



Parasite Transmission in *Anopheles darlingi* Mosquitoes in Central and South America

Characterizing the rate-limiting step in transmission

Overview

The most powerful parameter for dictating the rate of transmission from mosquitoes to humans in mathematical models is the extrinsic incubation period (EIP) or, the time it takes for parasite to arrive in the saliva after taking an infectious blood meal. EIP is dependent on parasite replication in the body of the insect, it is also affected by ambient temperature and can change substantially over a vector's geographic range. EIP is very poorly characterized in the African vectors, but data are non-existent for South/Central American vectors and for *P. vivax*. The methods for repeatedly assaying the saliva of single mosquitoes over their lifetime for the presence of parasite have recently been developed by faculty at PSU and are the subject of a joint proposal being prepared for NIAID. NAMRU-6 and PSU together are uniquely poised to understand this key epidemiological parameter that can then be modeled over the local landscape to understand disease risk for American troops in Central and South America.

Objectives / Technical Approach

In this study, we will investigate the ability for *Anopheles darlingi* to transmit viral pathogens. The Rasgon lab has determined that diverse *Anopheles* spp., spanning 3 continents, are highly competent vectors for several emerging arboviruses of epidemic and invasive importance. As every single *Anopheles* sp. so far examined has been a competent vector for these pathogens, it is likely that *An. darlingi* will be competent as well. The role of *Anopheles* mosquitoes in viral epidemics has been neglected, and given that *An. darlingi* is one of the main *Anopheles* vectors in the neotropics, these studies may be of extremely high impact. As NAMRU-6 has the only extant *An. darlingi* colony, and thus a joint proposal to study this interaction is the only way it can be studied. Mosquitoes will be challenged with infectious virus in a bloodmeal, and virus midgut infection, dissemination, and saliva transmission assayed using focus forming assays (which detect live infectious virus). Once transmission potential has been verified, this project can be leveraged earlier observations to further characterize the phenomenon.

Mission Area:

Understanding Pathogen
Dynamics and Creating
Sustainable Interventions

Type: Hypothesis-Driven
Research

Region: Central/South America

Countries: Peru (Phase I)

Status: In Development



PennState

**Applied Biological and
Biosecurity Research Laboratory**

Partners

Funders:

- United State Navy
- The Pennsylvania State University

Implementation / Scientific:

- Naval Medical Research Unit 6 (NAMRU-6), Lima and Iquitos, Peru