Illinois Natural History Survey – Medical Entomology Lab

We continue to collaborate closely with the Illinois Department of Public Health on statewide monitoring and surveillance programs on mosquitoes and ticks and vector-borne pathogens. This year, our collaboration on mosquito surveillance expanded from insecticide resistance monitoring to documenting the diversity and abundance of mosquitoes throughout the state, and test them for neglected and emerging viruses of public health concern such as Eastern Equine Encephalitis virus, Jamestown Canyon virus, and La Crosse encephalitis virus. Along with the determination of blood-hosts of a range of mosquito species, this work will update and expand our understanding of transmission potential for arboviruses throughout Illinois.

Our collaboration on statewide surveillance for ticks and tick-borne disease agents is leading to a better understanding of the abundance and distribution of different tick species and their prevalence of infection with pathogens of public health importance, such as those causing Lyme disease. This year we published papers documenting the emerging diseases Heartland virus and Tidewater Spotted Fever. A large effort this summer documented the Gulf Coast Tick in a much wider range in southern Illinois and at far greater levels of abundance than had previously been realized. Maps with the results of our tick surveillance work are available to the public here: https://idph.maps.arcgis.com/apps/MapSeries/index.html?appid=976061db733441eb977ef5cf2facd5c4

We also continued to collaborate with a wide array of local public health and mosquito abatement districts across Illinois (including field training in vector surveillance), several state city parks and forest preserve districts, other researchers at UIUC, the Urban Wildlife Center at the Lincoln Park Zoo, Southern Illinois University, the University of Kentucky, the Dixon Springs Agricultural Center, USDA ARS, the UIUC Institute for Sustainability, Energy, and Environment (iSEE), the Midwest Regional Center for Excellence in Vector-borne Diseases (MCEVBD), and the Centers for Disease Control and Prevention (CDC).

Other research projects included the molecular processing of samples from a field study on the ecology of West Nile Fever vectors in the Greater Chicago area to understand how the risk of infection to humans relates to the availability of green space, and both vector and host diversity, in urban areas. We published papers on how to optimize vector control interventions using mathematical models, including how consideration of both public demand for vector control and opposition due to environmental concerns can affect outcomes. We performed studies on the effects of changing temperatures on *Ae. albopictus* body size and longevity, and on dengue competence of *Ae. aegypti*, which informs our understanding of seasonal and potential future risk due to these invasive species. Another study focused on the effects of nectar phytochemicals on mosquito longevity and La Crosse virus competence. Asian tiger mosquitoes feeding on certain phytochemicals had substantially longer lifespans and a transcriptomic analysis of these mosquitoes revealed that these phytochemicals upregulate detoxification-related and immune-related pathways. Additional projects include behavioral experiments in olfactometers to explore the consistency of mosquito host preferences; exploring the mosquito microbiome as a marker of different habitats; and the hosting of a workshop on risk assessments of genetically-modified mosquitoes.

An INHS lab member, Raymond Kim, setting up a resting trap to collect blood-fed mosquitoes in southern Illinois.