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STUDIES ON THE JAMAICAN KITE SWALLOWTAIL, *EURYTIDES (PROTESILAUS) MARCELLINUS* (LEPIDOPTERA: PAPILIONIDAE)

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ABSTRACT.— The eggs of *E. marcellinus* are unsculptured except for a pattern of numerous, incised small circles. Three larval morphs were observed: blue-green, pale brown and black. Pupation may last 7-10 days or there might be pupal diapause which is broken by moisture. The only known food plant is *Oxandra lanceolata*, a tree which is mostly common in the central and western parishes. The only known breeding site is at Rozelle in the eastern parish of St. Thomas, but indications are that other sites are likely to occur in central Jamaica.

KEY WORDS: Annonaceae, biology, diapause, eggs, hostplants, immatures, larva, larval polymorphism, pupa.

The earliest record of this Jamaican endemic swallowtail was a 1725 illustration by Sloane (Brown and Heineman, 1972). The taxonomic work on the species is extensive, with both generic and specific names undergoing changes. *Eurytides marcellinus* (Doubleday) is now the most commonly used name.

This species has generally been uncommon, although high numbers have occasionally been recorded (Lewis, 1954; Brown and Heineman, 1972; Riley, 1975; Collins and Morris, 1985). When numbers are very high, there might be migration across the island, and these migrants are usually males (Collins and Morris, 1985).

Walker (1943) reported that large numbers swarmed over the Liguanea Plains in 1924; numbers then remained very low for several years and Avinoff (pers. comm. to Walker) suggested that it might have become extinct by late 1930's. However, thousands swarmed through Kingston and St. Andrew in the 1940's and 1950's (Anon., 1945; Lewis, 1951, 1953, 1954).

Eurytides marcellinus is now regarded as a vulnerable species (Collins and Morris, 1985), the major conservation problem being pressure on the only breeding site identified to date.

The current paper describes some aspects of the biology and ecology, including the immature stages, pupal diapause, population distribution, the occurrence of breeding sites and conservation of the species.

THE IMMATURE STAGES

EGG: Farr (1982) observed eggs occurring singly, on the undersurfaces at the edge of leaves of the foodplant. Recently laid eggs were grey-white, translucent and measured 0.8 to 0.9mm in diameter. Turner (cited in Collins and Morris, 1985) reported the eggs as being pale brown, becoming black prior to hatching. It is likely that the eggs so described by Turner were older than those observed by Farr (1982). The eggs are unsculptured except for a pattern of numerous, incised small circles.

LARVA: Three larval morphs were collected at Rozelle (parish of St. Thomas) in June 1992; these were blue-green, pale brown and black (Fig. 1). Turner (cited in Collins and Morris, 1985) recorded the blue-green morph and Farr (1982) described the black morph. All morphs have a tan-coloured head capsule. Two collars (an anterior black and posterior white) are at the anterior margin of the prothorax, bordering the head capsule. The body length of the fifth instar ranged between 20 and 30mm (n = 9).

The following description of the black larval morph is largely from Farr (1982). The body of the caterpillar is mid-dorsally black, bordered on each side by a conspicuous white stripe each of which is in turn bordered ventrally by a somewhat broader, pale brown stripe. These pale brown stripes shade rather abruptly to black on the thoracic region and are bordered ventrally by white. Lateroventrally, pale yellowish green ground color, with a pale white stripe margining the lateroventral region just above the thoracic and abdominal legs. Thoracic legs, prolegs and ventral region are pale green. The thoracic region is slightly swollen, osmeteria present but apparently seldom emitted. All segments are covered with numerous short, pale brown setae.

The only larval food-plant recorded to date is *Oxandra lanceolata* (Sw.) (Annonaceae). This larval foodplant is found in woodland on limestone and the adults have been observed primarily in these habitats, for example in Rozelle, St. Thomas (Turner, cited in Collins and Morris, 1985).

Larvae are solitary and were found on the upper surfaces of the leaves or on stems in the field. They were generally about 1-2m above the ground. In the laboratory, larvae ate only the very young leaves of *O. lanceolata* and did not accept the mature ones.

Fig. 1. (a) Adult *E. marcellinus*; (b) prepupa; (c & d) pupa; (e, f, & g) fifth instar larvae: blue-green, pale brown, and black morphs. Scale bar = 1cm.

