UTRGV™
Center for Vector-Borne Disease

NEWSLETTER

April 2020 Volume 1 Issue 1

Program Highlights

Welcome to the first Center for Vector-Borne Disease newsletter!

On April 10, 2018, The University of Texas Rio Grande Valley announced the establishment of a multi-disciplinary Center for Vector-Borne Disease (CVBD) as collaborative efforts to develop a self-sustaining research-focused center in South Texas to study diseases like Zika, chikungunya and dengue. We started with eight founding members from three different departments and two different colleges, and we have expanded to 11 members. We have managed to invite multiple speakers to campus to present research on Vector-Borne diseases and have expanded educational opportunities for students at UTRGV. Last but certain not least, we have continued to lead the way in cutting-edge and innovative research efforts related to Vector-Borne diseases in South Texas.

We are especially proud of our efforts to bring leading researchers to the campus to meet with faculty and students. Over the past year we have invited three such speakers, and we plan to have two more in Spring 2020. Inviting these speakers to present helps expand the UTRGV footprint, as well as introduce students to the broad range of research areas in vector biology.

As we look to the future of the center, we are exploring ways to expand our impact and reach. We continue to partner with multiple outside agencies, including the USDA, other university, as well as local, state, and federal agencies. We hope to share positive outcomes soon regarding external funding, and we continue to strive to provide excellent educational opportunities to undergraduate and graduate students. One such student, Ms. Xochitl Estrada, is highlighted below. We also presented two travel awards to undergraduates to present research results at national conferences. As we move forward into our second year of activity, we plan to expand all of our efforts in education, research, and outreach. One new direction is developing plans for community-based seminars to introduce the lay-public to Vector-Borne disease research and concerns. We anticipate these will be highly successful. We welcome you to join us as we move forward to establish a ground-breaking center at UTRGV.

Education Update

This summer UTRGV planned to offer the innovative and ground-breaking multi-institutional course, Field Experiences in OneHealth. This will be the third time this course is offered. In 2019, it was offered and had 11 graduate, medical, and veterinary students from UTMB, UTRGV, TAMU, and one student from North Carolina State University participating. This course is starting to attract more national attention, with students from multiple universities and even outside the state starting to apply for participation. Faculty from all three schools were involved in providing content to the students, and students traveled to all three campuses during the three-week course. Unfortunately, due to COVID-19 concerns, the course had to be cancelled. We anticipate offering this course again in 2021, so any UTRGV graduate or medical student who may be interested can start to plan ahead.

Outreach/Workshops/Training

The 5th annual South Texas Tropical Medicine and Vector-Borne Disease Conference was held in February. Focusing on promoting awareness of Vector-Borne diseases in South Texas, this two-day event was attended by multiple local and state vector-control personnel, as well as experts in the field from around the state. Dr. Vitek gave a presentation at the meeting, and three UTRGV students presented research posters. We anticipate the next meeting in 2021 will also include a student poster presentation option for interested students.

Dr. Tamer Oraby gave a presentation to students at Sharyland High School in October. The presentation was on research he's worked on in the past and is currently working on related to Vector-Borne diseases among other related areas. The students displayed a great deal of interest in the topics and thought it's important to hear and learn about them, especially since many of them are planning to pursue a medical-related degree.

In this Issue:

Center Members:

Dr. Christopher Vitek, Director
Sylvia Alafa, Program Specialist
Dr. Erin Schuenzel
Dr. John Thomas, III
Dr. Teresa Feria
Dr. Scott Gunn
Dr. Rupesh Kariyat
Dr. Tamer Oraby
Dr. John Vandeberg
Dr. Beatriz Tapia
Dr. Hannah Penn
Dr. Robin Choudhury

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Dr. Hannah Penn is working with the USDA ARS in Baton Rouge, LA on analyzing how genetics interact with *Varroa* mite-vectored viruses in honeybees. On Dec 7, 2019, she gave a talk to the Louisiana Beekeeper's Association Annual Convention in Pineville, LA, about how honey-bee foraging decisions change with viral loads. In the coming year, she wants to begin evaluating red harvester ant preference seeds without plant pathogens with Dr. Choudhury. She is also looking to integrate more work on human disease vector prevalence (ticks and mosquitoes) and management in collaboration with Dr. Vitek and the other CVBD members.

