

**BIOMEDICAL & VETERINARY SCIENCES
GRADUATE PROGRAM**



ANNOUNCES

The Doctor of Philosophy Seminar and Examination of

Sarah C. Kuchinsky
**“Determining the Pathogenesis and Enzootic
Transmission of Usutu Virus”**

Friday, September 2nd, 2022

2:00PM

Fralin Hall Auditorium

Zoom link information:

<https://viriniatech.zoom.us/j/87548599520?pwd=SDZwa0FTTi9qRnN5WjYvWkxPbDc1QT09>

Password: Sarah



Bio

Sarah's interest in wildlife health began long before she can remember, but solidified into a possible career path after interning at the New England Wildlife Center in Fall 2012. Sarah earned her BS in Biology from Butler University in 2012, and then spent time gaining additional animal and research experience as an ORISE Fellow with the FDA. She then went onto Frostburg State University to complete her MS in Conservation Biology and Applied Ecology in 2017. Her thesis focused on the prevalence of the Lyme disease causing bacteria in ticks and wild rodents in a local state park. Here, Sarah fell in love with the One Health concept and recognized that zoonotic disease is at the intersection of wildlife, human, and environmental health. Her goal to work within the One Health initiative sparked her desire to combine her passions for animal health and research, and thus she applied for the combined DVM-PhD program at Virginia Tech. Her research questions have combined aspects of field work and lab work, something she greatly enjoys. Sarah will graduate with her DVM in 2025, upon which as a veterinarian scientist she would like to work in a state or federal agency with an emphasis on mitigating impacts of wildlife disease and zoonotic disease. In her spare time, Sarah enjoys baking, hiking, running, traveling, and spending time with loved ones.

Funded by

National Institutes of Allergy and Infectious Diseases
VMCVM Office of Research and Graduate Studies

Lay Language Abstract

Usutu virus (USUV) is a mosquito-borne virus that can cause neurological disease in humans and wild birds. It is in the same virus family as West Nile virus and St. Louis encephalitis virus, both of which are endemic in the United States. USUV is typically maintained in an enzootic cycle between wild birds, typically songbird species, and mosquitoes with an affinity for biting birds, such as *Culex* spp. mosquitoes. USUV was first isolated in South Africa in 1959 and has since spread throughout sub-Saharan Africa and Europe. Upon emergence in Europe, USUV caused massive die-offs in Eurasian blackbirds (*Turdus merula*) as well as an increase in human cases. My work primarily sought to understand whether USUV has evolved to increase disease in humans or transmissibility in wild birds. We first assessed the pathogenesis of African and European USUV strains in an immunocompromised mouse model. Specifically, we showed that African strains of USUV caused more disease and developed higher viral loads in serum and tissues in an immunocompromised mouse model compared to European strains. To further understand USUV infection in wild birds, we developed a physiologically relevant model of infection using juvenile chickens. In juvenile chickens, we found that the European strains were characterized by more disease and higher viral loads in tissues compared to the African strains. This work established the first bird model of USUV infection where birds developed viremia, i.e. infectious virus is detectable in blood. Finally, to identify possible reservoir hosts of USUV, we assessed USUV transmission between house sparrows (*Passer domesticus*) and *Cx. quinquefasciatus* mosquitoes. We found that house sparrows were able to transmit a European and African USUV strain to biting *Cx. quinquefasciatus* mosquitoes, with the European strain being more infectious to these mosquitoes. This indicates that house sparrows are competent for USUV transmission and thus a potential reservoir species. The collection of these chapters provides great insights on the pathogenesis of distinct USUV strains, disease presentation in birds, and enzootic transmission of USUV. Additionally, they indicate that USUV emergence in the United States is a very real possibility.

Awards and Academic Achievements

- Wildlife Disease Association Student Travel Award, July 2022
- VMCVM Outstanding PhD Student Award, March 2022
- Tyler J and Frances F. Young Scholarship, August 2021
- Featured power talk at the Interfaces of Global Change Graduate Research Symposium, April 2021
- Second Place 5-minute oral presentation Virginia Tech GSA Research Symposium, March 2021
- American Society for Virology Student Travel Award (meeting canceled due to COVID-19 pandemic), April 2020
- Second Place 15-minute oral presentation, Virginia Tech GSA Research Symposium, April 2020
- Outstanding Ph.D. Oral Presentation Award, BMVS Annual Research Symposium, November 2019

Publications

Kuchinsky SC, Marano J, Hawks S, Loessberg E, Honaker CF, Siegel PB, Lahondere C, LeRoith T, Weger-Lucarelli J, and Duggal NK. 2022. North American house sparrows are competent for Usutu virus transmission. *mSphere* (in review)

Hawks SA, Prussin AJ II, **Kuchinsky SC**, Pan J, Marr LC, Duggal NK. 2021. Infectious SARS-CoV-2 is emitted in aerosol particles. *mBio* 12(5):e0252721-e. doi: 10.1128/mBio.02527-21. PubMed PMID: 34663099.

