

“ONE HEALTH” ... in Action! [#2]

Lassa fever is an acute viral hemorrhagic fever, with a case-fatality rate of >30%, first discovered in West Africa (Nigeria) in 1969. Epidemics in that year and in the next few years affected patients and staff in hospitals and involved person-to-person spread, fomites, aerosol transmission, or reuse of contaminated needles. The causative agent was shown to be an arenavirus, the same virus group responsible for Argentine and Bolivian hemorrhagic fevers. However, the natural history, transmission cycle, and reservoir hosts remained obscure. In 1972, a large outbreak of Lassa fever occurred in eastern Sierra Leone. Since cases appeared to be occurring in villages and towns (in addition to spread within the hospital environment) a unique opportunity arose to uncover the source of human infections.

Thomas P. Monath, MD, a CDC medical virologist with experience working in West Africa on Lassa and other hemorrhagic fevers was assigned the task. Recognizing the need to form a multi-specialty team to uncover the vector of Lassa virus, Monath brought together a team of physician-epidemiologists [including David Fraser, MD and Carlos C. ‘Kent’ Campbell, MD, MPH, now the President of the American Society of Tropical Medicine and Hygiene], Jordi Casals, MD, a renowned Rockefeller Foundation virologist who was immune to Lassa by virtue of a laboratory infection acquired during the original work in 1969, Vernon F. Newhouse, PhD, a CDC virologist-zoologist and experienced field researcher, and Graham E. Kemp, DVM, MPH, a Rockefeller Foundation veterinary virologist with whom Monath had worked closely in Nigeria and who had been part of the original work on Lassa in Nigeria in 1969. This team arrived at the epicenter, Panguma, Sierra Leone in September 1972 to find a town nearly paralyzed by fear of a terrifying, fatal disease.

They set to work to establish a Lassa fever ward at the Panguma hospital with patient isolation that interrupted nosocomial spread, mapped the town, and traced cases to specific households. The team began an exhaustive effort to trap and sample potential vectors, focusing on bats and rodents because of their known association with other arenaviruses.

The multi-disciplinary team collected, took virus samples from, and preserved specimens for species identification. Virus samples were placed in liquid nitrogen and metal canisters were filled with formalin-preserved carcasses. The outbreak eventually dissipated without any specific control measures, although cases appeared at a lower level, showing that this region of Sierra Leone was continually affected. CDC subsequently established a permanent field station here, under the direction of Karl M. Johnson, MD (the physician member of our previously profiled veterinarian-physician, Murphy/Johnson “One Health” in Action team).

Upon return to CDC in Atlanta, Monath began the systematic testing of the field material, resulting in the elucidation of the rodent reservoir host. The results were published in *Science* (Monath TP, Newhouse VF, Kemp GE, et al. Lassa virus isolation from *Mastomys natalensis* rodents during an epidemic in Sierra Leone, 1972. *Science* 1974; 185:263-6). In addition, Monath later collaborated with James C. DeMartini, DVM, PhD, a veterinary pathologist at Colorado State University School of Veterinary Medicine to study the *Mastomys* rodents collected in Sierra Leone, showing that Lassa virus had subtle detrimental effects on the reservoir host, a potentially important factor in the Lassa life cycle (DeMartini JC, Green DE, Monath, TP. Gross and microscopic findings in Lassa virus infected and noninfected wild *Mastomys natalensis* from Sierra Leone. *Bull WHO* 1975; 52:651).

This collaboration between physicians, PhD virologists and zoologists, and veterinarians is a unique episode in history illustrating the power of close interaction across these disciplines. The story of these investigations has been told in several books, e.g. John G. Fuller, *Fever: The Hunt for a New Killer Virus*. Readers Digest Press, New York, 1974.; Laurie Garrett, *The Coming Plague*: Farrar, Strauss and Giroux, New York, 1994; and Frank Ryan, *Virus X, Tracking the New Killer Plagues*, Little Brown & Co., Boston, 1997.