



Center for
Emerging,
Zoonotic, and
Arthropod-borne
Pathogens

Distinguished Speaker Seminar Series in Infectious Disease FALL 2022

August 25, 2022:

Jonathan Auguste, Ph.D. Assistant Professor, Department of Entomology, CALS

"Enemy of my Enemy: Employing an insect-specific virus in the fight against Zika virus"

September 1, 2022:

Maria Elena Bottazzi, Ph.D. Associate Dean, National School of Tropical Medicine, Baylor College of Medicine

"Academic Creativity, Strategic Alliances and Diplomacy: Behind the scenes of a COVID-19 vaccine suitable for global access"

Host: Kylee Kehn-Hall, Ph.D

September 8, 2022:

David Riglar, Ph.D. Sir Henry Dale Research Fellow, Faculty of Medicine, Imperial College London

"Using synthetic biology to combat the double-edged sword of spatially varying host-microbiome interactions"

September 15, 2022:

Luis Escobar, Ph.D. Assistant Professor, Department of Fish and Wildlife Conservation, CNRE

"Linkages Between Climate Change, Zoonotic Diseases and Wildlife"

September 22, 2022:

ID IGEP Research Rotation Presentations

September 29, 2022:

Hanh Lam, Ph.D. Associate Professor of Biological Sciences, COS

"Probing host-microbe interactions for pathogen specific antimicrobials"



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VIRGINIA TECH.

October 6, 2022:

Martha Clokie, Ph.D. Professor, University of Leicester

"The use of phages to remove intestinal pathogens from poultry and swine"

Host: Bryan Hsu, Ph.D.

October 13, 2022:

Brian Kvitko, Ph.D. Associate Professor, University of Georgia

"A new paradigm for bacterial necrotrophs: chemical warfare"

Host: Ann Stevens, Ph.D.

October 20, 2022:

ID IGEP Research Rotation Presentations

October 27, 2022:

Leda Kobziar, Ph.D. Associate Professor, University of Idaho

"Catching, Counting, and Considering the Microbial Life Transported by Wildfire Smoke Plumes"

Host: David Schmale, Ph.D.

November 3, 2022:

Gregory Glass, Ph.D. Professor, University of Florida

"Nuances and hidden implications in disease dynamics"

Host: Luis Escobar, Ph.D.

November 10, 2022:

Kevin Lahmers DVM, Ph.D, DACVP Clinical Associate Professor, Virginia-Maryland College of Veterinary Medicine

"The story of Theileria orientalis, a rapidly emerging pathogen of cattle, and Haemaphysalis longicornis, its exotic tick vector"

Host: Margie Lee, Ph.D

November 17, 2022:

ID IGEP Research Rotation Presentations

December 1, 2022:

John Aggrey, Ph.D. Postdoctoral Associate, Department of Science, Technology, and Society, CLAHS

"Invisible Visibilities: Risk Infrastructure and Epidemiological Obfuscation in Epidemics"

ENEMY OF MY ENEMY: EMPLOYING AN INSECT- SPECIFIC VIRUS IN THE FIGHT AGAINST ZIKA VIRUS

AUGUST 25, 2022 AT 12:30 PM

IN PERSON
FRALIN HALL AUDITORIUM

Jonathan Auguste, Ph.D.

Assistant Professor, Department of Entomology, CALS



Center for Emerging, Zoonotic, and Arthropod-borne Pathogens (CeZAP)
Distinguished Speaker Seminar Series in Infectious Diseases

