

Notes on the biology of *Pareba issoria* (Hübner, 1819) (Lepidoptera: Nymphalidae: Acraeinae)

Заметки о биологии *Pareba issoria* (Hübner, 1819) (Lepidoptera: Nymphalidae: Acraeinae)

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КЛЮЧЕВЫЕ СЛОВА: *Pareba issoria*, Acraeinae, Nymphalidae, биология, яйцекладка, личинки, куколка, поведение.

ABSTRACT: *Debregeasia hypoleuca* Wedd. (Utricaceae) has been recorded for the first time as the larval host plant of *Pareba issoria* (Hübner). The gross morphology and duration of various life history stages has been recorded. The larval and oviposition behaviour has been studied in details. The larvae hibernate in third instar.

РЕЗЮМЕ: *Debregeasia hypoleuca* Wedd. (Utricaceae) впервые отмечена как кормовое растение *Pareba issoria* (Hübner). Приводятся данные о макроморфологии и продолжительности развития преимагинальных стадий. Детально изучены поведение гусениц и бабочек в момент откладки яиц. Установлена зимовка гусениц 3-го возраста.

Introduction

Pareba issoria (Hübner) is found in lower Himalayan region of north-west India to Sikkim in north-east India [Varshney, 1994]. Bell [1909] and Wynter-Blyth [1957] has very briefly discussed its immature stages and recorded *Boehmeria* and *Debregeasia bicolor* of family Utricaceae and *Buddleia* of family Loganiaceae as its larval host plants. During the course of present studies the various life history aspects of *P. issoria* have been studied in detail and *Debregeasia hypoleuca* Wedd. (Utricaceae) has been recorded its new host plant from Shiwalik areas adjoining Chandigarh from north-west India. *Erigeron* sp. (Compositae) and *Verbena bonariensis* Linnaeus (Verbenaceae) have been recorded as its nectar food plants. The detailed account of various life history stages is as below.

Observations

Egg. Incubation period: 20.50±1.53 days.

Height—0.86±0.13 mm, width—0.62±0.06 mm; laid in a loose mass, number of eggs 150–175 in a cluster,

eggs evenly arranged; each egg orangish yellow, changes to dirty orangish brown before hatching; oval in shape, base broader than apex, chorion surface craved with shallow reticulate network of horizontal and longitudinal ribs.

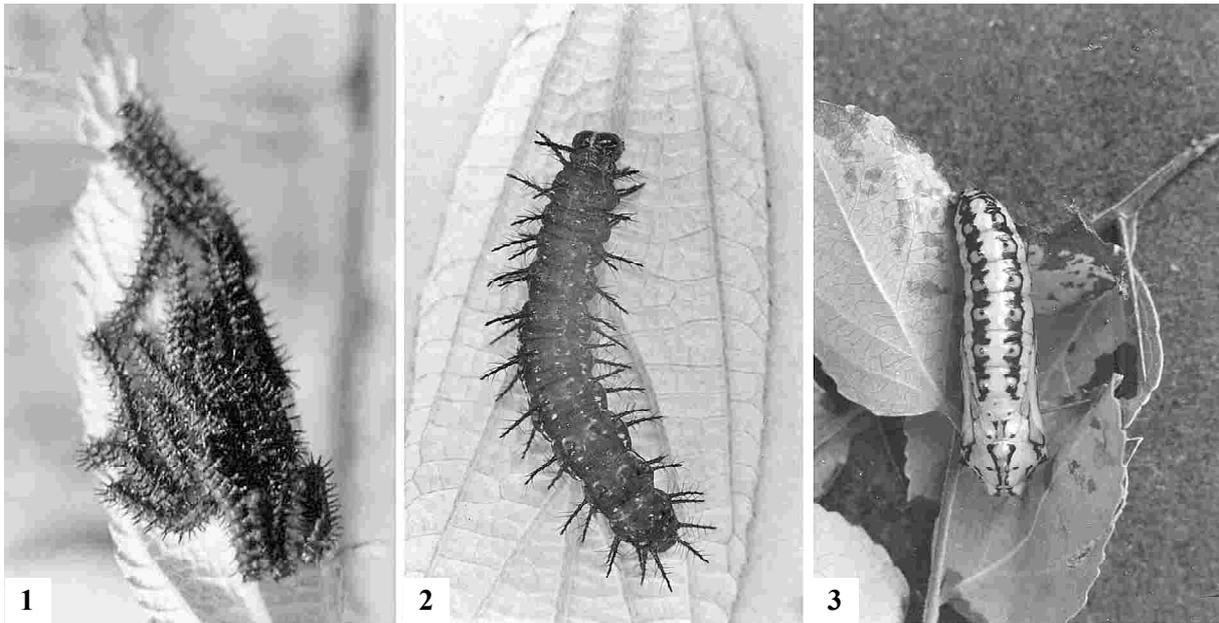
Larva. Number of instars: 5. Larval duration: 28.75±3.86 days.

