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PREVALENCE OF SELECTED ZONOTIC DISEASES IN VERTEBRATES FROM HAITI, 1972

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Abstract: Vertebrate animals collected in Haiti in 1972 were tested for selected zoonotic diseases. No rabies virus or neutralizing (N) antibody was detected in bats (*Artibeus jamaicensis*). However, N antibody against St. Louis encephalitis, Western equine encephalitis (WEE), and Eastern equine encephalitis were detected in resident species of birds and WEE antibody in bats. No N antibody against Venezuelan equine encephalitis was found. The possible introduction by migratory birds and local transmission of these arboviruses is discussed.

INTRODUCTION

Eastern equine encephalitis (EEE) has been reported from the Dominican Republic, and St. Louis encephalitis (SLE) and Venezuelan equine encephalitis (VEE) have been reported from other Caribbean islands.^{1,7} Western equine encephalitis (WEE), EEE, SLE, and VEE viruses have all been isolated in peninsular Florida.^{1,7} SLE virus was isolated from a bird (green heron - *Butorides virescens*) in Haiti in 1955¹⁶ and from birds and mosquitoes in Jamaica.^{2,20} Bat rabies has been reported from Florida, Trinidad,¹ and Cuba¹⁴ but not from the island of Hispaniola.

Mosquito species^{15,19} potentially capable of transmitting arboviruses are present in Haiti, as are suitable vertebrate hosts.^{7,21} Arboviruses have been transported by birds during their fall^{12,18} and spring migrations.³ Some migratory species of birds, mostly warblers, use the islands of the Greater Antilles in transgulf migration between North and South America.¹¹ Many species of waterfowl and shorebirds spend the winter in freshwater lakes and marshes of these islands.

Vertebrate animals were collected in the southern peninsula of Haiti in Oc-

tober, 1972, in an effort to evaluate the effect of the aerial application of malathion on non-target organisms.^{1,4} Specimens were obtained from these animals to test for the presence of selected zoonotic diseases.

STUDY AREAS AND METHODS

The study area was located adjacent to a large freshwater lake and surrounding marsh in a large, flat valley on the southern peninsula of Haiti. A description of the study area has been given elsewhere.^{6,13}

Birds and bats were collected in October, 1972, using Japanese mist nets.¹⁴ Although migratory species of birds (e.g., warblers) were observed, only permanent resident species were captured. Birds were bled from the jugular vein; 0.2 ml of whole blood was diluted in 0.9 ml of phosphate buffered saline containing 25% normal rabbit serum. Bats were bled by cardiac punctures; blood was diluted with an equal volume of diluent. Diluted sera were separated by centrifugation and stored at -20 C until tested in the laboratory. Whole carcasses of bats were kept at -20 C until the brains were removed and smears made using tissue from the hippocampal area.

The fluorescent antibody (FA) test was used for the detection of rabies virus in brain smears. The bat sera were tested for neutralizing (N) antibody against rabies virus in weanling white mice. The bat and bird sera were tested for neutralizing (N) antibody against WEE (Fleming), EEE (NJO), SLE (TBH-28), and VEE (Trinidad) viruses by the plaque reduction neutralization test¹ (PRNT) in monolayers of duck embryo in 30 ml bottles; 80% reduction of the 90-120 plaque forming units of virus was considered to indicate a positive result.

RESULTS

Neither rabies virus nor N antibody was detected in 56 brains and 72 sera tested from the bat species, *Artibeus jamaicensis*. Only one bat had N antibody to any of the four arboviruses, one WEE positive (1.4%); whereas, three of

six species of birds had N antibody to three arboviruses (Table 1). Two sera from village weavers (*Ploceus cuculatus*) were positive for SLE (1.8%) and one was positive for WEE (0.9%) N antibody. Two of three barn owls (*Tyto alba*) had SLE antibody, and the one great blue heron (*Ardea herodias*) had N antibody against both SLE and EEE viruses. None of the sera were positive for N antibody against VEE virus. The overall prevalence of antibody in birds was higher for SLE (4.2%) than for any of the other viruses (0.8% for EEE and WEE).

DISCUSSION

The lack of evidence of rabies virus in the fruit-eating bats collected during this study supports the negative results from previous studies of bats on other Caribbean islands (except Trinidad and Cuba). However, since this sample of bats was

TABLE 1. Prevalence of arbovirus N antibody in vertebrates collected in Haiti, 1972.

Species	N antibody ^a			
	<u>SLE</u>	<u>EEE</u>	<u>WEE</u>	<u>VEE</u>
Fruit bat (<i>Artibeus jamaicensis</i>)	0/69 ^b	0/69	1/69	0/69
Village weaver (<i>Ploceus cuculatus</i>)	2/110	0/110	1/110	0/110
Barn owl (<i>Tyto alba</i>)	2/3	0/3	0/3	0/3
Great blue heron (<i>Ardea herodias</i>)	1/1	1/1	0/1	0/1
Other species ^c	<u>0/4</u>	<u>0/4</u>	<u>0/4</u>	<u>0/4</u>
TOTAL	5/187	1/187	2/187	0/187

^aNeutralizing antibody with > 80% plaque reduction in plaque reduction neutralization test in tissue culture considered positive.

^bNumber of positive over the number tested.

^cOther species included purple gallinule (*Porphyryla martinica*), mourning dove (*Zenaida macroura*), and common ground dove (*Columbigallina passerina*).

SLE - St. Louis encephalitis (TBH-28)

EEE - Eastern equine encephalitis (NJO)

WEE - Western equine encephalitis (Fleming)

VEE - Venezuelan equine encephalitis (Trinidad)

small, no conclusions about the absence of bat rabies in Haiti can be made.

Since all of the birds and bats sampled were permanent resident species, this study suggests that transmission of SLE, WEE, and EEE viruses occurred in Haiti in 1972. This is the first evidence of WEE virus activity on the island of Hispaniola and of EEE virus activity in Haiti. The low prevalence of N antibody may indicate a temporary focus of virus activity and does not prove enzootic maintenance of WEE and EEE viruses. These viruses could be introduced annually in the spring from South America or in the fall from North America¹⁸ by migratory birds such as warblers,¹² with local transmission occurring only sporadically.

The prevalence of N antibody against SLE virus (4.2%) was higher than for the other arboviruses but not as high as prevalences of hemagglutination inhibiting (HI) antibody for SLE found in wild birds in Florida⁸ (7.6%) or HI antibody in birds from Jamaica (17%).²⁰ There is no evidence that SLE virus is transported southward by migratory birds as are WEE and EEE viruses, although the SLE virus isolated in Haiti in October, 1955, was from a migratory species (green heron). Both the serologic

evidence for SLE infection in the abundant and sedentary weaver finch and the 1955 virus isolation suggest that SLE virus may be enzootic in Haiti.

The village weaver was the predominant bird in the study area and was closely associated with the mosquito-breeding sites in the extensive marshes.¹³ This weaver finch was introduced from West Africa before 1917²¹ and has become a pest bird much like the house sparrow (*Passer domesticus*) in North America; *P. domesticus* is a member of the same family (*Ploceidae*) and is an important vertebrate host in transmission cycles of SLE and WEE in the United States. *P. cuculatus* breeds in tree colonies near human dwellings, and large post-breeding flocks congregate along the edges of the lake and marshes throughout the late summer and fall.

The close proximity of large populations of birds in the Miragoane Valley¹³ with potential vector mosquitoes and with the human population¹⁰ provide an ideal biocenose for the maintenance of the arboviruses. Although human cases of arboviral encephalitis have not been recognized, surveillance and laboratory diagnostic services may be insufficient to allow detection.

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