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LIFE HISTORY OF *MELANOCYMA FAUNULA* IN MALAYSIA (LEPIDOPTERA: NYMPHALIDAE: MORPHINAE)

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ABSTRACT.– Information and pictures of the immature stages of *Melanocyma faunula* (Westwood) found in Peninsular Malaysia are presented here for the first time. Eggs and larvae were found exclusively on the palm, *Orania sylvicola* (Griff.) H.E. Moore (Palmae).

KEYWORDS: *Amathusia*, Amathusiinae, Amathusiini, behavior, Asia, biology, distribution, egg, *Faunis*, hostplant, immatures, larva, larval behavior, life history, Oriental, oviposition, Palmae, pupa, Southeast Asia, *Taenaris*.

Fig. 1-3. *Melanocyma faunula*: **1)** Adult; **2)** Sungai Gombak and typical vegetation of the area; **3)** Emerging crown of *Orania sylvicola*;

Amongst all the different groups of insects in the tropics, butterflies are probably the best known group. Their extraordinary beauty has tempted people of all times to take a closer look. However, there are still a lot of butterflies where nothing is known of their life history, and often not even the larvae are known. This is especially true for the Oriental Amathusiini.

Ackery (1988) states that only a fifth of the currently recognized species of Amathusiini are covered by hostplant records: the species listed are from 6 of the 13 recognized genera. Three of these genera, *Amathusia*, *Faunis* and *Taenaris,* include palms in their hostplant records.

Like all hostplant records, this one also is biased towards plants of some economic importance or plants occuring close to man. Of the palm genera recorded, none are occuring exclusively in forest habitats, and all records are probably relating to cultivated species. Since the principal habitat of the Amathusiini is deep forest (Ackery, 1988), the paucity of hostplant records for them thus becomes more understandable.

Melanocyma faunula (Westwood, 1850) (Fig. 1, 9) is the only species in the genus *Melanocyma*. The three genera — *Melanocyma, Faunis* and *Taenaris* — form a natural group within the Amathusiini, possibly worthy of subtribal rank. The group is characterized by the possession of a gnathos in the male genitalia, among other characters. The species in this group are also smaller than usual in the family (Corbet and Pendlebury, 1992).

The various subdivisions of the family Nymphalidae are given different ranks by different authors. The taxonomy followed here is the one given by Corbet and Pendlebury (1992), and upheld by Ackery *et al.* (1999): the Amathusiini are placed as a tribe in the subfamily Morphinae (by others, placed in Amathusiinae instead of together with the Neotropical genera of Morphinae).

Melanocyma faunula is distributed from Burma to Thailand and Malaysia, with several named subspecies. The present study is based only on the nominate subspecies, *M. faunula faunula*. It is found only in dense forested land up to 1500m a.s.l., and is locally not uncommon (Corbet and Pendlebury 1992). No vernacular name is given by Corbet and Pendlebury, although Yong (1989) refers to it as "Pallid Faun."

Species of the two genera *Taenaris* and *Faunis* are reported to feed on plants from a variety of monocotyledonous families. Observations on the hostplant of the third member, *Melanocyma*, are presented here for the first time.

Fig. 4-7: Life history of *Melanocyma faunula*: **4)** Hatching larvae; **5)** Gregarious 3rd instar larvae; **6)** 4th instar larva (from above); **7)** Side view of 4th-instar larvae

Study Locality

Observations were made during fieldwork at the University Field Studies Centre Ulu Gombak, 30 km north of Kuala Lumpur, West Malaysia. The Centre is situated in the valley of the Gombak River, in old secondary forest, at an altitude of 250m a.s.l. Natural vegetation is hill dipterocarp forest, a subdivision of lowland rainforest. The river itself is a typical *Saraca*-stream, as typified by the abundance of *Saraca thaipingensis* (Leguminosae) along its banks (Corner, 1988) (Fig. 2).

Hostplant

Hostplants of *Melanocyma faunula faunula* larvae were in all instances palms of the species *Orania sylvicola* (Fig. 3) (Palmae). *Orania* is a genus of the palm subfamily Arecoideae, with 16 species distributed from southern Thailand, peninsular Malaysia, Indonesia, to the Philippines and New Guinea, plus an additional species in Madagascar. The genus has its greatest diversity in New Guinea, with a minor radiation in the Philippines (Uhl and Dransfield, 1987).

Orania sylvicola (Griff.) H.E. Moore is the only species occuring in Malaysia and western Indonesia. It appears to be the most primitive member of the genus (Essig, 1980). It grows a smooth, grey stem up to a hight of 12m and a diameter of 30cm, with pinnate leaves 3.5-4.5m long. The leaflets are characterized by a praemorse tip and a greyish-white underside. It is a forest species found at an altitude of about 300m a.s.l. (Ridley, 1925).

