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THE BIOLOGY OF *MELANIS LEUCOPHLEGMA* (STICHEL, 1910) (RIODINIDAE) IN WESTERN PERU

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ABSTRACT. The immature biology and ovipositing behavior of *Melanis leucophlegma* (Stichel, 1910) (Riodinidae) from western Perú is discussed for the first time. The food plant of *M. leucophlegma* is *Inga feuillei* DC, a cultivated tree. The gregarious larvae were observed to have two color morphs during the third and fourth instars. Total development time from egg to adult was 8 weeks.

Additional key words: Neotropical, Ecuador.

The riodinid genus *Melanis* contains 28 species (Callaghan & Lamas in press). It is distributed from Argentina to Mexico and can be quite common. The butterflies are black with elongated forewings, sometimes with a subapical band, and variable orange, white or red markings on the margins and base of both wings (Fig. 2). The center of diversity of the genus is from the southern Amazon basin through southeastern Brazil to Paraguay and Argentina. Only three species are found north of Panamá. The genus belongs to the tribe Riodinini Grote, 1895.

Observations on the life histories of *Melanis* species are few. Food plant records exist for seven taxa; *Melanis pixe* (Boisduval, 1836), *M. electron auriferax* (Stichel, 1910), *M. aegates cretiplaga* (Stichel, 1910), *M. hillapana* form *impura* (Stichel, 1910), *M. xarifa* (Hewitson, [1853]) and *M. electron* (Fabricius,1793). However, notes on larval morphology and behavior exist for only one species, *M. pixe* (DeVries 1997). The present article adds another species to the growing body of information on the biology of *Melanis,* and of riodinids in general.

Material in the collection of the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, in Lima, Perú suggest that the range of *Melanis leucophlegma* is from western Ecuador and Peru to Lima, from sea level to 1300 m. In Lima the flight period is confined to the sunny summer months of December through March, and the butterfly can become quite common around urban areas where the food plant is cultivated. Like most other non-myrmecophilous larvae, those of *M. leucophlegma* are gregarious and have long lateral setae which serve as protection against ants and other predators. These do not protect them from being parasitized by Hymenoptera (Ichneumonidae), however, which serves as an effective biological control (G. Lamas pers. com.).

MATERIALS AND METHODS

Observations on *Melanis leucophlegma* adults and immature stages were made in the gardens of the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, in Lima, Perú. In the course of the study, six larvae in various instars and 32 eggs were collected on the food plant and six raised to maturity. Larvae were raised on food plant in plastic containers that were numbered with a reference code to record larval development. I examined eggs and larvae with a binocular microscope. Larvae, head capsules and eggshells were preserved in Pembel's solution (glacial acetic acid, formalin and ethanol) and adults spread or left in papers. Voucher specimens are in the collection of the author.