First instar. Duration 6.25±1.06 days. Width of head—0.38±0.00 mm; hypognathus, dark brown; epicranial suture black; stemmata prominent; primary setae present. Body length—3.70±1.02 mm, width—0.34±0.03 mm; oranges brown; beset with black coloured primary setae; thoracic and abdominal legs blackish brown.

Second instar. Duration: 5.00±0.70 days. Width of head—0.71±0.06 mm; brownish black; rest as above. Body length—5.71±0.58 mm, width—0.66±0.00 mm; brown, scoli make their appearance; rest as above.

Third instar (Fig. 1). Duration: 5.50±0.70 days. Width of head—1.66±0.00 mm; jet black in colour; epicranial suture black, adfrontal sutures white, base of clypeus and antennae white. Body length 13.33±1.52 mm, width 1.88±0.10 mm; blackish brown, ventral side lighter than dorsal; scoli black, prominent; a subspiracular cream coloured diffused line appears, thorax to ninth abdominal segment with a midventral line, the latter creamy in colour; thoracic and abdominal legs completely black from outer side and light brown from inner side; anal shield completely black.

Fourth instar. Duration: 5.50±0.70 days. Width of head—2.13±0.05 mm; black; epicranial and adfrontal sutures broader, white; parietals orange brown; rest as above. Body length—22.66±2.51 mm, width—2.66±0.28 mm; the subspiracular line broken due to presence of subspiracular scoli, the latter bicoloured with orange bars present on dorsal edge at bases of scoli and creamy white v-shaped lines extend from one scoli to another; supraspiracular band with supraspiracular scoli also



Figs 1–3. Praeimaginal stages of *P. issoria*: 1 — third instar larvae; 2 — last instar larva; 3 — pupa.

Figs 1–3. Преимагинальные стадии *P. issoria*: 1 — гусеница 3-го возраста; 2 — гусеница 5-го возраста; 3 — куколка.

appears, off-white in colour, broken into segments.

Fifth instar (Fig. 2). Duration: 6.50 ± 0.70 days. Width of head — 3.76 ± 0.09 mm; epicranial and adfrontal sutures white, tinged with orange, frons black, area of parietals near ecdysial line narrowly or broadly (variable) black; otherwise head orange coloured. Body length — 35.00 ± 2.00 mm, width 4.33 ± 0.33 mm; same as that of fourth instar; scoli as well as bands become more distinct and broader.

Pupa (Fig. 3). Duration: 8.66 ± 1.52 days. Length — 25.00 ± 0.00 mm, width — 5.00 ± 0.70 mm; suspended by anal cremaster with head facing downwards; freshly formed pupa pinkish in colour, after 3–4 days transforms to light pinkish brown, body elongated; cremaster broad, short black; tenth segment black, addorsal black bands present from second to ninth abdominal segment; a horizontal black band joins addorsal bands of both sides in intersegmental area of eighth and ninth abdominal segments; each addorsal band form u-shaped cup like structure on each segment to accommodate tubercles; the latter sharp, orange coloured, with tip black; similar tubercles present on first abdominal, mesothoracic and metathoracic segments smaller in size and not enflanked by black band; thorax with double line of median dorsal black band, broadened in the posterior part of mesothorax; cephalic prominences poorly developed; mesothorax with sharp lateral prominences, median carina present on mesonotum; lateral abdominal band black, decorated with orange rounded spots on each segment; on abdomen a ventral median double black band present; ocular spots black; antennae black; wing margins, venation and discal cell quite distinct in mature pupa and lined with black colour.