Guest Speakers

March 26, 2020 – Dr. Kerry Mauck, assistant professor from the University of California, Riverside will present on "Ecology of plant pathogens and their vectors in managed and unmanaged systems." (Canceled due to COVID-19 until further notice)

April 23, 2020 – Dr. Rebecca C, Christofferson, assistant professor, Pathobiological Sciences from LSU School of Veterinary Medicine. (Canceled due to COVID-19 until further notice)

Western Gulf Vector-Borne Disease News and Updates

The UTRGV Center for Vector-Borne Diseases (CVBD) partners closely with the CDC funded Western Gulf Center of Excellence in Vector-Borne Diseases. UTRGV researchers Drs. Thomas, Vitek, and Feria are all involved in research funded by this center.

The UTRGV Center for Vector-Borne Disease hosted the third annual meeting of the Western Gulf Center of Excellence in Vector-Borne Disease (WGCVBD) in June 2019. This meeting brought together participants in the WGCVBD for updates on the research progress. In addition, scientists from the USDA, CDC, Mexico, the Texas Department of State Health Services, Cornell University, and Oklahoma State University attended the meeting. This two-day event highlighted the research and education efforts, including a discussion forum for students who may be interested in careers in the field of vector biology and Vector-Borne diseases. Guest speakers included Dr. Chris Paddock, a CDC pathologist and rickettsiologist as the keynote speaker, and Dr. Jay Morrow from the UTRGV School of Medicine.

The next annual progress meeting for this center was originally planned for April 2020 and will be hosted in Corpus Christi. However, due to COVID-19, this meeting has been delayed until the fall.

Research

Vitek Vector Biology Laboratory

The Vitek Vector Biology Laboratory is continuing to study the patterns of insecticide resistance in mosquitoes along the eastern half of the TX/MX border. This project is funded by the Texas Department of State Health Services and in part by the CDC and is entering its third year of data collection (year two was expanded with a partnership with UTEP to surveil the entire TX/MX border). This project involves collecting mosquito eggs from participating cities weekly (currently 9 from Brownsville to Del Rio) and rearing the mosquitoes in the laboratory. Once they reach adulthood, female mosquitoes are tested for susceptibility to three commonly used pesticides, including the most commonly used pesticides in the region, Permethrin. This project has uncovered some interesting patterns of resistance and susceptibility in the first year of data collection, and the second year of data is currently being analyzed to determine if those patterns hold up. A publication on this research is currently being finalized and should be published by the end of the Fall semester, 2019. In addition to the research, this funding also supports two full time employees, two full time graduate students, and undergraduate students.

Rupesh Kariyat Laboratory

Kariyat lab is studying the behavior, growth, development and population dynamics of aphids, a major vector of various plant diseases. Currently they are using cowpea aphid as a model for examining diseases in silver leaf nightshade. Other vector related studies include understanding the ecology of Brown dog tick in the Rio Grande Valley, and chemical ecology of cattle fever tick. They use chemical ecology tools (Plant and animal volatiles, Olfactometry) and electrophysiology (Electrical penetration graph) and field experiments to answer these questions.

Choudhury Laboratory

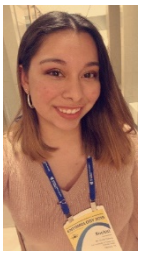
Dr. Choudhury's lab which is pretty new, but it's up and running! Our UTRGV start-up funds have been allocated and we are busy purchasing materials and setting up new experiments. We are exploring several research directions related to vectored plant diseases, including the dispersal capabilities of ambrosia beetles, stochastic effects on vector population dynamics, and modeling how best to mitigate risk of trade in the introduction of new vectors and diseases. This Spring, Dr. Choudhury will be teaching a split undergraduate-graduate level course on plant pathology, where students will learn about how different insect and nematode pests can vector plant disease causing organisms like viruses, bacteria, and fungi.

Thomas Virus and Pathology Laboratory
Research being conducted on infection of laboratory opossums with Zika virus is providing new insights into the potential pathological consequences of infection by Zika virus. Laboratory opossums are miniature opossums, smaller than laboratory rats, and are born at the developmental stage of a 5-week human embryo. Whereas mice and other small laboratory animals are resistant to infection by Zika virus, the virus replicates in laboratory opossums and can cause some severe pathologies. For these reasons, this animal has unique scientific value for developing an understanding of the consequences of Zika virus infection. Some insights that have accrued from the research, which is being conducted in the laboratories of Dr. John Thomas III (Department of Biology) and Dr. John VandeBerg (Department of Human Genetics) include the discovery that when the virus is injected into the laboratory opossums, it persists long term, perhaps for life. Some animals develop severe pathologies of the brain and reproductive system, whereas other animals appear not to be affected. The virus can be transmitted from infected mothers to their progeny, and it can be transmitted between adults sexually. These results are, to a large extent, consistent with what is known about potential consequences of infection of people by Zika virus suggesting that this animal model may be useful for studying the disease in humans. Future research with laboratory opossums will determine in more detail the potential pathological effects of infection by Zika virus on all organs, and on behavior and cognition. These animals also will be vital in testing candidate drugs and vaccines.