RESULTS

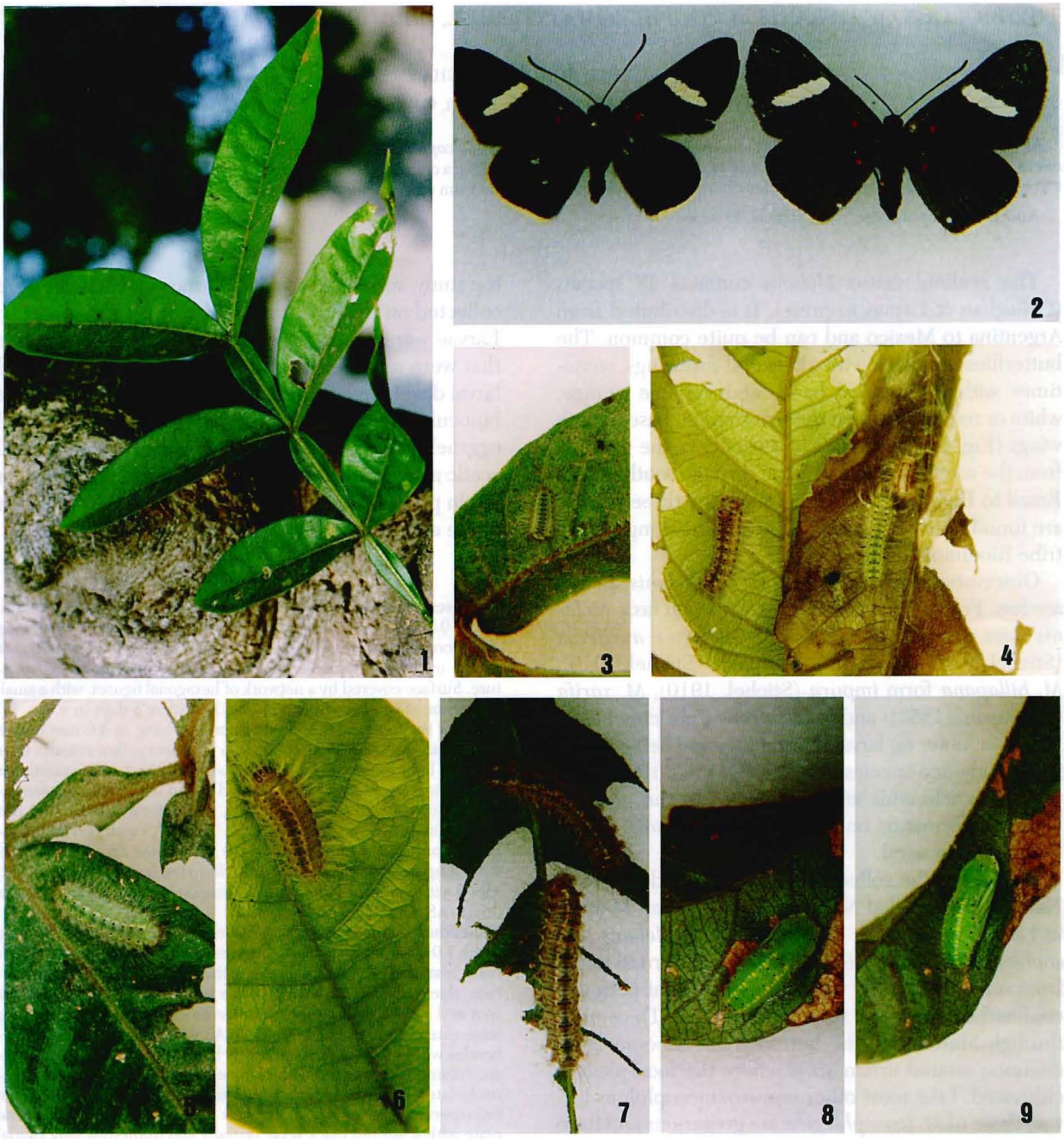
Description of immature stages. Egg: Diameter 0.6 mm, height 0.3 mm (n = 8). Color light green when laid, some with a ring of maroon colored scales circling the micropyle, and a maroon spot on the micropyle. Variable maroon markings increase as eggs mature. Surface covered by a network of hexagonal figures, with a small protrusion at each intersection point. Duration: 8 days (n = 32).

First instar: Length 0.8 mm upon hatching, to 4.0 mm before molt, head capsule width 0.3 mm (n = 8). Larva yellow initially, later uniform light green. Head light brown with short setae, mostly on the frontal region. Prothoracic shield raised with 12 long setae extending over head, six on each side, with lateral spiracle and two short setae below prothoracic shield. T2/T3–A8 with two dorsal tubercles on each segment, with 8–10 short setae on each; laterally three long and many short setae arise from the base of each segment. A9/10 with numerous long caudal setae on the anal plate; spiracles on A2–A8. Duration: 7 days (n = 23).

