

## RESEARCH ON BIRDS, TICKS AND VIRUSES

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**D**URING April and early May I was fortunate in being able to work with Naval Medical Research Unit No. 3 in Cairo, Egypt, as a guest of the Bureau of Medicine and Surgery, U. S. Navy. Among the many endemic diseases being studied at NAMRU 3 are the arthropod-borne viruses. These are the viruses in which the agency that transfers the disease from one vertebrate host to another is an arthropod, usually a mosquito or a tick. Since the vertebrate host is in many cases a bird, this study is naturally of interest to ornithologists. It was in order to help with the collection and identification of possible bird hosts that I was invited to Cairo.

Our knowledge of birds as major hosts of various viruses has mostly been gained since the war. Previously it was believed that most arthropod-borne viruses of medical or veterinary importance were maintained by a direct cycle between man or the domestic animal and the arthropod vector. However, it is now known that in a great many viruses the primary cycle of infection is from bird to arthropod to bird, and it is only during periods of explosive outbreaks that the disease becomes of medical importance. Indeed, from the point of view of the virus, the infection of man is an unfortunate accident since he dies before he can circulate the virus and reinfect other arthropods. Birds, however, are ideal hosts. They are exposed to and attractive to the vector, whether tick or mosquito; they are susceptible to the virus and circulate it in sufficient concentration to infect the arthropod; and as rapid breeders they produce a large number of non-immune individuals each year to perpetuate the disease.

### VARIED HOSTS FOR VIRUSES

In this country the viruses which have been demonstrated to have birds as hosts are Eastern and Western Equine and St. Louis encephalitis. The cycle of each of these is similar although varying in the specific hosts involved. The disease shows a rapid growth in late spring and summer when the mosquito population reaches its height. It is at this time that there is a peak population of young, non-immune birds in the nest, and they are readily susceptible to infection from the bites of infected mosquitoes and, in turn, transmit the virus to new mosquitoes. It is at this period of maximum incidence of infection that the disease may spread to man or horses. This active stage lasts but a short time, but the virus is able to pass the winter in hibernating mosquitoes which start the cycle over again the following spring. Similar life histories have been demonstrated for Japanese B encephalitis in Japan and West Nile virus in Egypt. Russian Spring-Sum-

mer virus also has a similar cycle, but in this case ticks rather than mosquitoes are the arthropod vector.

Besides the importance of birds as hosts, there is strong indirect evidence that they serve as long-range disseminators of viruses. Eastern Equine encephalitis is found along the east coast of the United States, the gulf coast of Mexico, and the north coast of South America and eastern Brazil. This distribution fits the migration pattern of many birds that breed in the eastern United States, migrate across the Caribbean or along the coast of Mexico and winter in northeastern South America. This agreement in range between the disease and migrant birds certainly suggests that birds have been the main instrument in spreading the virus. The irregular appearance of Murray Valley encephalitis in south Australia is also most easily explained through the agency of migrating birds. This virus is endemic in New Guinea and tropical north Australia, and appears at long intervals in epidemic form in south Australia. It appears to be introduced by migrant water birds who carry it south with them, particularly in years of heavy rainfall.

### CARRIED MANY MILES BY BIRDS

Among the tick-borne diseases, a recent explosive outbreak of Russian Spring-Summer virus in the Kyasanur Forest of southern India is strongly suggestive of introduction by migrant birds. This is the first recognized occurrence in a tropical region of this virus, although there is evidence that there was a previous localized infection in Saurashtra a few hundred miles north, and introduction by birds is the only logical explanation of such a long jump from previous areas of infection. The virus was probably carried in infected ticks transported by the birds, rather than in the birds themselves since the latter are infectious for only a short period. There is ample evidence that birds carry ticks for many hundreds of miles during migration. Dr. Harry Hoogstraal, Field Associate of the Museum and medical zoologist at NAMRU 3, has trapped migrant birds from Equatorial Africa carrying larval ticks of species unknown in Egypt, and has succeeded in raising the ticks to maturity. This transportation of ticks explains the occasional presence of small colonies of African ticks in southern Europe and, since an infected tick remains so for life, is an ideal agency for the transmission of viruses.

Although so much has been learned about the life histories and probable dissemination by birds of many viruses, the task still remains of demonstrating the actual transport of the diseases by infected birds or ticks. This must be a co-operative venture involving virologists, entomologists and ornithologists; birds must be trapped in large numbers on migration and identified, blood samples must be taken to determine the presence of antibodies from previous infection or of acute

## INDIAN ART EXHIBIT COMING IN AUGUST

An exhibit entitled "Indian Art of the Americas" will be on display in Stanley Field Hall from August 1 to September 28. Included will be art objects made during the last 2,500 years, and ranging in origin from Alaska to southern South America. This will be the first major exhibit in the United States to show Indian art of the entire hemisphere.

The exhibit will be one of the features of the Festival of the Americas, which is to be a series of cultural events held in conjunction with the Third Pan American Games. The exhibit will include art objects of first quality from the great Indian collections of Chicago Natural History Museum, and also outstanding material borrowed from eight of the other leading anthropology museums of the United States. An illustrated catalogue is in preparation and will be available to visitors.

### Here's Haven for Children During Summer Vacation

Safety—when your children are at the Museum you don't have to worry.

Comfort—when the midsummer heat is sizzling, the Museum is one of the coolest places in Chicago.

The thrills of discovery are experienced in roaming among one of the world's finest assemblages of natural history material.

These are the advantages for children whose parents utilize the facilities of the Museum as a haven for children to visit for hours, or a whole day at a time at intervals during the long school vacation. They were cited by Dr. Clifford C. Gregg, Director, in issuing his annual invitation when Chicago's public schools closed on June 26. With 49 large exhibition halls to cover, children may make frequent visits without exhausting the Museum's potentialities for a lively day.

viremia, and the ticks must be collected, identified and tested for infection. Such a program is being initiated this autumn by NAMRU 3 at a station along the north coast of Egypt where migrant birds from Europe arrive in tremendous numbers. Having worked with Harry Hoogstraal for several years, identifying the birds that are his tick hosts, I am naturally looking forward with a great deal of interest to the results of the program this fall. It is certainly to be hoped that enough positive evidence will be obtained of the transportation of viruses by birds to make possible an intensive study of the species involved.

I cannot close without expressing my appreciation for the generous hospitality I received at NAMRU 3. Captain John Seal, MC, USN, commander of the unit, gave me every facility for carrying on my work.



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