Thursday, August 25, 2022 at 12:30 pm

IN person
at Fralin Hall Auditorium

Vaccination remains critical for viral disease outbreak prevention and control, but conventional vaccine development typically involves trade-offs between safety and immunogenicity. ZIKV recently caused immense economic and health impacts throughout the Americas, and re-emergence poses a significant threat. Here, we created a chimeric virus expressing ZIKV prM and E proteins on an Aripo virus (ARPV; an ISFV) backbone. In vitro safety studies showed that after infection of mammalian cells with ARPV/ZIKV, the virus did not replicate nor cause cytopathic effects. Additionally, ARPV/ZIKV did not produce ZIKV E protein in mammalian cells but production did occur in insect cells. ARPV/ZIKV also demonstrated exceptional safety when administered at high doses intracranially to suckling mice. Protective efficacy was evaluated by subcutaneous immunization of 4-week-old immune-competent (C57BL/6J) and -compromised (IFN- α BR $^{-/-}$) mouse models. ARPV/ZIKV-vaccinated mice were completely protected from viremia, weight loss, and mortality after being challenged with a lethal dose of ZIKV. ARPV/ZIKV immunization also prevented in utero ZIKV transmission in gravid IFNAR $^{-/-}$ mice. Vaccinated dams and their embryos exhibited no morbidity post-challenge, and no detectable ZIKV was present in placental, spleen, or brain tissues. To further study the correlates of protection post-vaccination we characterized the cell-mediated response to ARPV/ZIKV immunization. Splenocytes derived from vaccinated mice demonstrated ZIKV-specific CD4 $^{+}$ and CD8 $^{+}$ responses, and significant cytokine production post-antigen exposure. Furthermore, transcriptomic studies on murine macrophages exposed to ARPV/ZIKV indicated robust PRR, B-cell receptor, Th1 and Th2 polarization, and antigen presentation signaling. Vaccine efficacy studies in Rag1 $^{-/-}$, Tcr $\alpha^{-/-}$, and muMt $^{-/-}$ mice, and T-cell depletion and passive transfer studies in IFNAR $^{-/-}$ mice, show both humoral and cell-mediated responses are significant contributors to ARPV/ZIKV-induced protection. Altogether, chimeric insect-specific flaviviruses are a promising new platform to restrict flavivirus emergence via vaccine development.



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ACADEMIC CREATIVITY, STRATEGIC ALLIANCES AND DIPLOMACY: BEHIND THE SCENES OF A COVID-19 VACCINE SUITABLE FOR GLOBAL ACCESS

SEPTEMBER 1, 2022 AT 12:30 PM

IN PERSON - FRALIN HALL AUDITORIUM

VIRTUAL OPTION - ZOOM

Maria Elena Bottazzi, Ph.D.

Associate Dean, National School of Tropical Medicine,
Baylor College of Medicine

Center for Emerging, Zoonotic, and Arthropod-borne Pathogens (CeZAP)
Distinguished Speaker Seminar Series in Infectious Diseases

Thursday, September 1, 2022 at 12:30 pm

in Person at Fralin Auditorium

Zoom Link: <https://viriniatech.zoom.us/j/89419666443>

For the last two decades, the National School of Tropical Medicine and its Center for Vaccine Development in Houston, Texas has operated with the mission to develop and test new low- cost and effective vaccines against emerging and neglected tropical diseases, build capacity for vaccine development locally and with foreign nations and guide and influence vaccine policy and advocacy. This approach relies on the need for international diplomacy, solidarity, and cooperation. This presentation will provide a behind the scenes vignette and an overview of the vaccine development process and will highlight the case study of Corbevax, a COVID-19 vaccine, suitable for global access.



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USING SYNTHETIC BIOLOGY TO COMBAT THE DOUBLE-EDGED- SWORD OF SPATIALLY VARYING HOST-MICROBIOME INTERACTIONS

David Riglar, Ph.D.

Sir Henry Dale Research Fellow, Faculty of Medicine,
IMPERIAL COLLEGE LONDON



Center for Emerging, Zoonotic, and Arthropod-borne Pathogens (CeZAP)
Distinguished Speaker Seminar Series in Infectious Diseases

Thursday, September 8, 2022 at 12:30 pm

in Person at Fralin Auditorium

Zoom Link: <https://viriniatech.zoom.us/j/89419666443>

The mammalian gut microbiome plays a critical, but poorly understood, role in the triggering, maintenance and response to inflammation-linked conditions including infection, inflammatory bowel disease and colorectal cancer. Spatial dynamics in both microbial abundance and gene expression are likely to be important factors in disease outcome, however, methods to resolve microbial function in the context of the gut's varying longitudinal, radial, and inflammatory microenvironments are limited. Because of this, care must be taken so that spatio-temporal dynamics do not lead to unexpected variation in a range of analyses.

