

Life history of *Eurema hecabe* (Linnaeus, 1758)
(Lepidoptera: Pieridae) from Himachal Pradesh, India

Преимагинальное развитие *Eurema hecabe* (Linnaeus, 1758)
(Lepidoptera: Pieridae) в Химачал Прадеш, Индия

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КЛЮЧЕВЫЕ СЛОВА: Индия, Химачал Прадеш, стадии развития, яйцекладка.

ABSTRACT. The life history of *Eurema hecabe* (Linnaeus) was described on Leguminosae plants i.e., *Cassia mimosoides*, *Albizia stipulata* and *Leucaena leucocephala*.

РЕЗЮМЕ. Описаны особенности развития *Eurema hecabe* (Linnaeus) на ряде бобовых: *Cassia mimosoides*, *Albizia stipulata* и *Leucaena leucocephala*.

To achieve long term stability, now a days, lot of emphasis is being given to understand the role of varied biodiversity in sustainable development of various ecosystems and subsystems. Insects in general, and moth and butterflies referable to order Lepidoptera in particular form a significant component of overall biodiversity. They occur in variety of habitats and are of interest to biologists, naturalists, conservationists and entomologists for specific as well as general reasons. Adult butterflies and their life stages, i.e., egg, larva, pupa, have dual economic importance because they are a significant component of the food web/chain, and are closely associated with different species of plants in one way or another. The species is very common, found all over India upto 9000 feet, and normally flies throughout the year except where there are extreme of climate, and in the North-West Himalayas where it appears from August to October [Wynter-Blyth, 1957]. *Eurema hecabe* (Linnaeus, 1758) is occasionally a pest of *Albizia*, planted as shade for tea plants [Varshney, 1978]. Workers such as Lefroy [1908], Sevastopolo [1938, 1970], Talbot [1939, 1947], and Wynter-Blyth [1975] published brief observations on the biology, life history and host plant associations of some Rhopalocera in India.

Methods

The study was carried out at Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni (1440 m), Solan, Himachal Pradesh, India. Oviposition on leaves of the plants of the family Leguminosae — *Cassia mimosoides*, *Albiz-*

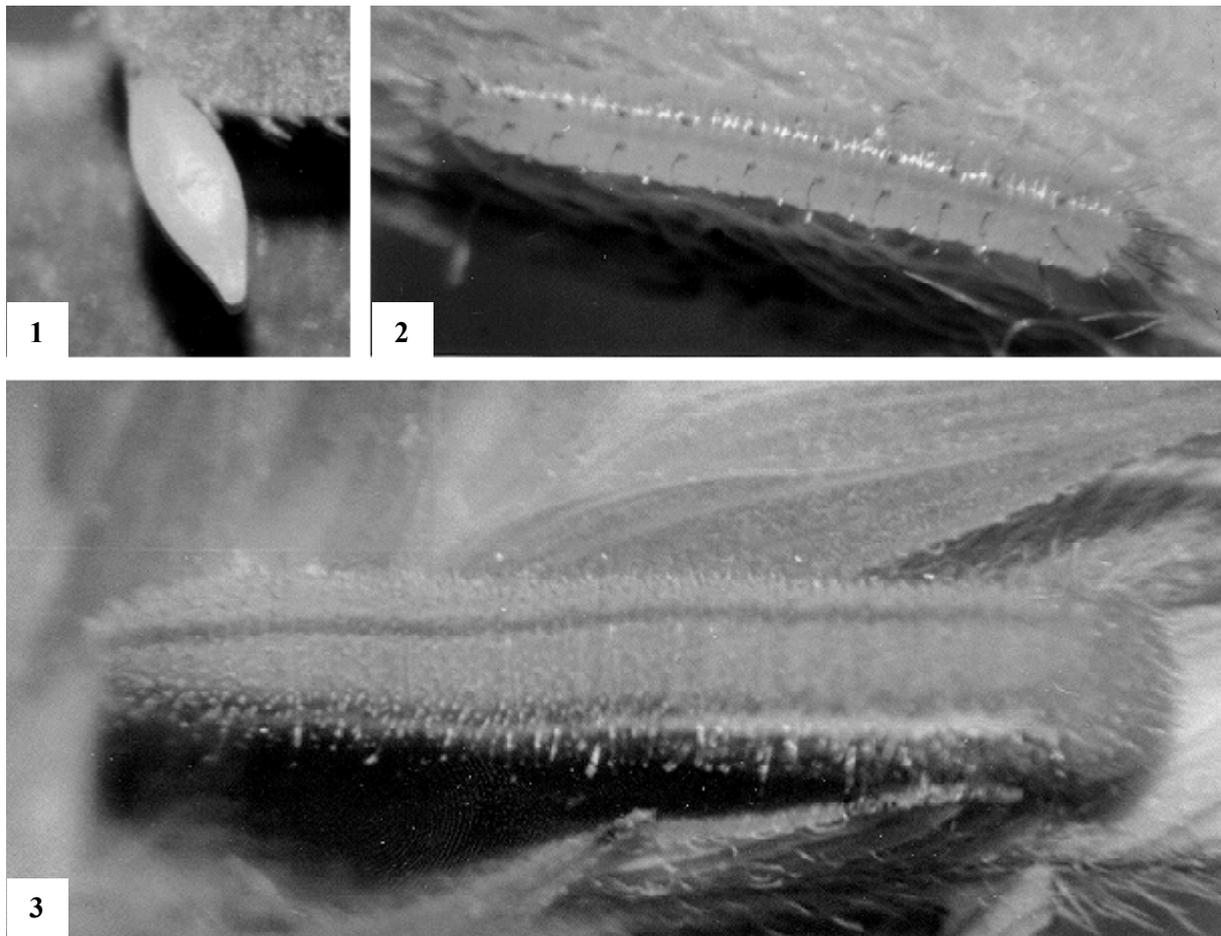
zia stipulata and *Leucaena leucocephala* was observed in the field. Freshly laid eggs were located and marked, and were observed daily until hatching. Newly hatched larvae were brought to the laboratory along with leaves, and kept in petridishes/breeding cages. Fresh leaves were provided daily for the developing caterpillars. Observations on development and habits were recorded. Measurements of head capsule width, and body length and width were made using with an ocular micrometer/scale.

