclas* (Cramer) and *Mysoria barcastus alta* Evans (Lepidoptera: Hesperiidae) in Trinidad, West Indies

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ABSTRACT

Partial life histories of two Pyrrhopyginae skippers (Hesperiidae) are described and illustrated from Trinidad. *Pyrrhopyge amyclas amyclas* (Cramer) occurs very locally on *Terminalia catappa* (Combretaceae) and *Mysoria barcastus alta* Evans is widespread on *Casearia* spp. (Salicaceae), including *C. sylvestris, C. guianensis* and *C. spinescens.*

Key words: Pyrrhopyginae, *Pyrrhopyge amyclas, Mysoria barcastus,* life history, Salicaceae, *Terminalia catappa*.

INTRODUCTION

In an earlier publication (Cock 1981), I summarized what was known about the subfamily Pyrrhopyginae (Hesperiidae) in Trinidad and Tobago at that time. Since then I have reared *Pyrrhopyge amyclas amyclas* (Cramer) and *Mysoria barcastus alta* Evans from caterpillars collected in Trinidad. Here I describe and illustrate aspects of the biology of these two species. Terminology of shelters follows Greeney and Jones (2003), and other terminology follows that used in my series on the skipper butterflies of Trinidad (Cock 2007 and preceding papers).

Pyrrhopyge amyclas amyclas (Cramer)

In Cock (1981), I recorded that my only observations of adults of this species were two records from the edge of the Nariva Swamp. Scott Alston-Smith (pers. comm. 1995) discovered that along the Manzanilla Cocal, the food plant of this species is tropical almond, *Terminalia catappa* L. (Combretaceae) and the caterpillars are easy to find there, e.g., near the old estate buildings. Neither of us has found caterpillars or adults in other parts of the island, in spite of the widespread distribution of the food plant. This food plant discovery suggests why the only two specimens that I had previously seen were on the edge of Nariva Swamp, not far from these tropical almond trees. However, *T. catappa* is a South-east Asian species, naturalized in Trinidad and Tobago, mostly by the seaside (Williams 1932), so it seems most likely that *P. amyclas* originally and perhaps normally uses other host plants, probably also in the Combretaceae, several of which are also restricted to coastal and swamp areas (Williams 1932). S. Alston-Smith and I collected caterpillars on the Cocal (7.v.1995, ref. 95/32) and the following account is based on these.

The eggs and caterpillar shelters were found mostly on the lower and partially shaded parts of trees. The eggs, which are hemispherical, 1.3 mm diameter, smooth and white, are laid on the leaf upper surface.