Second instar: Length 4.0–7.0 mm before molt, head capsule width 1.0 mm (n = 4). Color light green, slightly darker dorsally with black markings. Head dark green with white setae. On T1, prothoracic shield divided into two separate yellow tubercles with a black spot and rosette of short, bristly setae on each, and numerous long setae extending over head. T2/T3 to A8 with two separate black tubercles with a rosette of short bristly black setae; in a few individuals, tubercles connected with transverse black bar. Segments protrude laterally at base, from which extend many long white setae interspersed with bristly short black setae. A9/10 with short anal plate with scattered black setae dorsally and numerous long caudal setae. Duration: 9 days (n = 18).

Third instar (Figs. 3, 4): Length 7.0 to 10.0 mm before molt, head capsule width 1.6 mm (n = 6). Two color morphs observed, with T1 to A9/10 light brown (Fig. 4) or light green (Fig. 3) with a frequency of about 50% of each. Color of head light green, prothoracic shield on T1 divided into two separate prominent lumps, each with a black spot and a rosette of setae and a group of long setae projecting cephalad over head. Behind thoracic shield is light brown or green ridge along separation with T2. T2/A8 with two separate tubercles as on second instar; lateral protrusions prominent with many short black-tipped and long white setae at base. Spiracles tan. Duration: 9 days (n = 9).

Fourth instar (Figs. 4, 5, 6): Length 10.0–15.0 mm before molt, head capsule width 2.1 mm (n = 6). Head light green. Larva color on



FIGS. 1–9. **1,** Leaves of foodplant, *Inga feuillei.* **2,** *M. leucophlegma* imagos, male (left) and female, ex larva. **3,** Third instar larva, green form. **4,** Fourth instar larvae, green and brown forms, and a brown third instar. **5,** Mature fourth instar larva, green form. **6,** Mature fourth instar larva, brown form. **7,** Fifth instar larvae. **8,** Pupa, dorsal view. **9,** Pupa, lateral view.

T1 through T10 light green (Fig. 5) or light brown (Fig.6), morphs occurring in same proportion as third instar. On T1 prothoracic shield divided into two separate yellow or light brown lobes, more elongated than in third instar and a black spot in the center with long setae projecting over head, and numerous short bristly setae; T1 with light green or brown transverse line on union with T2. Dorsum of segments T2–A8 as in previous instars; a white-pink spot above spiracles on each segment giving appearance of dorsolateral lines; lateral protrusions black at margins with setae as on third instar. Juncture of segments light yellow. A9/10 with a black transverse line across anal plate; spiracles brown. Duration: 7 days (n = 9).

Fifth instar (Fig. 7): Length 15.5 mm to 22.0 mm, head capsule width 2.7 mm (n = 5). Color of all larvae, irrespective of previous color morph, was mottled light gray-green with black dots and yellow-white markings. Head light mottled brown. On T1 prothoracic shield raised into two separate, light brown flanges, each covered with short black

setae surrounding a short black line; flanges bordered posteriorly by a wide black transverse line; long setae project over head. Dorsally T2–A8 raised into two separate tubercles with a small black spot surrounded by short black tipped setae and connected by a thin transverse black line; a broken, white to yellow dorsolateral line at base of tubercles; lateral protrusions at base of segments darker brown than in previous instars and pointed; at base of segment a cluster of short black tipped setae with a black dot in the middle, and long white setae. Segments separated by dark gray line. Spiracles light brown. Anal plate rounded, outlined in black with a transverse black bar and numerous long caudal setae. Prepupa: Larva turned uniform light green with brown spiracles. Duration: 6–8 days; prepupa 2 days (n = 7).

Pupa (Figs. 8, 9). Length 13–14 mm; maximum width 5 mm (n = 6). Shape cylindrical for most of length, with a slight hump at A1 and a slightly bifurcated crest on T1; cremaster attached to a silk pad and girdle crossing at A1. Color light green, thoracic crest white with two black spots on each side; light brown spiracles on T1, A2-A6, and A3 under wing cover. Segments A2 through A6 with a pair of black and yellow dorsal spots, a small black tubercle above each spiracle and two white spots below; a black lateral spot on each segment posteriorly to wing pads with black lines along veins. Eclosion takes place at dawn, which possibly helps to reduce predation. Duration: 10 days (n = 6).

