

# LIFE HISTORY OF COMMON MORMON *PAPILIO POLYTES* (LEPIDOPTERA: RHOPALOCERA: PAPILIONIDAE) FROM SRI LANKAMALLESWARA RESERVE FOREST - EASTERN GHATS – ANDHRA PRADESH

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Received: July 03, 2018

Accepted: August 22, 2018

## ABSTRACT

The life history of the *Papilio polytes* in Sri lankamalleswara forest and Kadapa was studied on the basis of searches. The morphology of adults, eggs, larvae, and pupae were observed. Besides, the population index of *Papilio polytes* Murraya koenigiileaves discussed. Life cycle completes in 28 - 34 days. The present study was carried out at Sri Lankamalleswara reserve forest (79° 07'–78° 80' E) and Kadapa (14° 47' N and 78° 82' E) during the calendar year June 2017 to May 2018. Sri Lankamalleswara reserve forest has an average elevation of 138 meters (452 ft.). The basic protocol for captive rearing was to collect eggs from wild-mated females, rear larvae to adult butterflies in captivity, and release adult butterflies and pupae back into wild populations. This butterfly normally requires a tropical to subtropical environment but sometimes ranges into sheltered, hot temperate areas. The different stages from laying of the eggs to the formation of the adult through larval and pupal stages of *Papilio polytes* Linnaeus in Sri lankamalleswara reserve forest and Kadapa are described in detail.

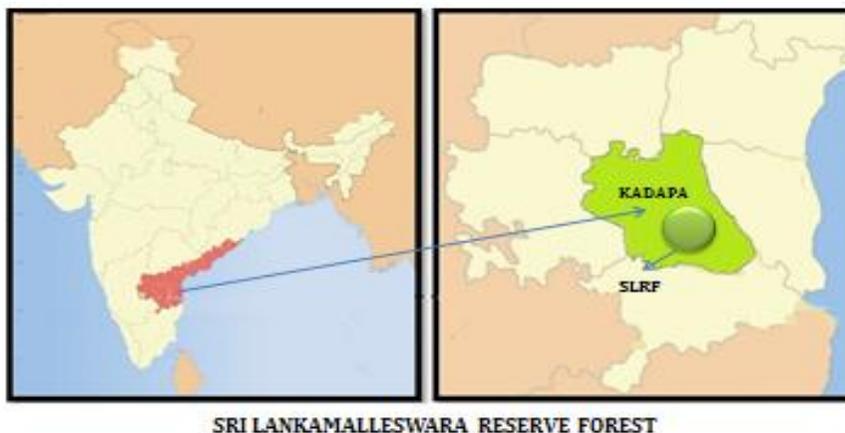
**Keywords:** *Papilio polytes*, life history, Papilionidae, Sri lankamalleswara reserve forest.

## Summary:

The common Mormons of Papilionidae are the dominant species of Eastern Ghats are now in danger. In order to consider the conservation programme for this species is necessary to have the complete information about its life history and its abundance. Further, the development time from laying of the egg to emergence of the adult is not known for most of the tropical butterfly species and since this was apparently much shorter and geographically more variable than in the temperate regions. This butterfly was completing its life cycle in 28-34 days. All other parameters also discussed. In the background, we have undertaken a complete study of the life cycles of the butterflies that are distributed in and around Sri Lankamalleswara reserve forest, Kadapa.

## Introduction:

Among various life forms of the planet Earth, insects and plants form the dominant group and the interactions between them are largely responsible for the dominance and diversification of both the groups. Butterflies are well known and conspicuous and are among the most beautiful creatures of nature. Available information on feeding habits and food resources of adult butterflies compared to that of larvae was very less (Kunte 2000). They are holometabolous with egg, larval, pupa and adult stages distinctly separated in the life cycle. Both larval and adults essentially survive on green vegetation and flowers: thus during most part of the life cycles, butterflies involve in complex feeding relationships with the green plants. It was therefore perceivable that clearing of the forests and other vegetation for the cultivation of food plants, use monoculture, indiscriminate application of pesticides and herbicides, and the growing number of urban and industrial processes have had affected butterfly species and numbers (Tracey, 1963). As a result, many species are rare. To consider conservation programme for individual species as has been attempted in Britain for several of rare species, notable *Lycaena dispar* (Lycaenidae) and *Papilio machaon* (Papilionidae) (Own, 1971), it was necessary to have complete information about the life cycle, particularly of the many species they appear to be rare. Further, the development time from laying of the egg to emergence of the adult is not known for most tropical butterfly species and since this was apparently much shorter and geographically more variable than in the temperate regions, local information desirable (Owen, 1971). It was in the background, we have undertaken a study of the life cycles of the butterflies that are distributed in and around Lankamalleswara reserve forest, Kadapa (14°45' to 15°12' N and 78°48' to 79°06' E). Here the life cycle of the common mormon *Papilio polytes* (Papilionidae) was reported. The measurements of egg, larva, pupa and adult reported here are based on twenty samples each.

