

Just how does a mosquito become the source of illness?

The Zika virus has made headlines as the World Health Organization declared it a world health emergency. While this particular virus is relatively new, how the virus is transmitted is not. This virus relies on the mosquito to move from person to person. Many viruses and parasites can be transmitted via mosquito or other insects such as fleas and ticks. Viruses are genetic material that when introduced into an acceptable host: a person, a dog, a horse or a bird; can reproduce and may result in harmful health effects. Influenza is a common virus. A parasite is an organism that lives in or on another organism, the host, and benefits at the host's expense. Examples of parasites include those responsible for malaria and heartworms.

Two well-known mosquito-borne illnesses are yellow fever and malaria. Details of epidemics are documented throughout history. Malaria has been described by the Chinese dating back to 2700 BC and by historians in the Middle East and in the Mediterranean as far back as 1700 BC. It even got its name "mal-aire" due to its association with the stagnant air associated with swamps and rivers. Yellow fever's history dates back over 400 years and is associated with exploration of jungles and tropical areas. Yet, the discovery of how these two diseases were transmitted occurred very close in time.

The actual discovery of the malaria parasite was made by Charles Louis Alphonse Laveran, a French army surgeon stationed in Constantine, Algeria on Nov. 6, 1880. He recognized that patients with malaria symptoms were also infected with a parasite. It wasn't until a British medical officer, Ronald Ross, serving in India was able to demonstrate that the mosquito was responsible for the transmission of the parasite. Both received Nobel Prizes for their discoveries Laveran, in 1907, and Ross, in 1902.

Yellow fever also devastated individuals living in tropical climates. In 1899 work on the Panama Canal was severely impacted by the disease. Walter Reed and a team of U.S. Army researchers investigated not only the cause of the fever, which was originally believed to be bacterial, but its method of transfer. They were able to identify the virus and its transmission path in 1900. This led to mosquito control efforts which significantly reduced the prevalence of the disease. The last significant outbreak of yellow fever in North America occurred in 1905. It wasn't until 1936 that a vaccine for yellow fever was developed.

Identification of the mosquito as the major culprit in both malaria and yellow fever led to work to control mosquito populations. One method of control was the use of dichloro-diphenyl-trichloroethane (DDT). It was one of the first modern insecticides, introduced in the 1940's, to address insect-borne illnesses such as malaria. For many, DDT was a blessing as it drastically reduced infection rates. It wasn't until later that other impacts due to the widespread use of the chemical became apparent.

Today mosquitos are linked with numerous infections. In humans, malaria, chikungunya, dengue, and yellow fever all include mosquitos in the transmission. The heartworm life cycle in dogs requires a mosquito. Birds and horses are also at risk as West Nile Virus, Equine Encephalitis and St. Louis Encephalitis are transmitted by mosquitos. But, how does the process work?

It starts with the female mosquito. She has to provide the essential nutrition to produce healthy eggs. This requires a meal of blood. When she dines on her host organism, a person, bird, dog or horse, she not only gets a mouthful of blood but she may also obtain the virus or parasite. These parasites and viruses are then transported to her next meal and are transmitted into the blood stream of the

uninfected host through her saliva. If the host is suitable to the parasite or virus, the disease begins to grow and manifest, and the cycle begins again.

So, how to prevent mosquito-transmitted disease? Control the mosquitos. This can be done through insecticides or eliminating mosquito breeding grounds such as standing water. Other precautions should also be taken during mosquito or insect breeding seasons. These precautions include wearing long sleeves and long pants in insect areas, wearing an insect repellent, or utilizing insect repellents or screens for outdoor areas. Also, there are vaccines and other prevention measures such as heartworm pills for dogs to prevent illness. And finally, there are treatments for illness should an animal or a person become ill. It is good for us to be aware of how various illnesses are transmitted, so we can help to prevent future outbreaks.