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Nota di contenuto	Are Wild Birds Important in the Transport of Arthropod-Borne Viruses?
Sommario/riassunto	The encephalitic arthropod-borne viruses (arboviruses) can cause a variety of serious human and wildlife diseases, including eastern equine encephalomyelitis, western equine encephalomyelitis, St. Louis encephalitis, Japanese encephalitis, and West Nile neuroinvasive disease. Understanding how these pathogens are dispersed through the environment is important both in managing their health-related impact and in interpreting patterns of their genetic variability over wide areas. Because many arboviruses infect wild birds and can be amplified to a level that makes birds infectious to insect vectors, numerous workers have suggested that the movements of migratory birds represent a major way that these viruses can be transported on a local, continental, and intercontinental scale. Virus transport by birds can, in theory, explain the colonization of new geographic regions by arboviruses, why some arboviruses in widely separated areas are genetically similar, and how arboviruses annually recur in temperate latitudes following interrupted transmission during the winter months. The four scenarios in which a bird could transport an arbovirus include (1) a viremic bird moving while it maintains a viremia sufficient to infect an arthropod that feeds on it at a new locale; (2) a bird previously infected by an arbovirus maintaining a chronic, low-level virus infection that, perhaps because of the stresses associated with annual movement, recrudesces

to produce a viremia high enough to infect an arthropod at a new locale or at a different time of year; (3) an infected bird moving and then directly transmitting the virus to other animals either by being preyed upon or scavenged or when other birds contact its saliva or feces; and (4) a bird transporting virus-infected arthropods that drop off at a new location. The idea that birds spread arboviruses is based largely on records of virus-positive birds of unknown movement status caught during the migration season, serological data showing that migrant birds were exposed to virus in the past, and indirect inferences about arbovirus movement based on patterns of genetic variation in viruses in different geographic locations. We review the direct and indirect evidence for these scenarios. Although there are a few records of migrant birds having moved arboviruses over long distances, we conclude that there is no strong empirical evidence that wild birds play a major role in the dispersal of these pathogens at the continental or intercontinental levels or that arboviruses routinely become established at new foci or are seasonally reintroduced into established foci as a result of transport by birds. Additional field and laboratory studies on how virus infection directly affects a bird's likelihood of moving are needed. Researchers interested in virus transport should focus on the extent to which birds move viruses locally and how local transport contributes to arbovirus dispersal more generally, whether virus-infected arthropod vectors disperse long distances, and the extent to which arboviruses are maintained at established foci through vertical transmission and overwintering by adult vectors. Unjustified assumptions that wild birds disperse pathogens could negatively affect the conservation of many migratory species throughout the world and cause public health resources to be diverted into ineffective ways to predict or prevent disease spread.