We have previously demonstrated the power of synthetic memory circuits to engineer living bacterial probes as recorders for exposure to inflammatory conditions within the mammalian gut. Here, I will discuss further developments to engineered biosensors and their combination with advanced 3D imaging approaches to investigate the functional biogeography of the healthy and inflamed gut.



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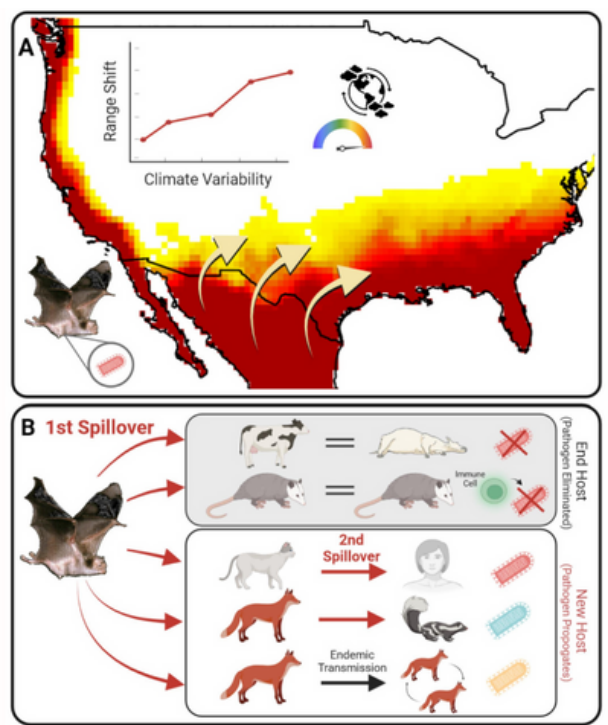
LINKAGES BETWEEN CLIMATE CHANGE, ZONOTIC DISEASES AND WILD LIFE”

SEPTEMBER 15, 2022 AT 12:30 PM
FRALIN HALL AUDITORIUM



Luis Escobar, Ph.D.

Assistant Professor
Dept of Fish & Wildlife Conservation, CNRE



Thursday, September 15, 2022 at 12:30 pm

in Person at Fralin Auditorium

Climate change is the most important current threat to human being and biodiversity. Although substantial data exist on the negative effects of climate change, consequences are increasing due negligent inaction. Floods, heatwaves, and spread of infectious diseases increase in magnitude and rise inequity in low Human Development Index countries. Climate change impacts amplify the harms to health driven by the COVID-19 pandemic, and could trigger new pandemics originating in wild life. This talk will present research on climate change and fish and wildlife diseases and their connections with food security.





ID IGEP Cohort Research Rotation Presentations

Center for Emerging, Zoonotic, and Arthropod-borne Pathogens (CeZAP)
Distinguished Speaker Seminar Series in Infectious Diseases

Thursday, September 22, 2022 at 12:30 pm

in Person at Fralin Auditorium

ID IGEP Cohort Research Rotation Presentations

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Student in the 2nd cohort class presenting:

- A.S.M. Rubayet UL Alam
- Alicia Arneson
- Shannon Carney
- Qiaoqiao Ci
- Osamudiamen Ebohon
- Jillian Green
- Md. Shakhawat Hossain
- Shaeri Nawar
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PROBING HOST - MICROBE INTERACTIONS FOR PATHOGEN SPECIFIC ANTIMICROBIALS