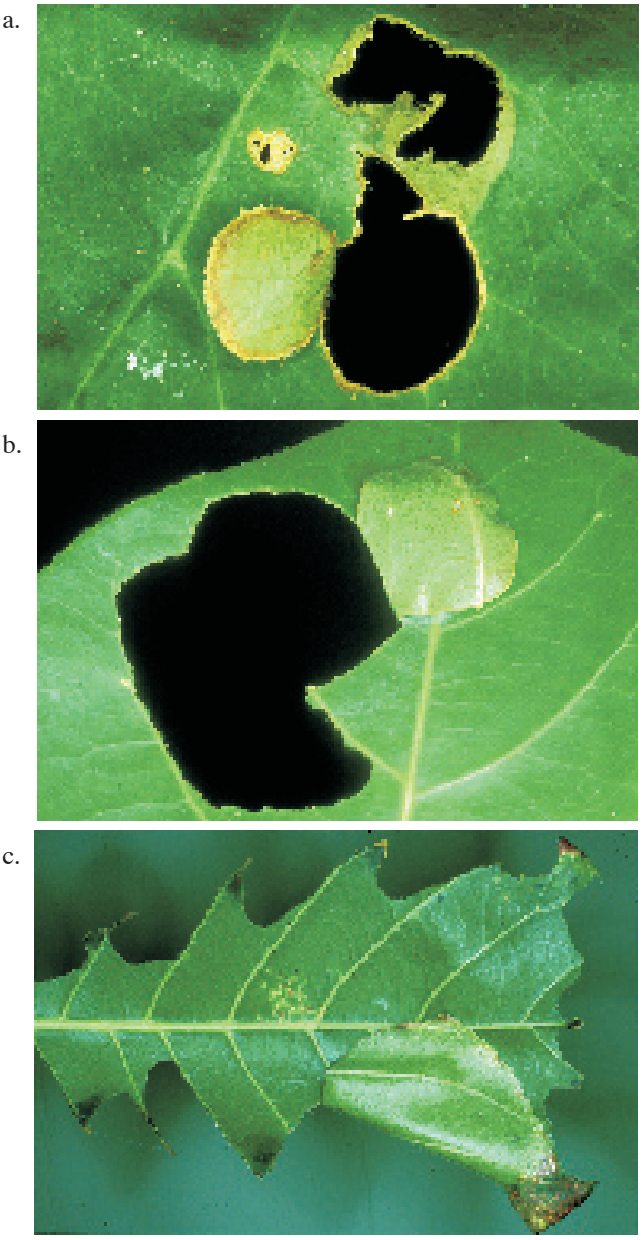


Fig. 1. *Pyrrhopyge amyclas amyclas* shelters and associated feeding damage on *Terminalia catappa*, Manzanilla Cocal, 7.v.1995 (a) shelter I, (b) shelter II, (c) shelter III.

Shelter I (Fig. 1a) is a Type 5 centre-cut fold. The shelter lid is an oval, approximately 7 x 6 mm, cut from the middle of the leaf lamina and with the bridge (hinge) along the long axis (not on a vein), folded over upwards and held with silk to make a pocket. Shelter II (Fig. 1b) is similar, but larger (examples of 24 x 20, 20 x 15, 25 x 18, 17 x 13 mm); the bridge may include a vein, or may parallel a vein. The shelter lid is domed (i.e., it is a tented shelter) by making minor cuts from the edge of the shelter lid and pulling the edges together with silk. Shelter III (Fig. 1c) can be similar to shelter II, but larger again (examples of 60 x 33, 50 x 28, 45 x 30, 42 x 28 mm) and often includes the leaf margin, i.e., a two-cut stem fold with a wide shelter bridge (Type 9).

The fifth instar caterpillar (Fig. 2) measures about 40 mm when mature. The head (Fig. 2a) is chordate, about 5 mm across; red with narrow dark brown stripes down the face; covered with short red and long white setae. T1 red-brown. Body deep dark red; T2-A8 each with a narrow, bright yellow, transverse band to the level of the spiracles; covered with scattered long white setae. Legs concolorous; spiracles light brown. Feeding by the larger caterpillars leaves the main veins of the leaf bare and projecting (Fig. 1c).

a.

b.

Fig. 2. *Pyrrhopyge amyclas amyclas* fifth instar caterpillar, Manzanilla Cocal, 7.v.1995 (ref. 95/32) (a) head, (b) caterpillar.

The pupa (Fig. 3) measures 24 mm. In outline it is generally rounded, although slightly bulbous frontally; the proboscis sheath reaches the end of the wing cases. Ground colour deep orange-red; inter-segmental areas of abdomen and vertical stripe through eye brown-orange. Abdomen, thorax and head covered with short red setae and long white setae – on the abdomen in a band around each segment; T1 similarly in a transverse band; antennae, legs and wings bare. Spiracles red-brown, quite large, but not conspicuous.

a.

b.

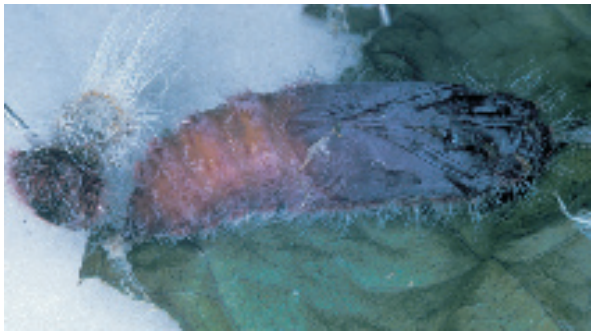


Fig. 3. *Pyrrhopyge amyclas amyclas* pupa, collected as caterpillar on *Terminalia catappa*, Manzanilla Cocal, 7.v.1995 (ref. 95/32) (a) dorso-lateral view, (b) ventral view.

I was able rear one male (Fig. 4) from these caterpillars to confirm their identity.

Fig. 4. *Pyrrhopyge amyclas amyclas* adult male, reared from a caterpillar collected on *Terminalia catappa*, Manzanilla Cocal, 7.v.1995 (ref. 95/32).

S. Alston-Smith (pers. comm. 1995) has reared an unidentified, gregarious, pupal parasite (Chalcididae, ?*Brachymeria* sp.) from material he collected at Manzanilla.