**MATERIALS & METHODS:****Study Area:**

**Fig: 01: Study area – Sri Lankamalleswara reserve forest & Kadapa**

**Methodology:****METHODOLOGY**

During the observations for the reproductive activity and other ecological aspects of butterflies in the environs of Sri Lankamalleswara reserve forest (79° 07' N – 78° 80' E) and Kadapa (14° 47' N and 78° 82' E), *Papilio polytes* laid egg singly on either upper or lower surface of young leaves mostly exposed to sunlight. A female can lay 8-12 eggs at a time, with one or two eggs on a leaf. The eggs along with leaf material (*koenigi*) were collected in Petri dishes of 15 cm diameter and incubated in the laboratory at around 28°C and the various life history stages were carefully followed. The success rate of egg hatching, larval and pupal development was recorded. Young leaves of *M. koenigi* were supplied daily to the growing larvae and egg hatching time and feeding behavior of the newly hatched larvae were noted. Particulars of larval, pupal stages and the timing of adult emergence were also recorded. The numerical frequency of eggs, larva, pupa on 25 plants of *M. koenigi* was recorded thrice every month of the year. (Waldbauer, 1968). Five replications were maintained for each parameter and averaged. Plant species utilized by adult butterfly as nectar hosts, their flowering periods and corolla lengths were recorded during field trips.

**Life cycle of *Papilio polytes*****Adult:**

The male and female are morphologically distinct. Both are in black and tailed. The head was with white marking. The upper forewing was with terminal series of white spots decreasing in size towards the apex. In the male (Fig.02), a complete discal band of elongate white spots is present. Female exhibits polymorphism and there are three forms on record in India: these include *Papiliopolytes* form *stichius*, *P. polytes* form *cyrus* and *P. polytes* form *Romulus* (Winter Bylth, 1957). Only the former was distributed in this part of the globe. It was larger than male and it mimics *Pachlioptaaristolochiae* (Fig.02). The upper forewing marking is with Red Crescent and termen with red spots.

The adults are in flight throughout the year, with the population peaking in October. They forage on such plants as *Duranta repens* with violet flowers *Eupatorium triplinerve*, *prema latifolia*, *Clerodendron phlomidis* with white flowers, *antigonon leptopus* with pink flowers, *caesalpina coriaria* with yellow flowers and *Lantana camara* with orange flowers.

**Oviposition:**

The adult lays eggs on the leaves of cultivated Citrus species, like *C. limon*, *C. aurantium*, *C. reticulata* and also on *Murraya koenigi* belonging to the family Rutaceae. The same has also been reported by Winter Blyth (1957). The eggs are laid singly on either upper or lower surface of young leaves mostly exposed to sunlight. A female can lay 8-12 eggs at a time, with one or two eggs on a leaf. (Fig. 04)

**Egg:**

Eggs are spherical, smooth, cream-colored and measure 1.8 to 2.1 mm (2.0 mm ± 0.12) wide and 0.9 to 1.2 mm (1 mm ± 0.1). An egg hatches three days after laying. Its color becomes dull just before hatching. (Fig. 02 & 03)

**Larva:** (Fig. 02 & 03)

**First Instar:** This instar completes for 2 – 3 days. On the first day, the larva was 1.8 to 2.1 mm ( $2.0 \text{ mm} \pm 0.11$ ) long and by the second day it grows up to 4.8 to 5.8 mm ( $5 \text{ mm} \pm 0.55$ ). Head was round, brown, smooth and measures 0.5 to 0.7 mm ( $0.5 \text{ mm} \pm 0.07$ ) in diameter. The body was a pale brown. Tufts of setae are located at the thorax and also at an anal region. These setae disappear after the first molt.

**Second Instar:** This lasted for 3 to 4 days, grows up to 10 to 12 mm ( $10 \text{ mm} \pm 1.0$ ) in length; head measures 1.5 to 1.7 mm ( $1.5 \text{ mm} \pm 0.1$ ) in diameter. The body was rough, snuff-coloured with white marking at the abdomen and anal regions on a dorsal profile. The thorax becomes stout. On the lateral sides of both head and anal regions, 2 spines develop.

**Third instar:** This instar lasts for 3 to 4 days, grows up to 20 to 22 mm ( $20 \text{ mm} \pm 1.0$ ) in length and 3 to 5 mm ( $4 \text{ mm} \pm 1.0$ ) in width, with head 1.9 to 2.2 mm ( $2.0 \text{ mm} \pm 0.1$ ) in diameter. The body was rough, snuff-coloured with white marking on the dorsal profile of the abdomen and anal region.