There are indications from New Guinea that *Orania* generally requires open-forest conditions to regenerate, such as big canopy gaps. The presence of large numbers of them in a forest is indicative that the vegetation is seral in nature (Johns and Hay, 1984). *Orania sylvicola* is fairly abundant along the banks of the Gombak River, in the immediate vicinity of the forest station for these studies in Malaysia. As indicated by growth form and vegetation type, this area had been cleared in former times.

Orania sylvicola is reputed to be poisonous in all its parts (Uhl and Dransfield, 1987). Local lore has it that a single fruit is enough to kill an elephant. Tests of the fruit show a poison, probably of a glucosidal nature, acting on the heart (Gimlette, 1991).

OBSERVATIONS

On 19 Oct 1994, a female of *Melanocyma faunula faunula* was observed while laying eggs. The butterfly was encountered at 1200h, fluttering around a group of smaller palms (*Orania silvicola*), landing repeatedly on the upper side of the younger leaves and tapping the surface with its forelegs. Sometimes it was seen landing on other plants as well, then taking off again almost at once. At 1236h it settled on the underside of the youngest *Orania* palm leaf, sitting very quietly, only moving the abdomen, laying one egg next to the other in rows of four, and moving forward a bit on completion of each row. At 1308h, 72 eggs have been laid this way. The female then rested, to finally fly off at 1315h. The eggs were laid in a single tier, packed tightly in the center of the clutch, but somewhat more distant in the outer parts.

The eggs hatched after 11 days, most of them within a 12 hour period. The larvae aggregated around the empty eggshells, and about a day later moved together to the tip of a palm leaflet to start feeding. They were lying parallel, close together, mainly on the un-

Fig. 8-9. *Melanocyma faunula*: **8)** Pupa; **9)** Freshly emerged adult.

derside of the leaflet, but some also on the upper side. They fed from the tip down. Six days later they aggregated in the middle of the leaflet for molting. The second instar larvae showed the typical red and white coloration. They continued to live gregariously, always feeding from the tip down, leaving the midrib in place. With their growing size and limited space at the leaf tip, the larvae gradually spread over the whole leaf, and successively to older leaves.

Before pupation, the larvae wandered off their hostplant. Total time from egg hatching to leaving the hostplant was 31 days. No pupae were recovered in this instance, in spite of intense searching within a radius of about 5m, thus indicating that the larvae cover considerable distances in search of a suitable pupation site. At other times, single pupae have been found suspended from the undersides of non-hostplant leaves.

Abundance

A total of 676 immature stages have been found within the research period of three years. The great majority of these were encountered during October 1994, and only 148 were found during the remaining time.

Description of the stages

All measurements and times given are averages from different batches reared in the laboratory. No single batch was raised all the way from egg to adult, but the calculated minimum rearing time in the laboratory of 33 days (for caterpillar stage alone) compares well with the 31 days recorded in field observations.

Eggs (Fig. 4): The eggs are spherical, with a diameter of 1.1mm. They appear smooth, but show very fine dentures, resembling golf balls, under magnification. The color of freshly laid eggs is yellow; they subsequently turn darker, and become black shortly before hatching. Clutch sizes found were 88, 63, 51, 20 and 72 eggs. The clutch of 88 eggs was laid in two tiers of 57 and 31, all others were arranged in a single tier. Numbers of larvae which were only discovered as first or second instar larvae, gregarious on one leaflet were 34, 23, 70, 22, 102, and 40. All eggs found have been on the lower surface of the youngest or second youngest leaf of *Orania sylvicola*. The longest recorded time from discovery of the eggs until hatching was 10 days.

1st instar (Fig. 4): Freshly hatched larvae are yellow, with a black head capsule. They are on average 3.1mm long and bear sparse white hairs 0.8mm long. The head capsule is roundish, without the typical "horns" of the Amathusiini, and measures 0.9 x 0.9mm. Development time in the laboratory was 6 days.

2nd instar: From the second instar on, the larvae show their typical coloration: a dark red color, contrasted by two bright white transversal stripes dorsally on each segment. The stripes are seperated by a fine red line or fold within the segment and bear a similar fold in the middle of each stripe. Coloration of the head capsule is a glossy black without any markings. The head capsule bears two horn-like processes, which are tilted approximatly 45° towards the front, and ends in a crown-like head with usually 6 bristles. These are long and hair-like in the second instar

and become progressivly shorter and stouter. Both head capsule and body bear long white hair-like setae.