***Mysoria barcastus alta* Evans 1951**

Moss (1949) found caterpillars of *M. barcastus* at Santarem, Brazil: "half a dozen mauve larvae, rather hairy and prettily belted with lemon-yellow. They were feeding on small bushes of *Casearia minima* (Flacourtiaceae) on waste ground". "*Casearia minima*" does not seem to be a valid name (IPNI 2007). The family Flacourtiaceae is now synonymized with Salicaceae and most members of the former Flacourtiaceae, including *Casearia* spp., have been transferred to Salicaceae (Stevens 2007).

On the basis of Moss's observation, when I summarized information on this species in Trinidad (Cock 1981), I suggested that likely host plants in Trinidad would be wild coffee, *C. sylvestris* Sw., and pipe wood, *C. guianensis* (Aubl.) Urb. At that time, I was unaware that in 1937, Margaret E. Fontaine had reared this species in Trinidad on *C. guianensis* (Cock 2004) and included the caterpillar and pupa in her unpublished sketchbooks (in the Entomology Library of the Natural History Museum, London). Her illustrations match the early stages I describe and illustrate below.

My collections in Trinidad over the last 25 years have shown that *C. sylvestris, C. guianensis* and *C. spinescens* Griseb. are regularly used as food plants in Trinidad. I have observed oviposition on, and collected caterpillars from, *C. guianensis* at Fort George (x.1981; ref. 81/8C), and collected caterpillars on the same food plant at Mt. Tabor, c. 1,000 ft. (xii.1981, ref. 81/27A), Curepe (x.1981, ref. 81/8D), and Mt. Tamana (14.x.1995, ref. 95/60). I have also collected caterpillars on *C. sylvestris* at St. Augustine (x.1981, ref. 81/16) and Macoya Gardens (ii.1982, ref. 82/45B) and on *C. spinescens* at St. Benedict's (8.x.1994, ref. 94/62), Point Gourde (8.x.1995, ref. 95/42) and Port of Spain (10.x.1995, ref. 95/50). The following descriptions are based largely upon the Point Gourde collection (ref. 95/42).

Eggs are laid on the upper surface of leaves; small isolated bushes are frequently preferred. The stage I shelter (Fig. 5) is a centre-cut fold (Type 5) made by cutting a 3/4 circular flap, 7 x 6 mm, from the mid-lamina, and folded over upwards along the longer axis. There is some feeding from the edge of the resultant hole, but mostly the caterpillar feeds from the edge of the lamina. The stage II shelter is similar, 13 x 10 mm, either fully within the leaf lamina (Type 5 shelter), or using the leaf margin for part of the edge, i.e. a two-cut stem fold (Type 10). Feeding is extensive from the edge of the lamina, leaving major veins intact. Shelter III (Fig. 5) is a rough oval, about 20 x 15 mm, using part of the leaf margin (Type 10); a major cut is made at one end along the fold, to create a slight overlap at that point, as the shelter lid is pulled into a convex shape. Feeding is from the leaf margin and main veins are consumed at this stage. Fifth instar caterpillars make a shelter IV by tying two leaves, one on top of the other, with silk strands – a two leaf shelter (Type 4). The same or a similar shelter is lined with silk when used for pupation. Within this, two Y shaped girdles of silk support the cremaster and thorax of the pupa.

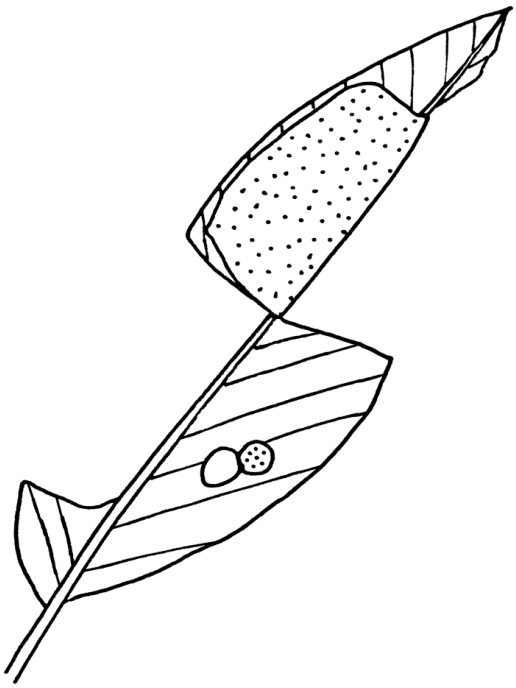


Fig. 5. Schematic leaf of *Casearia* sp. with first and third caterpillar shelters of *M. barcastus* (stippled areas represent leaf undersurface where folded over).

