

Aedes Mosquitoes: A Force in Human History

By Ralph Morris, MD, MPH and Barbara M. Soule, R.N. MPA, CIC, FSHEA

At the center of the current Zika virus epidemic is the humble insect vector, the *Aedes* mosquito, both *aegypti* and *albopictus* species. The female *Aedes*¹ acquires and transmits the virus by simply *doing what she does*—extracting blood from people, birds and other animals to obtain proteins needed to develop her eggs. To many of us, mosquitoes are just a warm weather nuisance, but in his 2010 book, “Mosquito Empires: Ecology and War in the Greater Caribbean,”² J. R. McNeill demonstrates that the mosquito has impacted the course of human history.



Aedes aegypti mosquito

The female mosquito draws blood with a long, pointed mouthpart called a proboscis.

Image courtesy of the [CDC website](#).

Zika virus is only one of several flaviviruses spread by *Aedes* mosquitoes. *Aedes* also transmit the viruses that cause yellow fever, dengue and chikungunya. Most of

these diseases originated in Africa. According to McNeill³, the mosquito carriers might have crossed the Atlantic Ocean on slave ships hundreds of years ago. McNeill makes the point that by the end of the 17th century, mosquitoes and the diseases they spread were playing a major role in shaping world events.

A Mosquito's Role in History

European colonizers paid a heavy toll in human life in the Americas, and this was due in no small part to *Aedes*-transmitted diseases. One example offered by McNeill is a campaign by Scotland between 1697 and 1698 to establish a lucrative trading colony in Panama. The project was thwarted when over 1,700 Scots, about 70% of those sent to Panama, succumbed to “fever,” which McNeill interprets as dengue, yellow fever and malaria (spread by the *Anopheles* mosquito), illnesses against which the Scots had no defenses. The financial debt resulting from the failed enterprise was so great, according to the author, that it was a factor in Scotland's acceptance of union with England.

¹ Mainly *aegypti* species and potentially *albopictus*

² McNeill, J.R. Mosquito Empires: Ecology and War in the Greater Caribbean, 1620-1914. New York, NY: Cambridge University Press; 2010.

³ McNeill, J. *Aedes* Rides Again: Mosquitoes and Flaviviruses in the Americas, *American Journal of Public Health* (April 2016), Vol. 106, No. 4, pp. 596-7.

In another example, McNeill describes Napoleon's 1804 decision to sell 827,000 square miles of the mid-section of North America to the United States for \$15 million, at the bargain rate of \$18/square mile. Napoleon's willingness to sell the land was catalyzed by the discouraging loss of nearly 55,000 troops sent to St. Domingue (modern day Haiti) to quell a slave insurrection following the French Revolution. In both of these examples, the modest mosquito proved a mighty force against invaders who bore no immunity against the diseases they spread. We could say of these examples, "the proboscis was mightier than the sword."

Now, Zika

According to the [World Health Organization \(WHO\)](#), Zika virus was first identified in 1947 in Uganda in rhesus monkeys. In 1952, it was identified in humans in Uganda and the United Republic of Tanzania. Confined to Africa, Southeast Asia and the Pacific Islands until 2015, the Pan American Health Organization alerted the world to the first confirmed Zika virus infections in Brazil in May of that year. *Aedes aegypti* is present in over 100 countries, the mosquito has "high competence as a vector," and there is a possibility that Zika virus will begin to be transmitted in the US, according to an article⁴ in the April, 2016 edition of the *American Journal of Public Health*.

The virus has devastated families with Zika-affected babies born with the birth defect known as microcephaly. The US Centers for Disease Control and Prevention (CDC) announced in an [April 13 media statement](#) that it has concluded that Zika virus causes microcephaly and other severe fetal brain defects. This affirms CDC's earlier guidance to pregnant women and their partners to take steps to avoid Zika infection, including avoiding travel to areas where Zika is actively spreading. It seems we are learning more about Zika virus every day. The [WHO reports](#) a scientific consensus that Zika virus also causes Guillain-Barre syndrome, a neurological condition that could lead to paralysis and death.

Better diagnostic testing and a vaccine for use against Zika virus are needed, according to Teixeira et al., who call for "a joint effort of the national and international scientific communities, public health policymakers and funders." Unlike the historical examples described by McNeill, public health professionals today have advanced technologies and rapid communication methods to combat the Zika virus and its mosquito carrier in ways that could not have been imagined hundreds of years ago. These include national disease tracking networks and genomic analysis.

Only time will tell what impact Zika virus will have on the course of modern history.

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⁴ Teixeira, M.G., Costa, M.C.N., de Oliveira, W. K, Nunes, M.L. and Rodrigues, L.C. The Epidemic of Zika Virus-Related Microcephaly in Brazil: Detection, Control, Etiology, and Future Scenarios. *American Journal of Public Health* (April 2016), Vol. 106, No. 4, pp. 601-5.