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Studies with a Virus Disease of Red Hairy Caterpillar *Amsacta albistriga W.*

By

R. JEBAMONI RABINDRA and T. R. SUBRAMANIAM

ABSTRACT

Histopathology of nuclear polyhedrosis was studied in fourth instar larvae of *Amsacta albistriga* inoculated with 10^4 polyhedra/larva. Adipose tissue and blood cells were the chief sites of infection. Slight to moderate infection of hypodermis, muscle fibre, nerve tissue, foreget. oesophageal valve, testicular epithelium and connective tissues surrounding the mid gut was also noticed, Tracheal matrix was not susceptible which was a peculiar feature.

INTRODUCTION

The nuclear polyhedrosis virus of red hairy caterpillar was reported for the first time by Jacob and Subramaniam (1972). This virus is highly virulent for the red hairy caterpillars and offers promise in the control of this insect species. In an earlier communication, susceptibility and pathology of nuclear polyhedrosis on red hairy caterpillar was reported by Jebamoni. Rabindra and Subramaniam (1974). The histopathology of the nuclear polyhedrosis of the red hairy caterpillar was studied with the light microscope and the observations are presented in this paper.

MATERIALS AND METHODS

The test larvae were reared on castor leaves. Fourth instar caterpillars of uniform size and age were inoculated with a dose of 10^4 polyhedra/larva by making them to feed on exposed leaf areas containing the virus inoculum. Following inoculation, the caterpillars were removed to virus free foliage. Three catetpillars were selected at random from each treated and control groups at 24 hr interval upto 168 hr and were killed in hot (50 - 60°C) alcoholic Bouin's fixative (Dubosque Brazil) and allowed to soak for about 10 minutes (Drake and McEwen, 1959). The caterpillars were cut transverely into three portions, transferred to cool alcoholic Bouin's fluid and fixed for 24 to 48 hr. The specimens were then dehydrated in Ethanol-Butanol series, infiltrated with paraffin for two to three days and embedded in paraffin according to standard procedures. Sections 4-6μ were stained by a modified azan staining technique after Hamm (1966).

RESULTS AND DISCUSSION:

Pathological changes were discernible only at 72 hr post inoculation.

1. Instructor, 2. Professor & Head, Department of Entomology, Tamil Nadu Agricultural University, Coimbatore-641003.

Adipose tissue was the first to show signs of infection. The pathological changes of various tissues in the course of virus infection are described below.

Fat Body : The fat body was the chief site of infection in the nuclear polyhedrosis of *A. albistriga*. Initial infection could be observed 72 hr after ingestion of virus. The nuclei had slightly swollen and the tissue was lobulated. By 96 hr post inoculation there was spectacular hypertrophy of infected nuclei. Changes in diameter of healthy and infected nuclei of the adipose tissue are presented in Table 1.

TABLE 1. Effect of virus infection on the nuclei of tissue of larvae

Post inoculation period in hours	Mean diameter in $\mu \pm$ S. E.	
	Healthy	Diseased
24	6.64 ± 0.26	6.90 ± 0.24
48	8.95 ± 0.27	9.20 ± 0.26
72	9.24 ± 0.26	11.54 ± 0.22
96	9.15 ± 0.25	23.50 ± 0.29
120	9.06 ± 0.36	28.33 ± 0.31
144	11.50 ± 0.21	30.68 ± 0.31
168	10.76 ± 0.25	52.94 ± 0.01

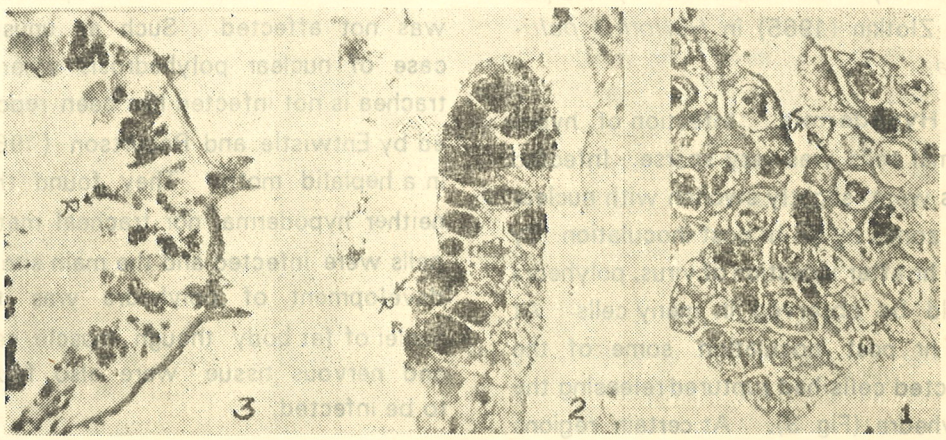

Fig. 1. Section of NPV infected fat body of *A. albistriga* 96 hr after inoculation showing the hypertrophied nuclei with virogenic stroma (Vs) and grannules (G) 625 X

Fig. 2. Section of NPV infected fat body of *A. albistriga* 144 hr after inoculation. Note rupture of nuclei (R). 625 X

Fig. 3. Section of NPV infected hypodermis of *A. albistria* 168 hr after inoculation showing rupture of nuclei (R). 232 X

In the hypertrophied nuclei, the chromatin had condensed to a central mass and the nuclear ring zone (Xeros, 1956) could be very clearly observed. In some nuclei, the early stages of formation of polyhedra as dark granules could be seen (Fig. 1). At 144 hr after ingestion of virus the infection was almost complete and the size of nuclei increased markedly as evidenced by diameter measurement. Several nuclei had ruptured liberating the polyhedra (Fig. 2). Even at advanced stage of infection i.e 168 hr post inoculation, certain patches of uninfected adipose tissue could be observed. Such lack of uniformity was observed by Harpaz and Zlotkin (1965) in *Heliothis peltigera*.

Hypodermis : Infection of hypodermal cells was very sparse. Infected cells were slightly swollen with nuclear ring zones by 96 hr post inoculation. By 120 hr after ingestion of virus, polyhedra could be observed in many cells. At 168 hr post inoculation some of the infected cells had ruptured releasing the polyhedra (Fig. 3). At certain regions where infection was noted, the hypodermis was found to be retracted from the cuticle. Similar observations were made by Morris (1962) in the western oak looper and Jacob (1972) in *S. litura*.

Other tissues The haemocytes were found to be completely infected and the haemolymph turned milky white as the disease progressed. Other tissues found to be infected by the virus were muscle tissue, ganglia and brain, foregut, oesophageal valve, connective tissues around the mid gut and testicular epithelium.

The usual tissues susceptible to the nuclear polyhedrosis virus may be ectodermal like hypodermis and tracheal epithelium and mesodermal like the fat, muscles, nerve sheath etc., as reviewed by Aizawa (1963) and Smith (1967). In the present investigation on nuclear polyhedrosis of *A. albistriga*, a peculiar exception was observed, when the tracheal epithelium was not affected. Such an unusual case of nuclear polyhedrosis wherein trachea is not infected has been reported by Entwistle and Robertson (1968) in a hepialid moth. They found that neither hypodermal nor tracheal matrix cells were infected and the main site of development of polyhedra was the nuclei of fat body though muscle cells and nervous tissue were also found to be infected.

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