Oviposition behaviour. The oviposition in the species *P. issoria* has been observed in the field at 12.45 p.m. at Solan. It was scorching sunshine with the wind blowing on a low speed. Before actually starting the process of egg laying, it was observed in the field that the female wanders for a considerable time in the vicinity of the host plant to precisely locate a suitable egg laying site. The young and medium sized leaves are preferred for egg laying. On finding an appropriate one, the female lands on the leaf, moves towards its apex and bends her abdomen to lay as many as 150–175 eggs in a loose cluster on the underside of the leaf in an orderly fashion. To begin with, the female deposits the eggs in the midrib region near the apex of the leaf and completes the first row. Then she moves her abdomen to the earlier position where the first egg was deposited and subsequently she deposits the second row of eggs. It has been seen that the female while laying the eggs moves her long abdomen alone to deposit 6–7 rows of eggs, one after the other on ventral surface of the leaf, while she herself remains motionless on the dorsal surface by holding the leaf tightly with her legs. While ovipositing, the female is so engrossed and concentrated in the job that even if the twig of the host plant is plucked softly, she continues to perform the process of egg laying unhindered, in a normal manner. The moment the eggs are unloaded and the process is completed, she flies away. On close examination of the underside of the leaf shows that the rows as well as the eggs are placed equidistantly.

Larval behaviour. After making an exit hole in the egg chorion, the first instar larva wriggles out of the egg shell. On hatching out, it feeds on the egg shell from outside and consumes more than half of it. The

basal cup-shaped portion with irregular edges remains intact with the substratum. All larval instars except the last i.e. fifth instar, the larvae feed and rest gregariously. Infact, they spin a thin mat of silken threads for anchorage and stepwork, and all of them remain entangled in it. However, the last instar larvae do not make such mat and move apart to adopt solitary mode of feeding. During the optimum conditions, numerous larvae feeding on host plant in groups, give the infested host plant blackish appearance. Regarding feeding pattern, it has been noted that the first instar larvae devours the chlorophyll and lower epidermis of the leaf, forming small circular patches. The instar larvae shift to undersurface of the leaf and corrode upper epidermis and chlorophyll and thus making larger irregular patches. The third instar forage the leaf from its margins, consume all the layers and make cup-like structures along the margins. The fourth instar larvae eat up whole of the leaf, including midrib and harder veins. The fifth instar is a voracious feeder and normally consumes 2–3 median sized leaves in a day. The extensively infested host plants give a wilted appearance in the field. During regular field studies, it has been observed the larvae of different instars indulge in feeding only in the morning and evening hours, while spending rest of time in resting on undersurface of the leaves. In resting posture, the anterior part of the larva is lifted up with its head incurved. The first and second instar larvae, when touched, exhibit dropping off behaviour with silken threads. This type of behaviour is missing in the remaining instars, who only adopt a different posture by raising the anterior portion of the body. However when molested again, they curl up and fall down on the ground,

remain there as such for sometime and then show brisk movements to fled away. The last instar larva secretes a yellow coloured liquid from bases of scoli, emitting foul smell when pinched with a pair of forceps.

Remarks

The field observations undertaken in Shiwalik area in north-west India reveals the species under reference, *P. issoria* is abundant during months of June to September. The period of nectar sucking is at its peak in the months of June to July. The species undergoes diapause in its third larval stage from month of November to March, when plenty of larvae are available on the undersurface of the leaves of the host plant. The incubation period of the species is quite long ranging from 19–22 days. The adults are weak flyers and they sail close to ground for long distances without beating their wings. The imagoes have been seen the nectar food sources and cluster on the flowers of single plant in good numbers in a drooping manner.

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