

## **On the Biology of *Dinorhynchus dybowskyi* Jakovlev. ( Pentatomidae : Hemiptera), Predator on Indian Gypsy Moth *Lymantria obfuscata* Walk.**

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### **ABSTRACT**

*Dinorhynchus dybowskyi* Jakovlev is an aggressive arboreal predator on Gypsy moth *Lymantria obfuscata* walk, and other Lepidopterous larvae. Its life cycle was studied in the laboratory, having 0.96 – 1.3 mm long, subglobose, Pale yellowish green eggs. Eggs laid in masses our winter and hatch in late spring (May). There are five nymphal stages lasting 30-35 days. The egg to adult development lasts for 35 days. During the entire nymphal period, an average of 20 larvae of the pest are consumed. The percentage of predation on the pest ranged from 15 to 20% in the field. Adult appear in mid summer (July) in the field. The predator has an effective biological control potential over Gypsy moth in Kashmir. Sexual dimorphism is clear, the male genital segment is concave distally and appears as a dark hollow structure at the end of the abdomen. This feature is not present in females.

**Keywords:** *Dinorhynchus dybowskyi*, life cycle, egg, Nymph, adult.

### **INTRODUCTION**

The Indian Gypsy moth a medium sized robust hairy moth, has assumed considerable global importance in view of its destructive nature, defoliating forest and fruit trees, chatterjee 1974.

The important potential pest species of Gypsy moth (*Lymantria*) include *Lymantria dispar*, *L. mathura*, *L. monacha*, *L. fumida*, *L. nigra* and *L. obfuscata*. *Lymantria dispar* (L), a palaeartic species, has become widely distributed in temperate areas of Europe, South and Central Asia, North America, Japan, Schaefer, 1979 North Africa and Australia (Britton, 1935).

*Lymantria obfuscata* Walker 1965, a primary pest of forest plantations in the North-western Himalayan region has lately taken the status of a potential pest of fruit Orchards in Himachal and Kashmir (Zutshi, 1967, Shah, 1996).

Surveys of its natural enemies were initiated with a view to find out biological control of this serious pest in Kashmir Reshi, 1985. During the survey it has been

observed that *Dinorhynchus dybowskyi* Jakovlev preys upon the larvae of Gypsy moth particularly during the nymphal stages. It has therefore decided to have a detailed study of its biology of this natural predator of the Gypsy moth. The present paper deals with the detailed life cycle of *Dinorhynchus dybowskyi* Jakovlev.

## MATERIAL AND METHODS

The *Dinorhynchus dybowskyi* was recorded from different places of valley, especially from Mirgund, Narbal, Khansahib etc. The nymphs were collected from the field and kept in the Laboratory in small plastic containers covered by muslin cloth. Nymphs were given larvae of gypsy moth as food till the adult emerged. Eggs laid on willow leaves remained dormant during winter and hatched in late spring. As soon as they hatched, they were fed on sugar solution. A piece of cotton dipped in sugar solution was kept on the side of the container for a few days. As soon as the nymphs started movements, the Gypsy moth were provided as food.

## RESULTS

### Mating and Position

The mating occurred in mid summer (July). The females mated three times during the season. The adult mate within 35 minutes, when they come first in contact with each other. Prior to mating the male slowly approached the female vibrating its antennae at frequent intervals. The female remains stationary until the male approaches her. The female raised and lowered her abdomen in contact with the male. The male forced his way beneath the female and after introducing its aedeagus into the female. They turned about again so that in the final position they were in upright and end to end position.

The oviposition lasted 10-15 days during early August. The female oviposited on fresh and dead foliage of the trees.

### Egg

The egg measured 0.96 - 1.33 mm in length and 0.85 - 0.86 mm in width, being subglobose to oval in shape. They are characteristically coloured with a black spot and a ring on the operculate end and 3 some what slanted 'O' marks are positioned evenly around the sides of the egg. The tops of these 'O' marks are fused into a blackband which surrounds the upper sides of the egg. The eggs were glued along their sides to the other eggs and at the base of the leaf substrate. When freshly laid they were pale yellowish green in colour. Four days after egg laying they turned

deep yellow on 5<sup>th</sup> day became reddish in colour. The eggs over winter and hatch in May. All the eggs in one mass hatched within two hours.

## Nymph

There were five nymphal stages. They can be separated on the basis of head width or pronotal width. After eclosion, the nymphs remained quiescent on top of egg masses until their cuticle became sclerotized. Temperature plays a great role in the development of nymphs. They usually attack Gypsy moth larvae near the metathoracic legs or just above the prolegs.

The first instar nymph was 1.25mm to 1.5mm long and 0.95mm to 1.5mm wide. The nymphs were oval shaped, convex above and below, widest at 2<sup>nd</sup> and 3<sup>rd</sup> abdominal segments. The eyes were dark red, head sparsely clothed with setae. Antennae was 0.90mm long, four segmented, slightly lighter in colour than the head with whitish annuli at joints. The nymphs at this stage did not require any food except water. They were not observed to attack any larvae, except their brood mates. After a period of six days, they moulted into next instar.

