

LIFE CYCLE OF THE BLUE TIGER BUTTERFLY *TIRUMALA LIMNIACE* (LEPIDOPTERA: RHOPALOCERA: DANAIIDAE)

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ABSTRACT

Tirumala limniace the blue tiger butterfly from India was studied in the environs of Eastern Ghats. It lays eggs singly on *Wattakaka volubilis* and this butterfly was seasonal in its distribution. The life cycle from egg to adult emergence is relatively shortest and spanning over 21-28 days. Besides, the population index of *Tirumala limniace* on same host plant leaves was discussed.

INTRODUCTION

There have been declines in butterfly population in general in India and in the world during the last few decades. Small populations of butterflies are more likely to become extinct (Ricklefs, 1973; Wright, 1983). The situation may be more serious with the endemic species. The need for effective conservation management is more urgent in view of the accelerated destruction of natural areas causing disturbance to the butterfly habitat. The success of such efforts requires sound knowledge of the biology and ecology of butterflies. (Gunathilagaraj *et al.*, 1998; Venkata Ramana, 2010). We provide here the life cycle of *Tirumala limniace* along with the population index of eggs, larvae, pupae for use in any conservation programme.

MATERIALS AND METHODS

Field areas were regularly searched for the reproductive activity of the blue tiger butterfly *Tirumala limniace* was found laying eggs on *Wattakaka volubilis*. The eggs with the leaf material were brought to the laboratory and incubated, and further developmental stages were followed, and the success rates of egg hatching, larval and pupal development was also recorded. Young leaves were supplied daily to the growing larvae. Particulars of the larval, pupal stages and the time of adult emergence were recorded from close observations. Searches were made every month for recording the different life stages - egg, larvae, pupae on 20 plants of *Wattakaka volubilis* to work out the population index.

RESULTS AND DISCUSSION

Mating was observed during the day between 0900 - 1700 hr and the copulating pair stayed tied together for over two hours. The breeding female laid eggs in the morning from 0930 -

1130 hr. Eggs were laid singly on the upper and underside of young and soft leaves of Asclepiadaceae family members particularly *Wattakaka volubilis*. They were cream white in color and barrel shaped, rather flattened at the base and dome shaped at the tip with criss crossing longitudinal and horizontal ridges. They became dull white on the day of hatching. They measured 1.00 - 1.20 (1.10 ± 0.20) mm in height and 1.50 - 1.70 (1.60 ± 1.00) mm in width. They hatched 3 - 4 days after being laid. The larvae developed through five distinct instars.

Instar I: This stage lasted 2 - 3 days. On the first day, the instar was 1.40 - 1.60 (1.50 ± 0.20) mm long. By the end of the instar period, it grew to a length of 5.40 - 6.20 (5.80 ± 0.80) mm. Body was soft and smooth and a pair of tentacles was formed on head region. Head was smooth. It measured 0.30 - 0.40 (0.30 ± 0.01) mm in diameter.

Instar II: This stage lasted 2 - 3 days. The instar progressed to a length of 10.0 - 12.0 (11.0 ± 2.0) mm. Its head measured 0.4 - 0.5 (0.45 ± 0.02) mm in diameter. Two pairs of tentacles, one at 3rd segment and the other at 12th segment became distinct. The Body was banded with black, greenish-yellow and white rings. The spiracles were large, black and oval. The underside of the body was whitish, with greenish tinge and marked with white bands and blotches. The head had black and white stripes.

Instar III: This stage lasted 2 - 3 days. The instar grew to 18.00 - 24.00 (22.0 ± 1.30) mm in length. Its head measured 0.60 - 0.70 (0.65 ± 0.01) mm in diameter. Body was banded with black, greenish yellow and white rings. The tentacles increased in length.