Penn Research Lab
is working with the USDA ARS in Baton Rouge, LA on analyzing how genetics interact with *Varroa* mite-vectored viruses in honeybees. On Dec 7, 2019, she gave a talk to the Louisiana Beekeeper's Association Annual Convention in Pineville, LA, about how honey- bee foraging decisions change with viral loads. In the coming year, she wants to begin evaluating red harvester ant preference seeds without plant pathogens with Dr. Choudhury. She is also looking to integrate more work on human disease vector prevalence (ticks and mosquitoes) and management in collaboration with Dr. Vitek and the other CVBD members.

Funded from the Western Gulf Center of Excellence in Vector-Borne Diseases
The Western Gulf Center of Excellence in Vector-Borne Diseases funds some research at UTRGV. The South Texas Mosquito Borne Disease Surveillance project (funded by the CDC) continues into its fourth year. To date, over 200,000 mosquitoes have been tested, and luckily no evidence has been found of Zika virus, dengue virus, or chikungunya virus. The testing is being expanded to include West Nile virus in Fall 2019. In addition to expanding the testing, the surveillance effort is also expanding to include tick borne diseases. We are pursuing active partnerships with animal control, veterinarians, and animal shelters to assist in the collection of ticks and fleas. Drs. Feria, Thomas, and Vitek are working to assess the risk of tick-borne diseases in the region such as Rocky Mountain Spotted Fever.

Student Highlight



Xochitl Estrada is a first-generation college student majoring in Biology at UTRGV. She originally came to UTRGV wanting to pursue a career in the medical field and began as a biomedical science major, but during her first year switched to biology as her passion and interest wasn't in the medical profession. She received an HHMI fellowship for research after her freshman year and started with research activities very early on. In 2017, she took a course in Medical Entomology and was fascinated by the field that combined science with medical importance. The guest speakers piqued her interest in the field even more, and she decided to pursue that as a research direction.

She started working in Dr. Vitek's laboratory in 2019, volunteering with ongoing projects, and began her own research project on evolution of insecticide resistance in the summer 2019. Over the course of her research and class activities she became more fascinated with zoonotic diseases, Vector-Borne diseases, and the role that insects can play in health. Of particular interest in how vector biology and disease transmission may change in response to the climate crisis. In addition to her own project, she assists with multiple projects including one that was initiated by the Center for Disease Control and Prevention (CDC).

After she graduates, she plans to pursue a master's degree and eventually a PhD with the goal of becoming a medical entomologist. She enjoys the laboratory work she is currently doing, including field work, identifying mosquitoes, and helping control the threat of mosquito-borne diseases like Zika virus.

The most challenging obstacle she has faced along the way is being a first-generation college student. She wasn't sure what to expect or how to ensure success and felt a little lost early on. Through mentorship with faculty, research advisors, and fellow students as well as the continued support of her parents and family, she has succeeded and excelled in the educational pursuits and looks forward to the next challenge.

Publications

RR Kariyat, I Gaffoor, S Sattar, CW Dixon, N Frock, J Moen, C M De Moraes, M C Mescher, G A Thompson, S Chopra. Sorghum yellow seed1-mediated 3-deoxyanthocyanidins confer defense against corn leaf aphid (Rhopalosiphum maidis) *(Journal of Chemical Ecology,* https://link.springer.com/article/10.1007/s10886-019-01062-8)

A Vasquez, J A. Goolsby, A T. Vacek, A Racelis, and RR. Kariyat. Incidence of the Brown dog tick, Rhipicephalus sanguineus, and its parasitoid, Ixodiphagus hookeri on dogs in South Texas. *Subtropical Agriculture and Environments* 70:6-10.2019

Status Update on the Threat of Babesiosis Returning to the United States, Tidwell Jason[1], Vitek Christopher J[3], Thomas Donald, Perez de Leon B[2], and John M Thomas[3*]
https://juniperpublishers.com/jdvs/JDVS.MS.ID.555723.php

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