The 2<sup>nd</sup> instar nymph was 2.5 to 2.65mm long, 2.0 to 2.10mm wide, being elongate oval to pyriform in shape, convex above and below, widest at 4<sup>th</sup> abdominal segment. The head was black in colour, antennae 1.40mm long, four segmented. These instars were carnivores and predated regularly on larvae and pupae of the host. The nymphs were unable to moult into next instar in absence of animal food. These nymphs were found on poplars, clustered together on axils of the horizontal branches. The nymphs approached with rostrum protruding forward and slipped the apical rostrum of the beak between adjacent setae and made contact directly with the integument. After 5 days it moulted into next instar.

The 3<sup>rd</sup> instar nymph measured 3.40 to 4.50mm in length and 2.4 to 3.2mm in width, had oval to pyriform shape, widest at 3<sup>rd</sup> abdominal segment. They had black head, margins incurvated and simulated anterior of eyes. They had a long antennae of four segments. The instars fed voraciously on the larvae of Gypsy moth and consumed 4-6 larvae during their development. After a period of five days, it moulted into the next instar larvae. The 4<sup>th</sup> instar nymph was 5 - 6.5mm long and 3.7 - 4.5 mm wide, had oval to pyriform shape. Antennae were 3 mm long, having four segments. The 3<sup>rd</sup> and 4<sup>th</sup> instar nymphs searched more actively and attacked more aggressively than the 5<sup>th</sup> instar nymphs and adults. They aggregated in shady areas of the tree trunks or under surface of the leaves. The penetration was rapid and when

insertion was complete, the predator could not be dislodged easily. The host was paralyzed within minutes but feeding some times took hours. During the development of the instar it consumed 5 to 10 Gypsy moth larvae. After 5 days it moulted into the next instar.

The 5<sup>th</sup> instar nymph measured 8.20 to 9.21mm in length and 9.5 – 5.6 mm in width, had elongate oval shape head and thoracic terga with white markings more extensive. Antennae were 4 mm long with four segments it fed voraciously on Gypsy moth larvae pupae. This was the last nymphal stage and it required 5 to 12 larvae and pupae for its development. After a period nine of days of it changed into the adult.

### Adult Emergence

After completion of five nymphal stages, which required a total of 30-35 days from first nymphal stage to the adult emergence, the young adults emerged in the

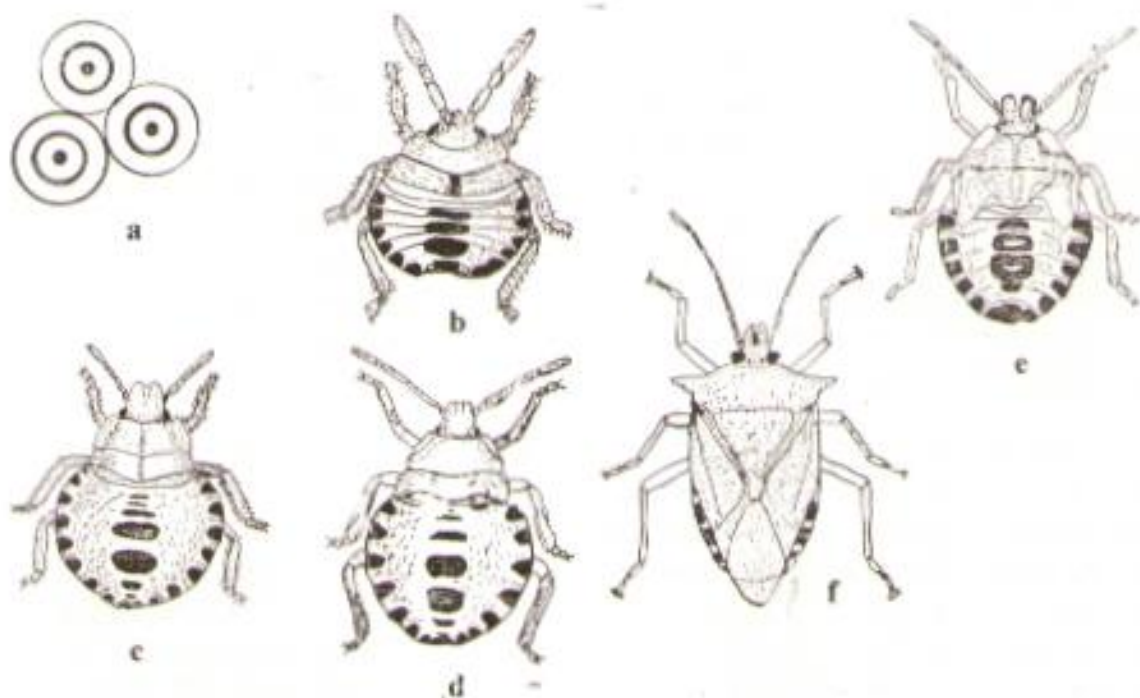


Fig.1. Developmental stages of *D. dybowskyi* from egg to adult.

field in mid-July. During the development of predator i.e. from egg to adult it required 20-35 Gypsy moth larvae and pupae.

### Parasitism

The percentage of predation was 15-25% in the field.

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