

Quantifying the prevalence of the West Nile, Rift Valley Fever, and Dengue Fever Viruses across Mouse Lemurs Populations from Madagascar

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Wildlife, non-human primates in particular, can serve as reservoirs for arboviruses that can be transferred to humans via mosquitoes (de Thoisy et al., 2001). West Nile Fever Virus, Rift Valley Fever Virus, and Dengue Fever Virus have all been identified in humans in Madagascar (Fontenille et al., 1998; Mathiot et al., 1984; Ratsitorahina et al., 2008). Mouse lemurs (*Microcebus* spp.), primates endemic to Madagascar, may act as potential reservoirs for these viruses, but this has yet to be determined. With this study, we aim to (1) validate the use of blood spots on TropBio™ cards as a method for detecting RNA viruses, (2) determine the prevalence of these viruses in brown mouse lemurs of Madagascar, and (3) test if there is a correlation in the presence of these viruses with habitat degradation.

To validate the protocol, house mouse (*Mus musculus*) blood was spiked with non-infectious viral RNA for Dengue Fever, West Nile Fever, and Rift Valley Fever viruses and inactivated viral particles for West Nile Fever Virus in a dilution series and applied to TropBio™ cards. RNA was isolated from the cards, reverse transcribed to cDNA, and the target viral cDNA was detected by Polymerase Chain Reaction (PCR). Lemur blood samples were collected from intact forest and deforested regions of Madagascar using TropBio™ cards. The samples for each of the viruses were tested using quantitative PCR (qPCR) to determine the prevalence of each of the viruses. The TropBio™ cards were used for both sampling and testing purposes.

Protocols for cDNA reverse transcription and standard PCR using our primers for the viruses have been verified and the PCR product can be visualized on agarose gel. Moving forward, we will refine RNA extraction protocols and qPCR protocols. Once these protocols have been optimized, RNA will be extracted from the Madagascar samples and the presence of the viruses will be quantified with qPCR.

The presence or lack of these viruses in mouse lemur populations of Madagascar can indicate or eliminate a possible source of human outbreak, and a correlation between habitat fragmentation and virus presence can show the effect of habitat degradation on virus presence in endemic species.

References:

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Statement of Research Advisor:

The research being conducted by Emma will be the first study to test for these diseases in lemurs and put their prevalence in the context of deforestation. Further, the viral detection method that Emma is developing will be useful for researchers all over the world to test for these diseases in wildlife.

—Tonia Schwartz, Biological Sciences