12. *LYMANTRIA OBFUSCATA*, WLK. AND ITS NATURAL ENEMIES IN KASHMIR

Lymantria obfuscata Walker (Lymantridae: Lepidoptera) was recorded from all parts of Kashmir in 1963 on Willows (*Salix* spp.), Poplars (*Populus* spp.) and very occasionally on Apple (*Pyrus malus* L.), Walnut (*Juglans regia* L.), Quince (*Cydonia vulgaris* Pers.) and False Acacia (*Pseud-acacia* L.). The infestation though insignificant, caused some slight damage to Willows.

Hibernating eggs of the previous season hatched on 8 April both in the laboratory and fields at a maximum temperature of 14° C. and 75% R. H. Hatching was synchronous with the appearance of first foliage and permanent rise in temperature. The pest was active from April to mid-July when it hibernated as egg. Larval and pupal periods occupy 40 to 45 days and 10 to 15 days respectively. Of the alternate food plants tried the caterpillars fed on leaves of Apple (*P. malus* L.), Peach (*Prunus persica* Stokes), Apricot (*Prunus armenia* L.) and Cherry (*Prunus cerasus* L.) in order of preference.

Natural Enemies

I. *Diseases*

10% of the caterpillars in field and 25% in the laboratory succumbed in May to diseases caused by the following, of which the last two are potential insect pathogens.

Bacillus sp. (non-crystal forming), *Alcaligens* sp., *Brevibactor* sp. and *Acromonos* sp.

Rain and cloudy weather persistent during that period propagated the infection which receded or even disappeared on the onset of warmer days. The symptoms of the infection are:

(i) Liquefication of body of the caterpillar; (ii) blackening of cuticle; (iii) characteristic foul smell; (iv) fluid oozing from body; (v) hanging of caterpillars by first and second pairs of prolegs and (vi) brittling of body.

II. *Predators*

(1) **Calosoma himalayanam** Gestro. (Carabidae: Coleoptera).

Adults and grubs were collected from Shivpore, Pazalpore, Narrabal and Nishat by first week of June on trees and under bark, trash, ceilings and soil near tree bases.

Life history and breeding: A wide mouthed 6 lb. glass jar filled with 4 inches of moist soil is ideal for breeding 1-2 pairs of beetles. The mouth is covered with brass wire-netting, in the centre of which is attached a 1″ wide wire-gauze touching the soil. This facilitates climbing of the beetles in search of hosts that rest on top. Females immediately after copulation lay eggs in lower strata of soil at the rate of

10-15 per day averaging a total of 60. Eggs are creamy white, shining, oval with slight depression on one side. They are removed daily and placed in a separate vial, two-thirds filled with moist soil. On hatching the grubs are fed on the host caterpillars. A full grown grub measures 35-40 mm. in length; black on dorsal side and white on ventral side. There are also red patches on the ventral side. The egg, larval and pupal periods vary from 3-6, 32-36 and 10-15 days respectively. Pupae are transferred to a jar containing moist soil till the emergence of adults. A single grub consumes 30-35 caterpillars and/or pupae by feeding on their body fluids and contents. An adult beetle is 25-30 mm. long, 10-15 mm. broad and shining metallic blue. The elytra are ridged and bear minute circular depressions in rows.

(2) **Carabid Beetle** (unidentified)

Smaller in size, blacker and dull in colour in comparison to *C. himalayanam*. Collected from Shivpore and Pahalgam. The beetle was bred in the laboratory as described under *C. himalayanam*. Life history not studied.

III. *Parasites*

(a) Larval parasites

Drino inconspicuoides Bar. (Tachanidae: Diptera). Caused 40-50% mortality of the pest caterpillars in fields during June. It was recovered from the material collected from Parimpore, Shalteng, Narrabal, Shivpore, Pantachuk, Zewan, Athwajan and Pazalpore.

