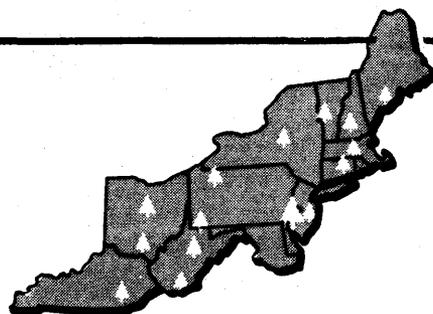


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## EFFECT OF NUCLEOPOLYHEDROSIS VIRUS ON TWO AVIAN PREDATORS OF THE GYPSY MOTH<sup>1</sup>

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**ABSTRACT.** The nucleopolyhedrosis virus (NPV) of the gypsy moth was fed to black-capped chickadees and house sparrows in the form of NPV-infected gypsy moth larvae. Body weight and results of histological examination of organs of treated and control birds indicated that NPV had no apparent short term effect on these two important predators of the gypsy moth.

**Keywords:** biological control, gypsy moth, nucleopolyhedrosis virus.

The nucleopolyhedrosis virus (NPV) of the gypsy moth (*Lymantria dispar* L.) is being developed by the U.S. Department of Agriculture as a biological control agent. After an aerial application of NPV, many avian predators of the gypsy moth are likely to ingest infected larvae, pupae, and adults. Studies have indicated that some insect viruses do not harm birds (Ignoffo 1975), but the effects of gypsy moth NPV have not been determined. This paper reports the effects of NPV on the black-capped chickadee (*Parus atricapillus* L.), and the house sparrow (*Passer domesticus* L.). These species were chosen because of their importance as gypsy moth predators,<sup>2</sup> ease of capture, and adaptability to caged conditions.

### Methods

In September 1975, six black-capped chickadees and nine house sparrows were captured in mist

nets (ATX mesh) and in box traps that had been placed in wooded areas of Bethany, Connecticut. The birds were transported to the laboratory and caged individually in 0.9-m<sup>3</sup> wooden enclosures that were fitted with wire-mesh tops and fronts. The bottom of each enclosure was lined with paper, which was changed daily to maintain sanitary conditions. The birds were fed wild bird seed, sunflower seeds, healthy gypsy moth larvae, and mealworms. Water was provided through a standard J-tube. After a 3-day adjustment period, the birds were weighed and placed in treated or control groups. Treated birds included three chickadees and five sparrows; three chickadees and four sparrows served as controls.

On day 1 and on alternate days for 3 weeks, treated birds were fed NPV-infected 4th-instar gypsy moth larvae rather than the normal diet. Infected larvae were produced by allowing 3rd-instar larvae to feed on a diet containing  $1.0 \times 10^6$  polyhedral inclusion bodies (PIB) of the gypsy moth NPV per ml. These larvae were in their 8th day of infection when fed to the treated birds; each larva contained from  $3.3 \times 10^7$  to  $2.1 \times 10^8$  PIB. During the test period, each treated

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<sup>2</sup>Galipeau, P.R. 1974. Avian Predators of the gypsy moth. Unpublished report. Forest Insect and Disease Laboratory, Hamden, Conn.

chickadee ate 70 to 80 infected larvae ( $2.3 \times 10^9$  to  $1.7 \times 10^{10}$  PIB), while each treated sparrow ate 90 to 100 infected larvae ( $3.0 \times 10^9$  to  $2.1 \times 10^{10}$  PIB).

Control animals were fed a normal diet throughout the test period. All birds were observed daily for mortality or signs of disease.

On day 22, birds were weighed and then delivered to the Department of Pathobiology at the University of Connecticut, Storrs, for necropsy and histopathological examination. After necropsy, the following organs were fixed in 10-percent neutral formalin: brain, lung, heart, kidney, liver, spleen, gizzard, pancreas, and intestine. Organs were embedded in paraffin, processed routinely, sectioned at 5 to 7  $\mu\text{m}$ , stained with hematoxylin and eosin, and examined by light microscopy.

## Results and Discussion

All birds adjusted to captivity, and neither treated nor control birds displayed signs of disease during the test period. The weight of treated and control birds is shown in Table 1. Most of the birds lost weight, as might be expected when they were caged, but only one treated chickadee lost a significant amount (28 percent). Also, t-tests to compare means revealed no significant changes in weight in treated or control birds.

Necropsy and histological examination revealed

no lesions of disease in chickadees. Examination of sparrows revealed foci of lymphoid cells in the livers and lungs of both treated and control birds. However these lesions are common to these species, so their presence was not considered important. We found severe lesions only in one study bird—there was evidence of diffuse infiltration by lymphocytes in the liver of a control sparrow.

The results of this study, though limited by the small number of birds available, indicate that eating NPV-infected gypsy moth larvae has no apparent short term effect on black-capped chickadees or house sparrows.

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**Table 1.—Weight comparisons for treated and control black-capped chickadees and house sparrows, in grams.**

Treatment group	Bird no.	Weight		
		Before treatment	After treatment	Percent change
<i>Black-capped chickadees</i>				
Treated . . . . .	1	16.9	12.2	- 27.8
	2	10.5	10.0	- 4.8
	3	11.0	11.0	.0
Mean and SD		12.8 $\pm$ 3.6	11.1 $\pm$ 1.1	—
Control . . . . .	1	10.0	9.6	- 4.0
	2	11.3	11.8	+ 4.4
	3	11.2	10.6	- 5.4
Mean and SD		10.8 $\pm$ 0.7	10.7 $\pm$ 1.1	—
<i>House sparrows</i>				
Treated . . . . .	1	29.8	28.0	- 6.0
	2	29.0	26.7	- 7.9
	3	25.8	25.9	.0
	4	24.8	22.7	- 8.5
	5	23.5	22.7	- 3.4
Mean and SD		26.6 $\pm$ 2.7	25.2 $\pm$ 1.1	—
Control . . . . .	1	27.8	26.5	- 4.7
	2	28.6	26.8	- 6.3
	3	24.9	25.9	+ 4.0
	4	26.4	24.7	- 6.4
Mean and SD		26.9 $\pm$ 1.6	26.0 $\pm$ 0.9	—