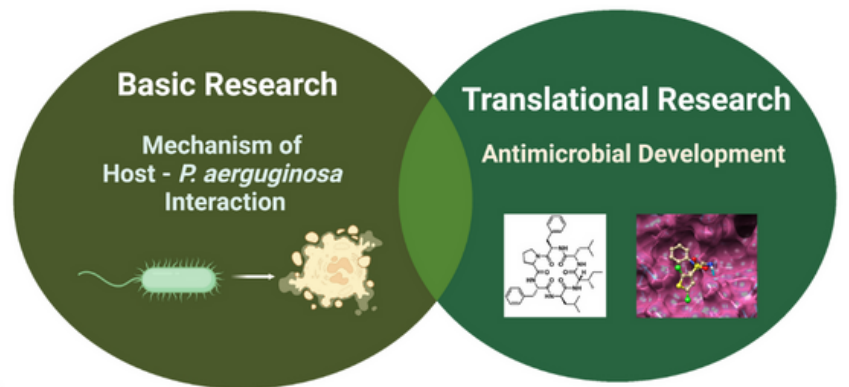
SEPTEMBER 29, 2022

12:30PM IN FRALIN HALL AUDITORIUM



Hanh Lam, Ph.D.

Assistant Professor
Department of Biological Sciences
College of Science



Thursday, September 29, 2022 at 12:30 pm

in Person at Fralin Auditorium

Pseudomonas aeruginosa is one of the ESKAPE pathogens that frequently “escapes” antimicrobial drugs and is one of the most common causes of healthcare-associated infections worldwide. The Type III secretion system (T3SS) is a major virulence determinant associated with acute *Pseudomonas* infection. T3SS is required for virulence in a number of pathogens but largely absent from commensals, making it an ideal target of antimicrobial development. Among four effector proteins secreted out from the T3SS, the ExoU phospholipase is a known marker of highly virulent strains and antibiotic resistance. Our lab investigates the mechanisms of host cell death caused by *P. aeruginosa* ExoU phospholipase and develops inhibitors of bacterial phospholipase and the T3SS using an interdisciplinary approach.

'THE USE OF PHAGES TO REMOVE INTESTINAL PATHOGENS FROM POULTRY AND SWINE'

OCTOBER 6, 2022 AT 12:30 PM

IN PERSON - FRALIN HALL AUDITORIUM
VIRTUAL OPTION - ZOOM

Martha Clokie, Ph.D.

Professor
UNIVERSITY OF LEICESTER



Image © University of Leicester



Thursday, October 6, 2022 at 12:30 pm

in Person at Fralin Auditorium

Zoom Link: <https://viriniatech.zoom.us/j/89419666443>

Antibiotics are frequently used to treat bacterial infections in poultry, but are increasingly acknowledged as being problematic as they drive antimicrobial resistance. Worryingly, multi-antibiotic resistant bacterial strains from many bacterial species have entered the human food chain and are difficult to treat. Consequently, alternatives to antibiotics are needed to treat and prevent diseases in poultry and prevent carriage of human bacterial pathogens. Bacteriophages (phages for short) could provide an effective alternative or compliment. Phages are viruses that target and kill bacteria with extreme specificity to a bacterial species or subspecies. They are incredibly abundant and genetically diverse. Phages are present in food we eat, in the natural environment and they play important roles in maintaining gut health in animals.

I will show how phages have been used to prevent and treat problematic bacterial infections caused by bacteria such as Salmonella. I will present studies that have shown phages can be used at different stages from pre to post slaughter to control the spread of harmful bacteria within the food chain. I will then present data on our current research, on using phages to reduce Salmonella colonisation in swine and poultry. To date, we have isolated a large phage set, that can lyse the most dominant subgroups of Salmonella worldwide and I will share insights form analysing the genomes of these phages within the context of all known Salmonella phages using a graph-based system that we developed. I will show how our recent trials have been conducted, and how delivering phages via feed significantly reduces Salmonella colonisation in poultry. In summary, I will show how phages have the potential to provide natural, safe and much needed means to prevent and treat diseases and improve animal welfare and food safety within the poultry industry.