When mature the caterpillar (Fig. 6) measures about 40 mm. The head (Fig. 6a) is rounded, slightly chordate; red-brown with a series of narrow, sharply-defined, dark red lines from near posterior margin, over epicranial region: (1) parallel to epicranial suture as far as the clypeus, the area between being black except for the posterior 2 mm; (2) a group of three from around external angle to clypeal suture; (3) a single line, mid-way between (1) and (2); a black mark over the stemmata and the area posterior to them; a black mark adjacent to the clypeus uniting the bases of lines (2) and (3); narrow black line down basal 2/3 of centre of clypeus; head covered with long, pale setae of 2-3 mm, and very long pale setae of 5 mm.

a.

b.

Fig. 6. *Mysoria barcastus alta* fifth instar caterpillar, collected on *Casearia spinescens*, Point Gourde, 8.x.1995 (ref. 95/42), (a) head, (b) caterpillar.

T1 shiny red with very long pale setae. Body deep maroon-red with transverse bands. T2 with 1 mm wide yellow band from middle of segment to sub-ventral flange; trace of yellow-white narrow band on posterior margin. T3 yellow band as T2. A1-A8 yellow band stops just short of spiracles; a narrower yellow-white band on anterior margin, partially hidden as body is flexed. A9 with narrower yellow band; trace of yellow-white anterior band. A10 red. Ventro-lateral flange red in centre of segments, pale in-between. Body covered with long pale setae, and very long pale setae on yellow bands. All legs red. Spiracles concolorous. The yellow-white bands are less pronounced in earlier instars (Fig. 7).

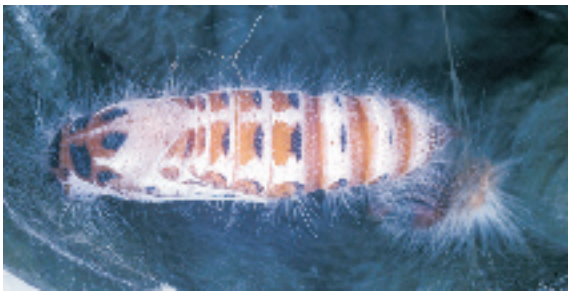
Fig. 7. *Mysoria barcastus alta* fourth instar caterpillar, collected on *Casearia guianensis* at Mt. Tamana, 14.x.1995 (ref. 95/60).

The pupa of ref. 95/42 (Fig. 8) is a particularly strongly marked individual, and is described in detail here. It measures about 25 mm, and is light chestnut brown, with black markings and partially covered with a light layer of white waxy powder. The white waxy powder covers: posterior half of eyes; all appendages; posterior half of thorax, extending anteriorly in dorsal and dorso-lateral streaks; A1-5 dorsal line, dorso-lateral line and posterior margin (with rounded corners); A6-A8 broad band around each segment, apart from a circle around each spiracle; A9 narrow posterior band dorsally and laterally, continuous ventrally and a narrow dorsal line; A10 ventrally and along dorsal line; A11 all. The black markings comprise: eyes, except central vertical stripe; a broad rounded bar across frons; collar a broad sub-dorsal bar, rounded laterally; thorax a sub-dorsal spot, and diagonal mark at base of wings; streaks on T2 legs with gap in middle; streaks on T3 legs with broad gap in middle; streak in distal half of antennae; on FW a spot at base of costa, base of space 1A, streaks on veins 1 (distal 1/3), 2 (distal 1/2), 3 (all), 4 (all, joined to 3 at base), 5-7 (distal portion only), end cell; on A6-A8 a bar ventrally in centre of segment, pointed laterally, strongest on A6, A7; on A1-5 and increasingly strong sub-dorsal streak on anterior margin of white waxy posterior border; on A8 an obscure, narrow line along posterior margin; on A9 a strong line on posterior margin; similarly on A9 but interrupted at dorsal line. Spiracles T1 ground colour, on anterior margin of black mark at base of wings; inconspicuous. Spiracles A2-A6 dark brown, in centre of clear patch of ground colour, bordered with black as follows: A2 narrowly on dorso-posterior angle; A3 similar, but extends further; A4 along posterior margin, extending slightly along dorsal margin, and at ventro-posterior margin enclosing two of an arc of four small shining ground colour ovals; A5-A7 broadly along posterior margin of increasingly small ground colour area around spiracles. Distinctive shining, ground colour ovals: A2-A4 anterior and slightly dorsal to spiracles, with ground colour surround; A4 an arc (concave dorsally) below spiracles; A5-A6 a pair below spiracle; A7 two, one above the other ventrally to the spiracle. Cremaster brown. Long white erect setae (c. 2 mm) as follows: eyes except central band; front of head; dorsally on collar and thorax; all abdomen segments (but not intersegmental area).

