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HISTOPATHOLOGY OF TOBACCO CATERPILLAR SPODOPTERA LITURA F.. INFECTED WITH A NUCLEAR POLYHEDROSIS VIRUS*

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An infectious disease of the larvae of *Prodenia litura* was reported by Dudgeon as early as in 1913 from Egypt. This was subsequently identified as a typical nuclear polyhedrosis by Abul-Nasr (1954, 1956). Bergold and Flaschentrager (1957) isolated the polyhedra and virions from diseased larvae collected from Sudan and named the virus as *Borrelina litura.* Ramakrishnan and Tiwari (1969) reported for the first time the incidence of this disease on P. *litura* from Delhi. Jacob and Subramaniam (1972) observed the occurrence of a nuclear polyhedrosis on laboratory and field populations of the larvae of *Spodoptera litura* at Coimbatore. The present paper describes the results of histopathological investigations on the nuclear polyhedrosis of $ *litura* F.

Materials and Methods

The caterpillars used in the present experiments were obtained from a laboratory stock reared on castor *(Ricinus comm'mis* L.) foliage. Early fourth instar larvae were inoculated with 10 polyhedra each by a spot feeding technique. All larvae were reared singly in small plastic containers. At 24 hour intervals up to 120 hour after the treatment, 3 larvae each were selected at random from the inoculated and control groups for histological preparation. The larvae were killed in hot alcoholic Bouin's solution and allowed to soak there for 10 minutes. The smaller specimens were cut into two and the larger ones into three and transferred to alcoholic Bouin's fluid at room temperature for 24 hour. The fixed specimens were dehydrated in an ethyl alcoholbutanol series and imbedded in paraffin according to standard procedures. Transverse and longitudinal sections were cut at 4 to 6u. The sections were stained by an Azan staining technique developed by Hamm (1966). The changes in thickness of The hypodermis and size of fat cell nuclei were deiermined daily from the corresponding slides. Measurements were taken at 50 different regions of the hypodermis and of 50 fat cell nuclei both selected at random.

Results

At 24 hour post-inoculation no signs of infection were visible in any of the tissues under the light microscope. In larvae fixed 48 hour after inoculation nuclei of

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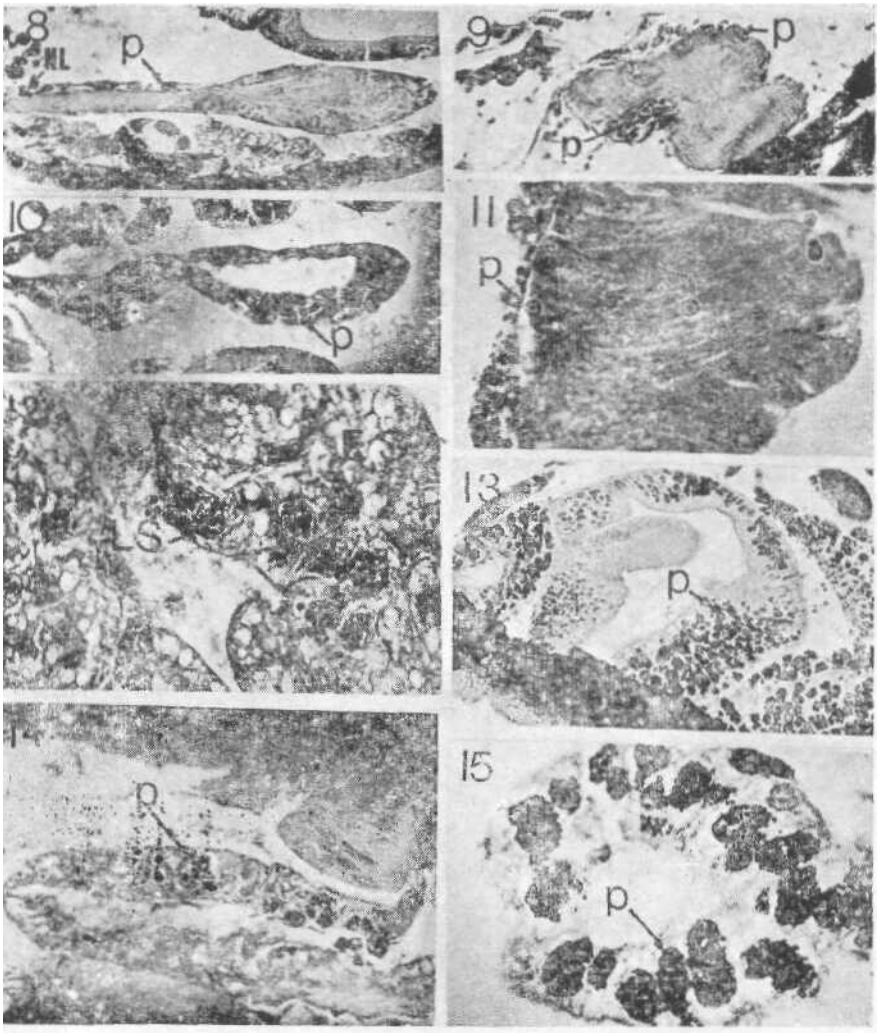
Post inoculation period in hour	Average thickness in μ ± S. E. Healthy	Infected
24	11 ± 0.99	13 ± 0.69
48	20 ± 1.61	34 ± 1.27
72	16 ± 5.38	96 ± 4.17
96	17 ± 1.29	121 ± 3.82
120	16 ± 1.07	121 ± 3.82