A NEW PARADIGM FOR BACTERIAL NECROTROPHS: CHEMICAL WARFARE

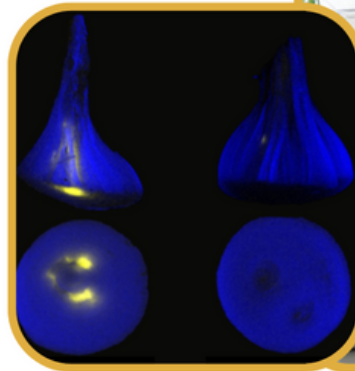
OCTOBER 13, 2022

12:30PM IN FRALIN HALL AUDITORIUM

Brian Kvitko, Ph.D.

Associate Professor of Molecular
Plant Bacteriology
UNIVERSITY OF GEORGIA

HOST: ANN STEVENS



Thursday, October 13, 2022 at 12:30 pm

in Person at Fralin Auditorium

Plants use multiple layers of inducible and constitutive defenses to combat pathogens. Antimicrobial secondary metabolites comprise one layer of these defenses. Onion, garlic and other *Allium* species release "phytoalexin" thiosulfinates after tissue damage allows inert cysteine sulfoxide (CSO) precursors to be cleaved by the alliinase CSO lyase. Thiosulfinates oxidize of cellular thiols creating mixed disulfides that can inactivate critical enzymes and are broadly antimicrobial. The bacterial onion pathogen *Pantoea ananatis* is dependent on two virulence systems working in tandem to cause disease. The HiVir (hvr) pantaphos toxin biosynthetic cluster and the allicin tolerance (alt) gene cluster. The phytotoxin pantaphos causes onion tissue necrosis, appears to be broadly phytotoxic, and is potentially mobile in plants. The alt cluster encodes a cohort of redox-associated enzymes that confer increased tolerance to thiosulfinates. We have found that other *Allium*-associated bacteria encode similar alt-like gene clusters and other bacterial pathogens of onion that are dependent on secondary metabolite toxins to cause disease. This chemical arms race between onions and onion pathogens provides an interesting evolutionary contrast to the plant immune receptor and pathogen virulence protein arms race model that underlies many plant-pathogen interactions.





ID IGEP Cohort Research Rotation Presentations

Center for Emerging, Zoonotic, and Arthropod-borne Pathogens (CeZAP)
Distinguished Speaker Seminar Series in Infectious Diseases

Thursday, October 20, 2022 at 12:30 pm

in Person at Fralin Auditorium

ID IGEP Cohort Research Rotation Presentations

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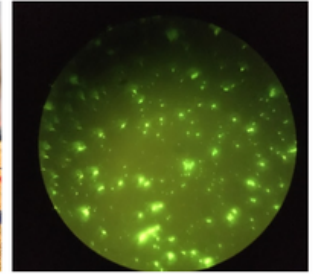
'CATCHING, COUNTING, AND CONSIDERING THE MICROBIAL LIFE TRANSPORTED BY WILDFIRE SMOKE PLUMES'

OCTOBER 27, 2022 AT 12:30 PM

IN PERSON - FRALIN HALL AUDITORIUM
VIRTUAL OPTION - ZOOM

Leda Kobziar, Ph.D.

Director, Master of Natural Resource, Associate Professor, Wildland Fire Science
UNIVERSITY OF IDAHO



Thursday, October 27, 2022 at 12:30 pm

in Person at Fralin Auditorium

Recent work has shown that viable microbes comprise a significant portion of overall aerosol emissions and transport driven by wildfires in the earth system. Using UAS-based aerosol sampling systems over high-intensity fires along with controlled laboratory experiments, we demonstrate new methodology to quantify biological emission factors for wildland fires and identify whether pathogenic microbes are transported to colonize new substrates. Our results suggest that between 3.6×10^7 and 2.0×10^9 microbes are emitted by the combustion of one kilogram of biomass in forest fires, or nearly six metric tons of microbial biomass for a 1500 ha burned area. We then test whether microbes can be experimentally transported through smoke to colonize soils, and use molecular analyses to characterize the microbial communities and consider the implications of this globally massive dispersal mechanism. These results and methodology can serve as a foundation for future work to explore the implications for both atmospheric and terrestrial processes.



