ALLANTOIN IN THE HAEMOLYMPH AND FAT BODY OF THE DEVELOPING LARVA OF THE MOTH, *SPODOPTERA MAURITIA* BOISDUVAL

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ALLANTOIN content of the haemolymph has been reported only in *Papilia japonica* and *Dysdercus fasciatus* while its fat body level has not been investigated despite its excretion by many insects and the unique feature of alantoinotelic excretion of certain species of this class[1]. In the larval excreta of *Spodoptera mauritia*, allantoin was a minor nitrogenous constituent and the changes in its excretion suggested its endogenous origin in the larva[2]. These changes in the excretion of allantoin may probably be a reflection of its changes in the larval haemolymph and fat body, an account of which is presented in this communication.

Haemolymph and fat body were collected from chronologically comparable final instar larvae of *S. mauritia* at 24 h intervals from the time it completed moulting to the time it became pupa. Allantoin in the tissues was determined according to Donellan and Kilby[3].

The changes in the allantoin content of the haemolymph and fat body during the development of the larva are presented in table 1. The changes in the titre of allantoin per unit volume and total volume of haemolymph showed a marked difference. Similarly the changes in the titre of allantoin in the fat body per unit tissue and total tissue exhibited a difference in magnitude. These changes were in accordance with the changes in the volume/weight of the haemolymph/fat body during the development of the larva. The results point to the synthesis and retention of allantoin in the early stages of the larval development while the larva eliminated most of the material from the haemolymph towards pupation. The removal of the material from the haemolymph may be partly due to the excretion and the storage in the fat body. The latter was evident from the results on the changes in the titre of allantoin in the fat body during the development of the larva. Accordingly the changes in the titre of allantoin per unit weight of the fat body indicate that there is an accumulation of the material in the later stages of larval development. The titre of allantoin per total fat body of the larva exhibits an appropriate inverse correlation with that of the haemolymph.

The present results suggest that uricolysis occurs in the larva of *S. mauritia*. But the co-existence of uric acid storage[2] and uricolysis requires further investigation. It is particularly interesting to note that maximum retention of allantoin occurs at the later stages of development where the larva undergoes a condition of water stress. The degradation of uric acid even at minimal quantities may act as a balancing mechanism in the maintenance of its internal environment.

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Table 1 *Allantoin content of the haemolymph and fat body*

Larval phases (h)	Haemolymph		Fat body	
	µg/ml	µg/total tissue	µg/g fresh tissue	µg/g total tissue
0	143.40 ± 15.97	6.19 ± 0.69	1070.26 ± 234.18	16.01 ± 3.50
24	132.60 ± 16.17	9.03 ± 1.10	980.67 ± 235.53	13.26 ± 3.18
48	74.62 ± 6.32	7.82 ± 0.66	789.94 ± 114.42	26.57 ± 3.85
72	27.04 ± 4.74	3.44 ± 0.60	946.01 ± 247.10	37.54 ± 9.81
96	17.23 ± 3.16	1.25 ± 0.23	1331.12 ± 240.17	53.62 ± 9.68
120	11.86 ± 2.37	0.33 ± 0.07	1989.95 ± 394.94	83.89 ± 16.65

1. Cochran, D. G., In: *Insect biochemistry and function*, (eds) D. J. Candy and B. A. Kilby, Chapman and Hall, London, 1975, p. 177.
2. Lazar, K. V., Ph.D. thesis, University of Calicut, Calicut, 1983.
3. Donellan, J. F. and Kilby, B. A., *Comp. Biochem. Physiol.*, 1967, **22**, 235.

OCCURRENCE OF TWO ENTOMOFUNGAL-PATHOGENS, *METARHIZIUM ANISOPLIAE* (METSCHINIKOFF) SOROKIN VAR. *MINOR* TULLOCH AND *NOMURAEA RILEYI* (FARLOW) SAMSON, ON *HELIOTHIS ARMIGERA* HUBNER (NOCTUIDAE: LEPIDOPTERA)

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Heliothis armigera, commonly known as gram caterpillar, is an important polyphagous pest causing serious damage to food and fibre crops. During our field survey on tomato at this Institute, a fungal infected dead grown-up caterpillar of *H. armigera* was collected. The diseased caterpillar was slightly bent and found clinging on to the leaf. It was brought to the laboratory and kept on a moist filter paper in a petri dish for fungal growth and sporulation. Initially, the fungal growth was noticed on the intersegmental region of the body and later the entire body surface was covered with pure white mycelial growth. At the final phase of the growth, the diseased-caterpillar was characterized by dark green fungal spores ramifying the entire body surface of the insect, as compared to healthy larvae which varied in colour depending upon their growth.

The fungus was isolated on sabouraud dextrose agar medium where it grew well at 25–28°C by producing vigorous growth of the pure white mycelium. Profuse sporulation was noticed on the fifth day after inoculation leaving a dark green coloration on the surface of the medium.