Results

Oviposition behavior: Oviposition has been observed from March to November between 10⁰⁰ and 16⁰⁰ hours on *Cassia mimosoides*, *Albizia stipulata* and *Leucaena leucocephala*. Prior to oviposition, like many other butterfly species, it spends a lot of time fluttering around in search of a suitable leaflet/leaf and touches the dorsal surface of the leaflets/ leaves of every plant in her way, with the tip of her abdomen. Eggs are placed singly on the dorsal surface of the tender leaves, each deposition taking three to five seconds. The female then flies off to locate another plant. A single female may lay 120-130 eggs. The rate of oviposition is highest during the months of June to September. After laying several eggs, she rests and drinks nectar.

Egg (Fig. 1): Height — 1.05 ± 0.01 mm; width — 0.35 ± 0.02 mm (n = 38); spindle shaped, upright, base and micropylar end comparatively narrower and rounded; weakly sculptured with ridges, furrows and transverse striae; slightly compressed in the middle; shining white when freshly laid, later turns pale yellow, then turning brownish before hatching; first instar movements traceable from outside chorion.

Incubation period and hatching: The egg incubation period is three days. It has been observed, both in the field and laboratory conditions, that the young larva emerges after chewing a hole in the micropylar end of the egg, then eats the egg shell. Hatching takes about 1.0 hours and occurs mainly in the morning.



Figs 1–3. Development stages of *Eureka becabae*: 1 — egg; 2 — first instar larva; 3 — fifth instar larva.

Рис. 1–3. Стадии развития *Eureka becabae*: 1 — яйцо; 2 — личинка первого возраста; 3 — личинка пятого возраста.

Larva. Number of instars — 5

First instar (Fig. 2): width of head — 0.32 ± 0.01 mm ($n = 28$); hypognathous, distinct, orange; ocelli present laterally, epicranial suture distinct, two long and other small, black primary setae. Body length 1.45 ± 0.02 mm ($n = 28$); width — 0.32 ± 0.01 mm; distinctly segmented, transparent on emergence, later turns green; thoracic T1 and T2 segments have complete band of long, black setae, T3 and each abdominal segment having dorsal pair of long black setae, small, sparse, black setae present on all body segments. Duration is 1 day.