DISCUSSION

Food plants. The foodplant of *Melanis leucophlegma* is *Inga feuillei* DC. (Fabaceae). This plant species grows into a tree 6–10 m tall and is cultivated for the long, bean-like pods that contain brown seeds covered with sweet, white pith, much favored by the local people. The leaves are paired and have a cup-shaped nectary at the base (Fig. 1). The distribution of the food plant is the west coast of South America south to Ica, Peru, and throughout the Amazon basin from sea level to 3000 m.

Food plants known for the seven species of *Melanis* are summarized in Table 1. All but two of the known host records are from two plant genera, *Inga* and *Pithecellobium.* These genera belong to the family Fabaceae. The records for *Eupatorium* and *Samanea* may be in error and should be reconfirmed. The recording of *M. pixe* on more than one plant genus suggests that *Melanis* species may be polyphagous.

Oviposition behavior. Ovipositing behavior was observed between 1600 and 1730 h. Females circled the *Inga* tree, alighting on the ventral leaf surface. They touched the leaf surface with the tip of the abdomen, depositing 1 to 9 eggs on the same leaf, usually in a cluster. They then flew off to another leaf, repeating the process.

Larval habits. The larval development time was about 55 days from egg to adult. Through the third instar, the larva fed on ventral and dorsal leaf surfaces between leaf veins. Fourth and fifth instar larvae consumed the entire leaf including veins, sometimes defoliating entire trees. (G. Lamas pers. com.). Larvae left the leaf to molt, but not to pupate.

The gregarious larval behavior described for *M. pixe* (DeVries 1997) was also observed in *Melanis leucophlegma.* Larvae of different instars fed together and were not aggressive towards each other. Not only were larvae of different instars kept together in the same container, but a fifth instar larva was observed eating around eggs to avoid damaging them. The larvae expelled frass some distance, flipping the end of the abdomen in the process.

TABLE 1. Foodplant records for *Melanis.*

Species	Food plant	Reference
M. pixe	*Inga* sp. (Fabaceae)	DeVries 1997
M. pixe	*Pithecellobium* sp. (Fabaceae)	DeVries 1997
M. pixe	*Inga* sp. (Fabaceae)	DeVries 1997
M. pixe	*Pithecellobium dulce* (Fabaceae)	Powell 1975
M. pixe	*Albizia caribea* (Fabaceae)	DeVries 1997
M. aegates cretiplaga	*Pithecellobium scalare* (Fabaceae)	Hayward 1973
M. hillapana impura	*Pithecellobium hassleri* (Fabaceae)	Jørgensen1932
M. xarifa	*Inga* sp. (Fabaceae)	Kaye 1921
M. electron auriferax	*Eupatorium* sp. (Asteraceae)	d'Araújo e Silva et al. 1968
M. leucophlegma	*Inga feuillei* (Fabaceae)	present article
M. pronostriga	*Samanea saman* (Leguminosae)	Scott 1986

Third and fourth instars had green and light brown color morphs. However, by the fifth instar, all the larvae became gray-brown. The reason for the presence of different color morphs during the two middle instars is unclear. Many lycaenid species have different color morphs, but this is related to the color of the plant parts on which they feed, whether flowers or buds. (Monteiro 1991, Callaghan in press). The phenomenon is quite common among African lycaenids (Clark & Dickson 1971). To the present, color morphs have not been observed among other riodinid butterflies. I noted no differences in behavior between the two forms. However, when not feeding, brown larvae may be protected by their cryptic coloration by resting on dried leaf spots (Fig. 4) which are quite common, particularly as the leaves become older towards the end of the growing season. An additional advantage could be that predators must learn to search for two types of larvae, and not just one, thus possibly lowering predation.

There is much to be learned about the immature biology of *Melanis* and riodinids in general and it is hoped that this article will stimulate interest in this interesting group of butterflies.

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