Instar IV: This stage lasted 2 - 3 days. The larva grew to 28.00 - 32.00 (30.0 ± 0.12) mm in length and 4.60 - 5.60 (5.10 ± 0.02) mm in width. Head measured 0.80 - 0.90 (0.85 ± 0.01) mm in diameter. There were 3 pairs of light brown coloured

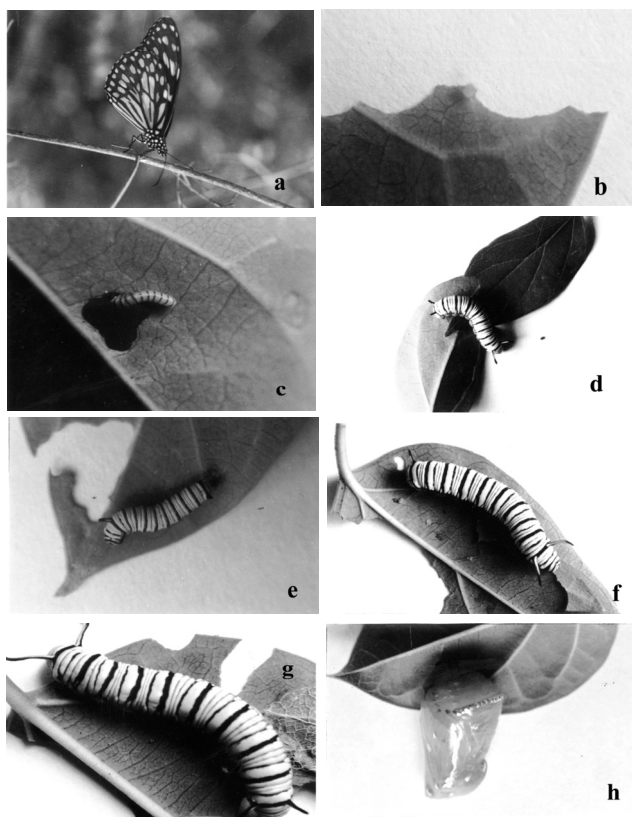


Figure 1: Life stages of *Tirumala limniace*

(a) Adult; (b) Egg; (c) Instar I; (d) Instar II; (e) Instar III; (f) Instar IV; (g) Instar V; (h) Pupa

legs at thorax and 4 pairs of prolegs at abdomen. The basal region of the tentacles became pale black.

Instar V: This stage lasted 3-4 days. The fully grown larva measured 45.00 - 51.00 (48.0 ± 0.16) mm in length and 5.60 - 6.60 (6.10 ± 0.02) mm in width. There were no changes in the other characters from fourth instar.

The larva stopped feeding and contracted to enter the pupal stage. It was then 35.00 - 38.00 (36.5 ± 0.13) mm long. This process took place for a day. The pupal stage proper lasted 6 - 7 days. The pupa measured 19.00 - 22.00 (20.5 ± 0.20) mm in length and 8.00 - 10.00 (9.00 ± 0.08) mm in width at the broadest region. It was fresh green in color and shiny. It was marked with gold spots on its dorsal surface. There was a single golden, beaded line on the 7th segment. Its maturity was indicated by its change to black color. Thus, the egg stage lasted 3 - 4 days, larval stage 11 - 16 days, and the prepupal

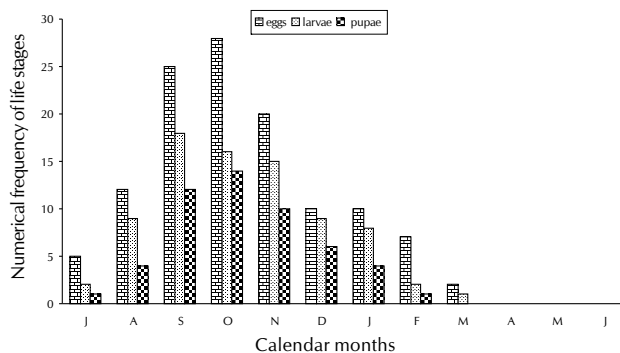


Figure 2: Month-wise distribution and numerical frequency of three different life stage of *Tirumala limniace* on *Wattakaka volubilis*

and pupal period 7 - 8 days. Total developmental period from egg to adult stage spanned over 21 - 28 days.

The data on the numerical frequency of eggs, larvae and pupae on three host plants *Wattakaka volubilis* in different months are given in Fig. 2. The three life stages were evident on the host plant from July - early March. This period corresponded with rainy and winter seasons in the study area.

CONCLUSION

The total period of development from egg to adult emergence was estimated to be 21-28 days. This was a relatively short period and may enable the butterfly to have more broods yearly (Kunte, 2000). In most parts of southern India the prevailing temperatures during September - January was relatively low and a voltinism pattern with 4-7 broods was expected for this blue tiger butterfly *Tirumala limniace*.

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