**Fourth instar:** this stage also lasts for 3 to 4 days and grows up to 27 to 29 mm ( $27 \text{ mm} \pm 1.1$ ) in length and 5.5 to 6.5 mm ( $6 \text{ mm} \pm 0.4$ ) width, with head 2.6 to 3.6 mm ( $3 \text{ mm} \pm 0.3$ ) wide and 2.5 to 3.5 mm ( $3 \text{ mm} \pm 0.2$ ) long. The ventral profile of the body was brown and the dorsal profile was green with 2 brown and the dorsal profile was green with 2 brown horizontal bands on the thorax and 2 lateral brown bands and 2 brown spots below them on the abdomen, and a horizontal brown band at the anal region. Segmentation of the body was clear with 13 segments with 3 pairs of legs colored brown, 4 pairs of prolegs (abdomen) and 1 pair of claspers.

**Fifth instar:** Fully grown larva measures 40 to 42 mm ( $40 \text{ mm} \pm 1.2$ ) in length and 7 to 9 mm ( $8 \text{ mm} \pm 1.1$ ) in width; it lasts for 3 to 4 days. Head was 3 to 4 mm ( $3.5 \text{ mm} \pm 0.3$ ) wide and 3.5 to 4.5 mm ( $4 \text{ mm} \pm 0.5$ ) long. The body of the dorsal profile becomes dark green and much smooth. Bands and other characters are similar to 4<sup>th</sup> instar.

#### Pre- pupa:

The body of the larva shortens by contraction and measures 31 to 33 mm ( $32 \text{ mm} \pm 1.0$ ) in length, then it attaches to the substratum.

#### Pupa:(Fig. 02 & 03)

This stage lasts for 10 to 11 days. The pupa was 29 to 31 mm ( $30 \text{ mm} \pm 1.2$ ) long, 12 to 14 mm ( $13 \text{ mm} \pm 1.4$ ) wide at the pupa was V-Shaped. The posterior end was pointed, attached to the substratum. The dorsal side of the pupa was dome-shaped and the ventral surface was indented. The pupae may be dimorphic, the color being either snuff or green; the green color was rare (Fig. 02).

The time taken for the development from the egg stage to the adult was 28 to 34 days.

The first diet of the first instar was egg shell from which it becomes out. From the second day of its life. It feeds on the leaves on which it develops. It stops feeding at the end of fifth instars.



Fig. 02: Life cycle of *Papilio polytes* from Srilankamalleswara reserve forest and Kadapa

**Table 01: Particulars of different larval instars of *P. polytes***

Instar	Duration (Days)	Length (mm)	Head diam.	Body colour
I	2-3	4.8-5.8	0.5 - 0.7	Pale brown
II	3-4	10-12	1.5 - 1.7	Snuff
III	3-4	20-22	1.9-2.2	Snuff
IV	3-4	27-29	2.6 - 3.6	Ventral brown Dorsal green
V	3-4	40-42	4-5	Dark green

**Table 02: Distribution of early stages of *P. polytes* on *Murraya koenigii***

Life cycle stage	Calendar months											
	J	F	M	A	M	J	J	A	S	O	N	D
Egg	5	4	8	4	8	7	11	26	9	3	4	9
Larvae	3	3	6	3	6	6	10	22	8	3	3	6
Pupae	3	1	4	2	5	5	6	19	6	2	3	5
Abundance	R	A	C	R	C	C	C	A	C	R	R	C

Note: A: Abundance, C: Common, R: Rare

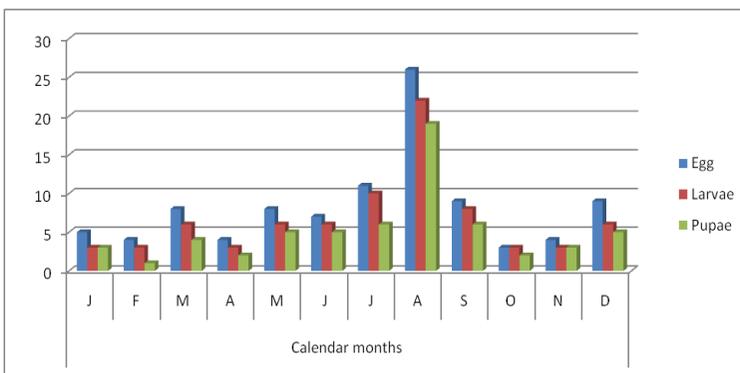


Fig. 03: Distribution of early stages of both *Papilio polytes* and *P. rumulus*

**OVIPOSITION PLANTS**



**NECTAR PLANTS**



**Fig. 04. Oviposition & Nectar Plants**

**ACKNOWLEDGMENTS:**

The first author P. Nagalakshmi greatly acknowledge to research supervisor Dr. S.P. Venkata Ramana for their support and encouragement.

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