PUPAE: The pupa is dark brown, smooth and has no processes (Fig. 1). The lack of thoracic processes is a feature different from other members of the *marcellus* group (West, 1987).

In the laboratory, larvae pupated on the underside of the leaves. In nature, larvae pupated in the soil (M. Hodges, pers. comm.). Pupae were kept in plastic rearing chambers 30cm wide and 10cm high, at 29-32°C. Moisture was provided by placing wet tissue paper in the container; pupae were not in contact with the wet paper.

Adults emerged within 7-10 days (n = 5). One pupa diapaused and emerged after 4 months; emergence occurred only after this pupa was placed in contact with the wet tissue paper. The response of diapausing pupae to moisture might explain the appearance of adults after periods of rainfall. Under the tropical conditions, moisture level is likely to be more important in the control of diapause than changes in temperature.

Table 1. Dates on which *E. marcellinus* adults were recorded from Discovery Bay area (Discovery Bay to Duncans). An asterisk (*) indicates multiple sightings; others are single sightings or single collections.

Dates of sightings or collections of *E. marcellinus* in the Discovery Bay area					
1982	1983	1984	1985	1989	1992
May 11*	April 11	June 11	Aug. 21	Sept. 2	May 31
12*	13	12			
13*	15	15			Oct. 8
14*		16			
15*	June 20*	20			
16*	21*				
17*	22*	Sept. 25			
	23*				
	Oct. 18				

ECOLOGY

E. marcellinus can maintain low populations for long periods, but numbers get very high occasionally (D'Abrera, 1981). During population explosions, there is migration, especially of the males (Collins and Morris, 1985).

In the 1940's, the butterfly appeared periodically and in the 1950's, the usual flight period was in May-June (Lewis, 1954). According to Riley (1975), adults can be seen in May to June and Collins and Morris (1985) reported two broods in May to July and September. Lewis (1953) observed major flights, lasting a few days, in Kingston, but such flights have not been observed since.

In more recent times, single adults have been recorded in Troy in the parish of Trelawny (1987); in the parish of St. Catherine, Pennington (October 1991) and Point Hill (July 1992), (B. Freeman, pers. comm.); and Mona, parish of St. Andrew, in October 1991. In the Discovery Bay area (Discovery Bay to Duncans) of St. Ann and Trelawny, single adults as well as major flights have been observed (Table 1).

Prior to the 1960's, records indicate that the range of the butterfly was Kingston, St. Andrew and St. Elizabeth (Brown and Heineman, 1972), St. James (Lewis, 1954), Trelawny (Bengry, 1955). Riley (1975) reported that the species is widespread but uncommon. The recent record in Trelawny and St. Ann should therefore not be surprising.

According to Turner (cited in Collins and Morris), *O. lanceolata* is absent from most of the island and is restricted mainly to the area around Rozelle in St. Thomas; consequently, a conservation problem arises due to the likelihood of the forests there being destroyed. This, however, is contrary to the findings of Adams (1972), who found the plant occurs mostly in the central and western parishes (where most of the limestone deposits of Jamaica occur). This plant has been recorded from the limestone forests of the Discovery Bay area; at the Institute of Jamaica are specimens collected in St. Ann, 3km east of Rio Bueno, and Trelawny, 2.5km west of Rio Bueno.

Based on the assumption that the larval food is restricted to St. Thomas, Collins and Morris (1985) concluded that the migrating adults are doomed to reproductive failure; however, considering that the food is widespread, it is likely that this reproductive failure is lower than that suggested. Moreover, no mass migration has been recorded from the St. Thomas area for the last two decades; hence the regular occurrence of individuals in the parishes of St. Catherine, St. Ann, and Trelawny, as well as the presence of larval food plant in these areas, indicate the existence of breeding populations in central and northern Jamaica. Several adult were recorded in Greenwood, St. James in 1954 in the absence of a major flight from the eastern population (Lewis, 1954). If migrating adults from St. Thomas are mostly males (Collins and Morris, 1985), then these other populations would be expected to be self-sustaining.

Further studies on the biology and ecology of the species are necessary; pupal diapause, larval polymorphism, and the significance of migration are concepts which are of tremendous interest. The breeding site at Rozelle is the only one confirmed, but the distribution of the larval food plant, the utilization of this resource, and the occurrence of other breeding sites need to be better understood before appropriate conservation strategies can be developed.

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