

## Incidence of Microsporidiosis in Field Population of the Armyworm, *Pseudaletia unipuncta* (Haworth)<sup>1</sup>

Y. TANADA

DIVISION OF INVERTEBRATE PATHOLOGY, UNIVERSITY OF CALIFORNIA,  
BERKELEY, CALIFORNIA

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### INTRODUCTION

Although the armyworm, *Pseudaletia unipuncta* (Haworth), has been studied and utilized extensively in research by numerous workers, no protozoan disease was reported from it until 1961 (Tanada and Chang, 1962) when a microsporidian<sup>2</sup> was observed in a field population of the armyworm on the Kahua Ranch, Kohala, Hawaii. Over 50 percent of the 110 larval specimens collected in the fall of 1961 were infected with the microsporidian.

In the fall of 1962, another opportunity became available to investigate the incidence of diseases among the armyworm field populations in Hawaii. The primary purpose of the observation was to determine the persistence and spread of the microsporidian. In 1962, as in the previous year, a severe drought condition existed in the cattle raising area of Kamuela and Kohala. According to Mr. M. Richards, manager of Kahua Ranch, only 19 inches of rain, about one-half of normal, had fallen on the ranch up to the time of this investigation, and most of the rangeland was dry except for a few areas around the watering troughs scattered throughout the range.

The evaluation of the armyworm population was made at the observation stations A, B, C, and D established in a previous year (Tanada, 1961). Small groups of armyworms were found only at station A (where the armyworm larvae with microsporidiosis had been first collected in 1961) and at an adjacent area (station A-1) across the highway about 200 yards away. In all, 165 larvae (fourth instar and older) were collected individually in sterilized vials, and examined the following week at the Entomology Department of the University of Hawaii.<sup>3</sup> Some of the specimens were further examined at the University of California, Berkeley, with the electron microscope to establish the presence of virus infections.

<sup>1</sup> This investigation was supported, in part, by a research grant from the National Science Foundation.

<sup>2</sup> Subsequent to the publication of the first report, the preliminary study of the life cycle of the microsporidian has indicated that there may be a mixture of two species involved in the armyworm infection because of the presence of two types of sporoblasts, one giving rise to single spores (*Nosema* spp.) and the other to eight spores (*Thelohania* spp.). This aspect is still under investigation.

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## RESULTS AND CONCLUSIONS

The results of the examination of the larval specimens are presented in table 1. Most of the specimens were attacked by the microsporidian and insect parasites. Of the insect parasites, only a tachinid and the hymenopterous parasite, *Meteorus laphygmae* Viereck, were definitely identified because the host larvae were usually killed and dissected prior to the emergence of the insect parasites.

Table 1. Incidence of Infection and Parasitization by Microsporidian and Insect Parasites in *Pseudaletia unipuncta* Larvae, Kahua Ranch, Kohala, Hawaii.

Locality	Number of Larvae	Larvae Attacked by					
		Microsporidian		Microsporidian and insect parasites		Insect Parasites	
		Number	Percent	Number	Percent	Number	Percent
Station A	109	37	33.9	4	3.7	11	10.1
Station A-1	55	1	1.8	0	0	20	36.4
Station B	1	0	0	0	0	0	0
Total	165	38	23.0	4	2.4	31	18.8

In station A, 33.9 percent of the armyworm larvae were infected with the microsporidian, 10.0 percent by insect parasites, and 3.7 percent by both microsporidian and insect parasites. In the adjacent station A-1, 1.8 percent of the armyworm larvae were infected by the microsporidian and 36.4 percent by insect parasites. For the entire collection, 23 percent of the larvae were infected with microsporidian and 18.9 percent with both the microsporidian and parasites. One larval specimen was found infected with the nuclear-polyhedrosis virus.

Although the armyworm population on this ranch had been studied during 1955, 1958, 1959, and 1960, when over 2,000 specimens were examined, the microsporidiosis in the armyworm was observed for the first time only in 1961. From the present observation, it is probable that the microsporidian may develop into an important factor in the regulation of the armyworm population at Kahua Ranch. The presence of the microsporidian and insect parasites in the same host individual indicates a mutual compatibility between pathogen and parasite in controlling the armyworm. The disease, however, has not spread extensively from the location where it was observed for the first time in the previous year. This may be associated with the drought and the scarcity of the armyworm during this period of the year. It would be of interest to investigate the progress and spread of the disease throughout the ranch, especially during the spring and early summer when there is usually a high armyworm population on the Hawaiian ranch.

## LITERATURE CITED

- TANADA, Y. 1961. The epizootiology of virus diseases in field populations of the armyworm, *Pseudaletia unipuncta* (Haworth). JOUR. INSECT PATHOL. 3(3):310-323.  
 TANADA, Y. and CHANG, G. Y. 1962. An epizootic resulting from a microsporidian and two virus infections in the armyworm, *Pseudaletia unipuncta* (Haworth). JOUR. INSECT PATHOL. 4(1):129-131.