Post inoculation period in hour	Mean diameter in μ ± S. E	
	Healthy	Infected
24	8.7 ± 0.47	8.5 ± 0.42
48	8.0 ± 0.40	10.7 ± 0.41
72	10.5 ± 0.39	15.6 ± 0.44
96	10.1 ± 0.58	20.2 ± 1.99
120	10.0 ± 0.28	22.9 ± 1.18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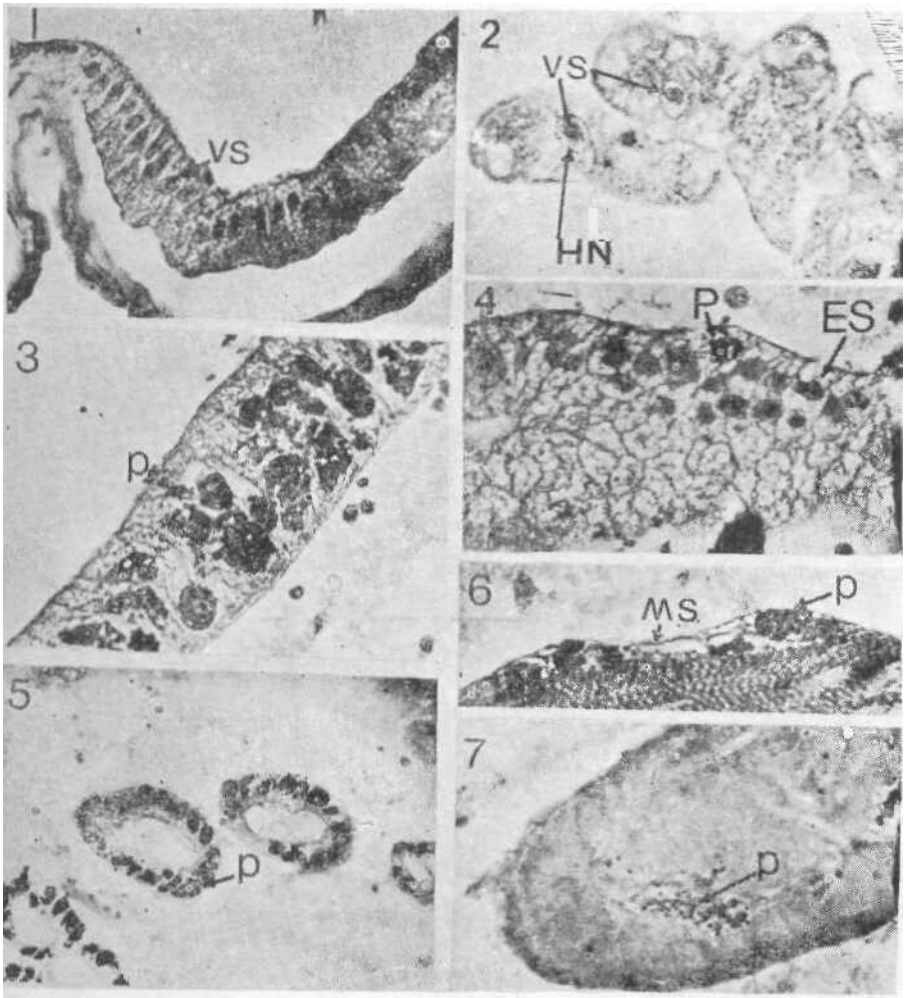
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The progress of pathogenesis was more rapid in tracheal matrix and hypodermis than in the fat body. There was considerable variability in the degree of infection of adjacent fat cells and lobes. A similar observation was made by Hunter and Hall (1968) in *Spodoptera exieua* infected with a nucleopolyhedrosis virus. As suggested by these authors the infective agent wither invades susceptible tissue at random or that cells of the trachea and hypodermis have inherent properties which enable the infection process to progress at a faster rate. In the present studies no infection of hindgut, Malpighian tubes, gonads or pericardial ceils were observed, though infection of these tissues have been reported in the closely related species S. *mauritia* (Tanada, 1969) and S *frugiperda* (Hamm, 1968). This may be due to the difference either in the nature of the infective virus, nature of host species or both. It is also important to consider the effects of age and stage of the host at the time of infection and the amount of inoculum.

Summary

Histopathology of a nuclear polyhedrosis of the tobacco caterpillar, *Spodoptera litura F.,* is described. Initial signs of infection were observed in the hypodermis and fat body 48 hour after inoculation. Polyhedra were visible in most of the susceptible tissues 72 hour post-inoculation. Hypodermis, tracheal matrix, fat body and blood cells were the major tissues infected. Polyhedra were also observed in the muscle cells, brain, nerve ganglia, neurilemma of nerves, connective tissues surrounding the midgut, silk glands, wing buds and foregut The hypodermis showed an abnormal thickening. The progress of pathogenesis was more rapid in the tracheal matrix and hypodermis than in the fat body. Considerable variability occurred in the degree of infection in adjacent fat cells and lobes.

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