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Authors: AKEY, BRUCE L., NAYAR, JAI K., and FORRESTER, DONALD J.

Source: Journal of Wildlife Diseases, 17(4) : 597-599

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-17.4.597

# AVIAN POX IN FLORIDA WILD TURKEYS: *Culex nigripalpus* AND *Wyeomyia vanduzeei* AS EXPERIMENTAL VECTORS[1]

BRUCE L. AKEY,[2] JAI K. NAYAR,[3] and DONALD J. FORRESTER[2]

*Abstract:* The mosquitoes *Culex nigripalpus* and *Wyeomyia vanduzeei* transmitted wild turkey poxvirus during interrupted feeding in 20 of 20 trials. In addition, *C. nigripalpus* transmitted the virus in 7 of 10 trials and 8 of 9 trials 2 and 4 weeks, respectively, after feeding on infected turkeys.

## INTRODUCTION

During the period 1969 through 1980, 32 cases of turkeypox were diagnosed in wild turkeys *(Meleagris gallopavo)* in Florida (Forrester, unpubl.). The majority of these (27 of 32) were observed in September through December. The population peaks of the mosquitoes *Culex nigripalpus* and *Wyeomyia vanduzeei* occur during late summer and early fall in south Florida.[11] *Culex nigripalpus,* the most abundant species, has been shown to be a natural vector of *Plasmodium hermani,* the cause of wild turkey malaria in the Fisheating Creek Wildlife Management Area of south Florida.[7] Studies using domestic turkeys as sentinels have shown that peaks of malaria and pox transmission coincide in this area (Forrester, unpubl.). This temporal and spatial coincidence suggested that *C. nigripalpus* was a vector of turkeypox among wild turkeys in south Florida. The present investigation was undertaken to determine the efficacy of *C. nigripalpus* and *W. vanduzeei* as vectors of turkeypox under experimental conditions.

## MATERIALS AND METHODS

Colonized *C. nigripalpus* and *W. vanduzeei* reared under controlled conditions[10,12] were used as experimental vectors. Broad-Breasted White (BBW) domestic turkeys were exposed as sentinel birds, developed pox lesions, and were the source of turkey poxvirus. The birds were exposed in wild turkey habitat at Fisheating Creek, Glades County, Florida during September and October, 1980, where numerous cases of pox in wild turkeys had been diagnosed (Forrester, unpubl.). Birds with early, unencrusted lesions were used as virus donors. Representative turkeypox lesions were examined histologically utilizing standard techniques to confirm the presence of intracytoplasmic inclusion bodies in the donor birds. Two-week-old BBW domestic turkeys which had been reared in isolation facilities were used as recipients in all experiments.

Each infected donor bird was wrapped in paper and taped to a board leaving only the anterior portion of the neck and the head region (on which lesions were

[1] Supported in part by Research Grant No. 1270-G from the Florida Game and Freshwater Fish Commission's Federal Aid to Wildlife Restoration Program, Florida Pittman-Robertson Project W-41. Florida Agricultural Experiment Stations Journal Series No. 2945.

[2] Laboratory of Wildlife Disease Research, Department of Preventive Medicine, College of Veterinary Medicine, University of Florida, Gainesville, Florida 32610, USA.

[3] Florida Medical Entomology Laboratory, University of Florida, IFAS, P.O. Box 520, Vero Beach, Florida 32960, USA.

present) exposed to the feeding mosquitoes. Each bird was inserted into a mosquito cage containing 200-300 females of *C. nigripalpus* or *W. vanduzeei*. As the mosquitoes fed, a small brush was used to dislodge individual mosquitoes before they became completely engorged. After 10 to 15 min of interrupted feeding, the donor bird was removed from the cage and replaced by a noninfected poult similarly restrained. The partially engorged mosquitoes were allowed to feed to repletion without further interruption; this generally took an additional 10 to 15 min. Ten poults exposed to *C. nigripalpus* and 10 exposed to *W. vanduzeei* were then moved to isolation facilities where they were observed daily for the development of turkeypox lesions. At the end of 17 days the birds were killed and representative lesions were removed and examined histologically for inclusion bodies.

Four additional groups of 200-300 female *C. nigripalpus* were allowed to feed to repletion on the donor birds. These mosquitoes oviposited after one week and groups of approximately 40 females were allowed to feed to repletion on each of 10 uninfected poults 2 weeks after the initial feeding. Similarly, groups of 40 females treated as above were allowed to feed on each of 9 uninfected poults 4 weeks after the initial feeding. These 2 groups of poults were maintained and examined as previously described.

## RESULTS AND DISCUSSION

Both species of mosquitoes were equally efficient in transmitting the poxvirus during interrupted feeding. Lesions were produced in 10 of 10 recipient birds in both cases within 5 to 14 days post-feeding. In addition, *C. nigripalpus* remained infective for 4 weeks. Lesions were produced in 7 of 10 birds 2 weeks post-initial feeding (PIF) and 8 of 9 birds 4 weeks PIF. Upon histological examination lesions from both donor and recipient turkeys contained inclusions typical of turkeypox. This indicates that a mosquito, once infected in the wild, remains infected for extended periods.[1,4,16] No evidence has been presented that avian poxviruses replicate in mosquitoes, even though poxviruses have been isolated from these arthropods.[4,8] It has been suggested that the poxvirus is mechanically transmitted by the mosquitoes rather than biologically.[4]

Since 1912, 9 species of Diptera have been reported as vectors of avian pox and include: *Stomoxys calcitrans*,[2,15] *Aedes aegypti*,[7,16] *A. vexans*,[9] *A. stimulans*,[4] *Anopheles maculipennis*,[2] *Culex pipiens*,[1,7,16] *C. quinquefasciatus*,[14] *C. tarsalis*[4] and *Culiseta annulata*.[2] Our study adds 2 more species to this list. Mosquitoes have been shown to be capable of infecting a number of different birds after a single feeding on a bird infected with pox; intermediate feeding on non-avian species did not reduce infectivity.[7]

These results suggest that *C. nigripalpus* is a natural vector for wild turkey poxvirus as well as wild turkey malaria in south Florida. *Wycomyia vanduzeei*, although present in much lower numbers[11] and unable to transmit wild turkey malaria,[13] may augment the transmission of turkeypox in this area.

**Acknowledgements**

The technical assistance of C.M. Tuczynski and J.W. Knight is gratefully acknowledged.

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*Received for publication 25 February 1981*