Measurements of the 2nd instar head capsule are 1.4mm wide and 1.4mm high without horns, 1.6mm including the horns. Length of the horns is 0.2mm. The hair-like setae on the body are up to 4mm long. Development time was 6-8 days.

3rd instar (Fig. 5): Measurements of the head capsule are 2.1mm wide and 2.1mm high without horns, 2.6mm including the hornes. Lenght of the horns is 0.5mm. The hair-like setae on the body are up to 7mm long. Development time was 6-8 days.

4rth instar (Fig. 6): Measurements of the head capsule are 2.9 mm wide and 3.0mm high without horns, 3.7mm including the hornes. Lenght of the horns is 1.0mm. The hair-like setae on the body are up to 8 mm long. Approximate length is 28mm. Development time was 7 days.

5th instar (Fig. 7): Measurements of the head capsule are 4.1 mm wide and 4.2mm high without horns, 5.3mm including the hornes. Lenght of the horns is 1.7mm. The hair-like setae on the body are up to 9mm long. Aproximate length is 35mm. Development time was 8-11 days.

Pupa (Fig. 8): The pupa is bright yellow, without any leaf-vein pattern, as is often found in the Amathusiini, and turns black shortly before the emergence of the adult butterfly. It bears two processes which stand apart at their base, but are almost touching at the tip. The pupa is freely suspended from the underside of a leaf. Under laboratory conditions, the pupae are usually suspended from the lid of the container. Measurements are 26.2mm length and 8.4mm diameter. The tips measure 1.6mm. Development time in the laboratory was 14-16 days.

DISCUSSION

Melanocyma faunula faunula exhibits the same egg laying and feeding behavior reported for the closely related *Taenaris onolaus* (Parsons, 1984). The larvae of *M. f. faunula* are very conspicuous, due to their contrasting colors and gregarious behavior, even though they have a preference for the underside of the leaflet. Corbet and Pendlebury (1992) concluded that it may well be that the larvae are distasteful. It could be speculated that there is a possible connection to the allegedly poisonous nature of their hostplant. Similar ideas are discussed by Parsons (1984) for *Taenaris onolaus*, which feeds on toxic cycads (see also Nash *et al.*, 1992).

Melanocyma faunula has been found on palms as small as 1.5m, and up to the maximum searchable size of about 4m. No obvious damage was detected in palms larger than this, but since conditions for searching these were difficult, no conclusions should be drawn from this. In smaller palms, eventually a whole leaf is eaten away, leaving only the midveins, and the caterpillars move on to the next leaf. Small palms with only 3 leaves have been found completely defoliated.

No definitive statement about the specifity of the hostplant can be made other than that *Orania sylvicola* was the only hostplant utilized within three years of intense survey of this area — with an abundance of palm species available. *Melanocyma faunula* was never found on another species of plant. Although in laboratory trials some feeding on leaves of other palm species was observed, no larvae could be successfully raised on any diet apart from *Orania sylvicola*.

Species of *Taenaris* are reported to feed on Cycadales, Musaceae, Pandanaceae, Costaceae, Liliaceae, Orchidiaceae and Palmae. The widest range is recorded for the New Guinea species *Taenaris catops* (Westwood), feeding on *Musa* (Musaceae), *Cordyline terminalis* (Liliaceae), *Phias tancarvillae* (Orchidiaceae), *Areca catechu* and *Caryota rumphiana* (Palmae), and *Taenaris myops* (Felder & Felder) feeding on *Musa* (Musaceae), *Tapenochilus sp.* (Costaceae), *Cocos nucifera* and *Elaeis guineensis* (Palmae) (Parsons, 1991). For *Taenaris horsfieldii* (Swainson), the only species of *Taenaris* in Malaysia, *Smilax* (Smilacaceae) is recorded as hostplant (Corbet and Pendlebury, 1992).

Hill *et al.* (1978) report for *Faunis eumeus* (Drury) as hostplants *Pandanus sp.* (Pandanaceae), *Smilax china*, *Smilax lanceaefolia* (Smilacaceae), *Liriope spicata* (Liliaceae) and *Phoenix hanceana* (Palmae). Easton and Pun (1997) report in addition, *Cycas revoluta* (Cycadales), *Musa paradisiaca* (Musaceae), *Chrysalidocarpus lutescens* and *Caryota ochlandra* (Palmae). The genus *Faunis* is represented by three species in peninsular Malaysia. Larvae of *F. canens* Hübner have been recorded from *Musa* (Musaceae) (Corbet and Pendlebury, 1992), though we found them on *Caryota mitis*, *Pinanga scortechinii* and *Elaeis guineensis* (Palmae)

It may be speculated on this basis, whether additional hostplant records are to be expected for *M. f. faunula* as well. A definitive answer, however, will only be given by future research.

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