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NUANCES AND HIDDEN IMPLICATIONS IN DISEASE DYNAMICS

NOV 3, 2022 AT 12:30 PM

IN PERSON - FRALIN HALL AUDITORIUM
VIRTUAL OPTION - ZOOM

Gregory Glass, Ph.D.

Professor
UNIVERSITY OF FLORIDA



Thursday, November 3, 2022 at 12:30 pm

in Person at Fralin Auditorium

Zoom Link: <https://viriniatech.zoom.us/j/89419666443>

Within the scientific enterprise it is estimated approximately 1.8 million publications are generated per year. At the same time, there are reports that more than half of all studies do not produce results that are repeatable either by the initial group or by other research teams. Various reasons have been proposed for these observations, with inappropriate activity being rare (but the most common reason for retractions). Today, we focus on the failure of repeatable results by distinguishing between reproducible and replicable results.

We focus on why lack of replicable results (new data, new research groups), which are key to scientific validation, are especially troublesome. We propose that, as scientific fields try to better integrate their findings within the broader scientific community, this challenge will become even more critical. We suggest that though technical proficiency may be satisfactory (good reproducibility), the choices of methods produce results that are extremely sensitive to those methods and can produce misunderstandings in the wider context. This generates incorrect directions for future studies.

I will provide several case studies related to pathogen/disease systems to demonstrate the consequences.



THE STORY OF THEILERIA ORIENTALIS, A RAPIDLY EMERGING PATHOGEN OF CATTLE, AND HAEMAPHYSALIS LONGICORNIS, ITS EXOTIC TICK VECTOR

NOVEMBER 10, 2022

12:30PM IN FRALIN HALL AUDITORIUM

Kevin Lahmers, DVM, PhD, DACVP

Associate Professor, Clinical Track
VIRGINIA MARYLAND COLLEGE OF VETERINARY MEDICINE



Thursday, November 10, 2022 at 12:30 pm

in Person at Fralin Auditorium

Since being discovered in the US in late 2017, the Asian Longhorned tick and *Theileria orientalis* Ikeda have been geographically linked and associated with cattle mortality. We have confirmed the transmission of Ikeda by the tick and have new data indicating an increased range and prevalence of *Theileria orientalis*. The Ikeda genotype has been found in 9 states. Dr. Lahmers will present new data and discuss what may be on the horizon of this rapidly emerging pathogen of cattle and its exotic tick vector.





ID IGEP Cohort Research Rotation Presentations

Center for Emerging, Zoonotic, and Arthropod-borne Pathogens (CeZAP)
Distinguished Speaker Seminar Series in Infectious Diseases

Thursday, November 17, 2022 at 12:30 pm

in Person at Fralin Auditorium

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DISTINGUISHED SPEAKER SEMINAR SERIES
IN INFECTIOUS DISEASE

INVISIBLE VISIBILITIES: RISK INFRASTRUCTURE AND EPIDEMIOLOGICAL OBFUSCATION IN EPIDEMICS

DEC 1, 2022 AT 12:30 PM
IN PERSON - FRALIN HALL AUDITORIUM

John Aggrey, Ph.D.

Postdoctoral Associate
Department of Science, Technology,
and Society
CLAHS



Thursday, December 1, 2022 at 12:30 pm

in Person at Fralin Auditorium

Zoom Link: <https://viriniatech.zoom.us/j/89419666443>

Risk communication and community engagement (RCCE) are essential for curbing emerging infectious disease (EID) epidemics. However, the biomedical framing of RCCE renders it inadequate in identifying evolving risk factors amidst the complexity, uncertainty, and changing nature of EID epidemics. I argue that the opacity of evolving risk factors that influence the dynamics of the epidemic constitutes epidemiological obfuscation. Drawing from an analysis of CDC and WHO documents on emergency risk communication and community engagement and insights from multi-sited qualitative interviews in Ghana during the 2014-2016 Ebola outbreak, I examine the risk infrastructure in EID epidemics to suggest that the muddle of evolving risk factors contributes to the shaping of people's response to EID epidemics and the epidemic process which sustains the longevity of epidemics.



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