In contrast, the pupa of the male reared as ref. 82/16 is much less heavily marked (based on an examination of the emerged pupa). The white waxy powder is more extensive, and covers most of the abdomen apart from the intersegmental bands, and partial bare bands subdorsally on A1-A4 in anterior part of each segment. The black markings are lighter and reduced: the thorax markings are present but reduced; the spot at the base of the wings is

missing; the legs and antennae are unmarked; only veins 1-6 distally and end cell of the FW are dark; most of the abdomen markings are absent and those that remain, e.g., lateral spots, are obscured by the more extensive white waxy powder. The pupa which Margaret Fontaine illustrated in her sketchbook (in lateral view) is similar, but perhaps with even more reduced markings. The lightly marked pupa of ref. 82/16 was male while the heavily marked pupa of ref. 95/42 was female, but I have not studied and kept enough material to suggest whether this is a sexually linked variation, or not.

a.



b.

c.

Fig. 8. *Mysoria barcastus alta* pupa, collected as caterpillar on *Casearia spinescens*, Point Gourde, 8.x.1995 (ref. 95/42) (a) dorso-lateral view, (b) lateral view, (c) ventral view.

As noted in Cock (1981), this species is widespread in Trinidad but seldom common. It can be taken feeding at flowers (e.g., avocado, eupatorium) and rests either with its wings spread or with them held more or less erect above its body (Fig. 9).

I have reared a eulophid parasitoid from pupae found in a stage I shelter with the remains of a first instar *M. barcastus* caterpillar (ref. 81/8D), and a tachinid from a fourth instar caterpillar (puparium formed 16.xii.1981, adult 30.xii.1981, ref. 81/27A), but neither has been identified.

a.

b.

Fig. 9. *Mysoria barcastus alta* adult female, (a) at flowers of *Austroeupatorium inulaefolium*, Rio Claro-Guayaguayare Road, 11.x.1993, (b) St. Benedict's, 16.x.1993.

Burns and Janzen (2001) describe and illustrate the life history of *M. ambigua* (Mabille & Boullet) from Costa Rica. This species is closely related to *M. barcastus*, so much so that Evans (1951) treated *ambigua* as a subspecies of *M. barcastus*. The adults are similar in appearance, but differ in the male genitalia (Evans 1951; Burns and Janzen 2001). The food plants of *M. ambigua* are also species of Salicaceae, most commonly *C. corymbosa* Kunth, but occasionally *C. sylvestris*, *C. arguta* Kunth, and *Zuelania guidonia* Britton & Millsp., but several other species of *Casearia* and Salicaceae in the same area are not used. Burns and Janzen (2001) do not provide descriptions of the caterpillar, but the colour figure is similar to that of *M. barcastus alta* illustrated here. Their illustration of the pupa is in lateral view, but suggests that the distribution of white waxy powder and dark markings differ. However, a more detailed examination of the variation of the two populations would be needed to draw conclusions as to the differences. Burns & Janzen (2001) note that parasitism levels of *M. ambigua* are low but parasitoids include five species of tachinid and a braconid.

DISCUSSION

The Pyrrhopyginae with which I am familiar all make centre-cut fold Type 5 for their first shelters. However, Burns and Janzen (2001) summarizing the biology of the Costa Rican fauna they dealt with, note that first shelters may also be cut from the edge of a leaf, so this generalization does not seem to hold for the whole subfamily.

Evans (1951) considered the Old World subfamily Coeliadinae to parallel the Pyrrhopyginae, but I have observed that the caterpillars of Coeliadinae, although equally brightly coloured are hairless, the first shelters are two-cut stemmed folds (Type 10) or a more complicated four-cut fold perforated shelter not covered by Greeney and Jones (2003). Later shelters are mostly of this later type, although mature caterpillars of *Pyrrhochalcia iphis* (Drury) in particular do not make a shelter (M.J.W. Cock unpublished). As far as the early stages are concerned, the similarity between the two subfamilies is rather limited.

ACKNOWLEDGEMENTS

Scott Alston-Smith shared his discoveries regarding *P. a. amyclas* with me. The *Casearia* spp. food plants were identified at the National Herbarium, St. Augustine, by Dennis Adams, Yasmin Baksh-Comeau, and Winston Johnson. I was able to consult the sketchbooks of Margaret E. Fontaine at the Entomology Library of the Natural History Museum, London, facilitated on one occasion by Martin Honey. My thanks and appreciation to all these colleagues for their help.

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