Life history and breeding: Adults readily mate in a cage (1′×1′×1′) having three sides and top of muslin, a sliding glass front and wooden bottom which is covered with a wet sponge. A sleeve is also attached to one side, especially when there is bright sunlight and the males are older than females. Males are usually darker in colour and bear less hairs at the tip of the abdomen. Mating lasts from 15 minutes to 4 hours. Mated females are introduced in a similar but smaller cage (4.5″×4.5″×3.2″) for completion of gestation period (about 2 days). Later they are transferred to 3″×1″ vials for ovipositing on the host caterpillars of 3-4 instars which are preferred. It was observed that active movements of the caterpillar stimulate the fly to oviposit. Under laboratory conditions unlimited eggs are invariably laid on the host but for best results not more than 3 eggs should be allowed on a single individual. The parasitised caterpillars are fed on host leaves in a jar till they pupate. The puparia are kept in an emergence box for emergence of adults. The egg, larval and pupal periods are 2-3, 10-12 and 7-10 days respectively.

The fly has a life span of about 20 days. A single female has a capacity of laying 40-60 eggs. 50-80% parasitism was obtained in the laboratory.

(3) **Exorista rossica** Mesnil (Tachanidae: Diptera)

Active from June to mid-July. Recovered from caterpillars collected at places mentioned for *Drino*. On dissection each mated female was observed to have on an average 100 eggs.

(4) **Sarcophaga** sp. (Tachanidae : Diptera)

Recovered from material collected at Parimpore, Pantachuk, Zewan and Athwajan. Parasitism in fields, negligible.

(5) **Apanteles porthetriae** Mues. (Braconidae : Hymenoptera)

Parasite cocoons collected from Pantachuk, Parimpore, Shalteng and Zanakoot from May to June. The usual site of cocoons is in crevices or under bark and very rarely on leaves. Parasitism in fields, negligible.

(6) **Apanteles** sp. near **solitarius** Ratz. (Braconidae : Hymenoptera)

Same as in the case of *A. porthetriae*.

(*b*) **Pupal Parasites**

(1) **Sarcophaga** sp. (Tachanidae : Diptera) was recovered from 10 to 15 per cent of the pupae collected from different parts of the valley.

(2) **Theronia** sp. or spp. (Ichneumonidae : Hymenoptera)

10 to 20 per cent of the pupae collected from Parimpore, Shalteng, Zanakoot, Pantachuk and Zewan were parasitised by *Theronia*.

(3) **Pimpla** sp. (Ichneumonidae : Hymenoptera)

Recovered from pupae collected from places as in the case of *Theronia* up to the extent of 10 per cent.

(4) **Brachymeria euploeae** Westw. (Chalcididae : Hymenoptera)

Percentage of parasitism in field, 10 to 15. Appeared in fields from mid-June.

(5) **Brachymeria** sp. (Chalcididae : Hymenoptera)

Active from late June. Parasitism negligible.

(*c*) Egg Parasites

(1) **Anastatus** sp. (?) **kashmirensis** Mathur (Eupelmidae : Hymenoptera)

(2) **Anastatus** sp. (Eupelmidae : Hymenoptera)

(*d*) Hyperparasites.

A large number of them (unidentified) were reared from puparia of ***E. rossica***.

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13. A RECORD OF *DELIAS SANACA PERSPICUA* FRUHSTORFER (LEPIDOPTERA : PIERIDAE) FROM INDIA

Fruhstorfer (1910) described *Delias sanaca perspicua* from females collected in Upper Burma. Subsequently the male was also described from the same locality by Jordan (1925), Evans (1932), and Talbot (1937, 1939). It has not so far been recorded elsewhere and its occurrence in NEFA is, therefore, of interest.

The Indian specimens do not exhibit any marked variations from those from Burma.

Material examined, 6 examples as follows : NEFA, Kameng, Dirang Dzong (1830 m.), 14 . x . 1961 (4 exs.); Jumla Pass (2848 m.), 17 . ix . 1961 (1 ex.); Dirang Dzong (1601 m.), 19 . vii . 1961 (1 ex.) (all S. Biswas Coll.).

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ZOOLOGICAL SURVEY OF INDIA,
CALCUTTA.

D. K. MANDAL
H. C. GHOSH

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