Second instar: width of head — 0.55 ± 0.03 mm ($n = 26$); light yellow, sparsely covered with moderately long secondary setae. Body length 3.53 ± 0.02 mm ($n = 26$); width — 0.56 ± 0.02 mm; same as above except gelatinous green, and with moderately long, black, primary and secondary setae; alimentary canal visible as dark green mid-dorsal stripe; creamish spiracular stripes not prominent, extend for the full length of the body. Duration is 2 days.

Third instar: width of head — 0.85 ± 0.04 mm ($n = 23$); same as above except light green. Body length — 7.08 ± 0.03 mm; width — 0.86 ± 0.01 mm ($n = 23$); same as above except each segment distinctly annulated (6–7

annuli), each annulus having a band of setae; broader and shining white spiracular stripes prominent; spiracles distinct. Duration is 1 day.

Fourth instar: width of head — 1.55 ± 0.02 mm ($n = 22$); same as above except gelatinous green. Body length — 12.40 ± 0.03 mm; width — 1.55 ± 0.02 mm ($n = 22$); same as above except annuli more distinct, difficult to distinguish different segments. Duration is 2 days.

Fifth instar (Fig. 3): width of head — 2.46 ± 0.01 mm ($n = 20$); same as above. Body length — 18.50 ± 0.10 mm; width — 2.09 ± 0.01 mm ($n = 22$); same as above except mid-dorsal stripe broader. Duration is 3 days.

Pupation: pupation takes place either on the ceiling of the breeding cage or on the stem of the host plant. Larvae begin preparation for pupation at night, and transform to pupae 10 to 12 hours later.

Pupa (Fig. 4): Length — 19.50 ± 0.50 mm; width — 6.50 ± 0.50 mm; green with minute, scattered black dots; tapering at both the ends, with the anterior end drawn out to a orange brown pointed tip; abdominal segmentation well defined; spiracles distinct; entire pupa held closely to stem or to the ceiling of the breeding chamber, by a well developed silk girdle around thorax and

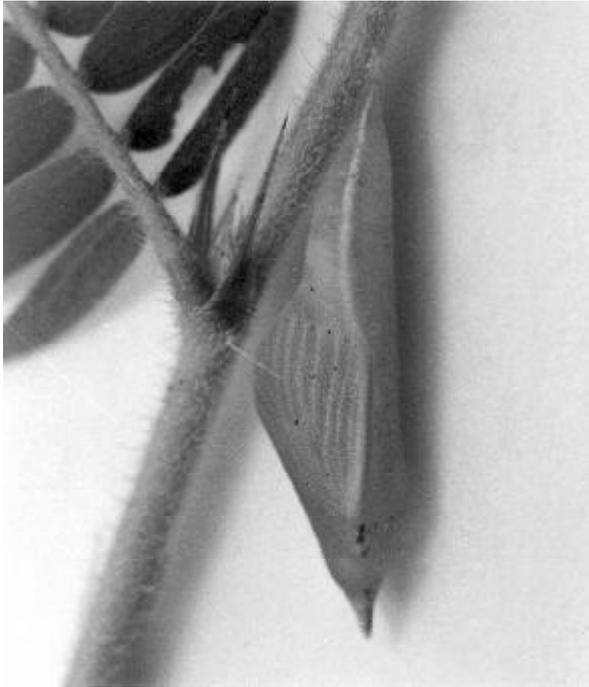


Fig. 4. Pupa of *Eurema hecabe*.
Рис. 4. Куколка *Eurema hecabe*.

with the caudal end; pupa turns light yellow before eclosion. Duration is 6 days.

Eclosion: adult eclosion is completed within 1.5–2.0 hours and usually takes place in the morning.

Larval behavior: *E. hecabe* is polyphagous on Leguminosae plants i.e., *C. mimosoides*, *A. stipulata* and *L. leucocephala*, and passes through four larval sta-

dia. Each of the four larval ecdysis is completed in five to nine hours. First instars after eating a portion of their egg shells, begin skeletonizing the tender leaflets/leaves of their host plant, eating the leaf tissue except the veins. The second instars feed on tender leaflets/leaves except midrib. The feeding behavior is of two types i.e., either making holes on the leaflets/leaves or feeding from margin of leaflets/leaves. The third, fourth and fifth instars consume whole leaflets/leaves and are voracious feeder. First and second instars rest on the upper surface of leaflets/leaves, whereas third, fourth and fifth instars rest either on the stem or on the midrib of the upper surface of leaves. The different larval stages are active and remain protected due to camouflaging with the surroundings.

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