Pathogenicity test was conducted by spraying the aqueous spore suspension of the fungus (1.8×10^9 spores/ml) against all the five different instars of *H. armigera*. It is evident from the results (table 1) that the fungus was highly virulent inflicting 100% mortality to all the instars except in the case of fifth instar where the mortality was 80%, with an incubation period ranging from 2 to 5 days. The infected caterpillars were slugglish and ceased to feed on the third day after inoculation. The body became slightly bent, tough and mummified on the fifth day. Initial growth of the fungus was noticed on the seventh day and on the eighth day the whole body was covered with tuft of pure white mycelial growth with green spores covering the entire body of the caterpillar (figure 1). The fungus was reisolated from such infected caterpillars satisfying the well-known Koch's postulates.

Table 1 *Effect of Metarhizium anisopliae var. minor on Heliothis armigera*

Instars	% Mortality			Incubation period (days)
	WOF	WF	Total	
I	85	15	100	2–7
II	25	75	100	4–6
III	35	65	100	4–9
IV	55	45	100	6–8
V	55	25	80	5–10

WOF–Without fungal growth; WF–With fungal growth.

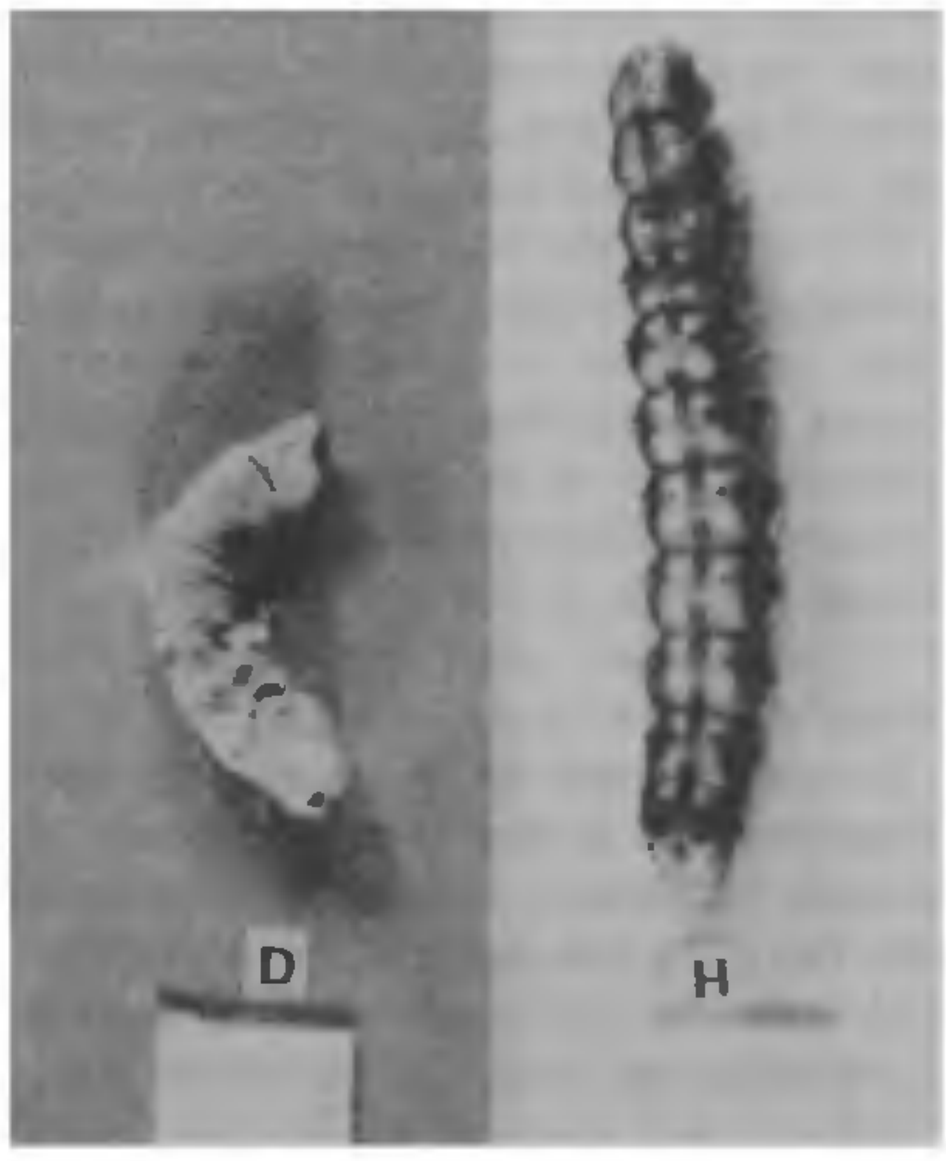

Figure 1. Effect of *M. anisopliae* var. *minor* on *H. armigera* [H: Health; D: Diseased. Note the characteristic mummification of the larva].