Heitzman-Breen N, Golden J, Vazquez A, **Kuchinsky SC**, Duggal NK, Ciupe SM. 2021. Modeling the dynamics of Usutu virus infection in birds. *Journal of Theoretical Biology* Sep 7:110896. doi: 10.1016/j.jtbi.2021.110896. PMID: 34506809.

Kuchinsky SC, Frere F, Heitzman-Breen N, Golden J, Honaker CF, Siegel PB, Ciupe SM, Duggal, NK. 2021. Pathogenesis and shedding of Usutu virus in juvenile chickens. *Emerging Microbes & Infections* 26:1-40. doi: 10.1080/22221751.2021.1908850. PMID: 33769213.

Kuchinsky SC*, Hawks S*, Mossel E, Coutermarsh-Ott S*, Duggal, NK*. 2020. Differential pathogenesis of Usutu virus isolates in mice. *PLOS: Neglected Tropical Diseases* 14(10): e0008765. (* contributed equally to this study)

Presentations

Kuchinsky S, Marano J, Hawks S, Loessberg E, Honaker CF, Siegel PB, Weger-Lucarelli J, and Duggal NK. North American house sparrows are competent for Usutu virus transmission. Oral presentation at: Wildlife Disease Association Annual International Conference; 2022 Jul 26; Madison, WI.

Kuchinsky S, Marano J, Hawks S, Loessberg E, Honaker CF, Siegel PB, Weger-Lucarelli J, and Duggal NK. House sparrows and *Culex quinquefasciatus* mosquitos are capable of transmitting Usutu Virus. Oral presentation at: BMVS Research in Progress Seminar Series, Virginia-Maryland College of Veterinary Medicine; 2022 Apr 13; Blacksburg, VA.

Kuchinsky S, Marano J, Honaker CF, Siegel PB, Weger-Lucarelli J, and Duggal NK. How much is enough? Determining the minimum infectious threshold for Usutu virus transmission between birds and biting *Culex* mosquitos. Oral presentation at: American Society for Virology, Flavivirus I: Pathogenesis Workshop; 2021 July 19.

Kuchinsky S, Marano J, Honaker CF, Siegel PB, Weger-Lucarelli J, and Duggal NK. How much is enough? Determining the minimum infectious threshold for Usutu virus transmission between birds and biting *Culex* mosquitos. Oral presentation at: Interfaces of Global Change Graduate Research Symposium; 2021 Apr 23; Blacksburg, VA.

Kuchinsky S, Marano J, Honaker CF, Siegel PB, Weger-Lucarelli J, and Duggal NK. How much is enough? Determining the minimum infectious threshold for Usutu virus transmission between birds and biting *Culex* mosquitos. Oral presentation at: BMVS Annual Graduate Research Symposium, Virginia-Maryland College of Veterinary Medicine; 2021 Mar 26; Blacksburg, VA.

Kuchinsky S, Marano J, Honaker CF, Siegel PB, Weger-Lucarelli J, and Duggal NK. How much is enough? Determining the minimum infectious threshold for Usutu virus transmission between birds and biting *Culex* mosquitos. Oral presentation at: Virginia Tech Graduate Student Assembly Research Symposium, Virginia Tech; 2021 Mar 23; Blacksburg, VA.

Kuchinsky S, Frere F, Pietrobono N, LeRoith T, Duggal N. Assessing the susceptibility to Usutu virus in avian models. Oral presentation at: American Society for Virology, Flavivirus II Virtual Workshop; 2020 Jun 17.

Kuchinsky S, Frere F, Pietrobono N, LeRoith T, Duggal N. Assessing the susceptibility to Usutu virus in avian models. Oral presentation at: Virginia Tech Graduate Student Assembly Research Symposium, Virginia Tech, 2020 Apr 8; Blacksburg, VA.

Kuchinsky S, Pietrobono N, LeRoith, T, Duggal, N. Determining the pathogenesis, transmissibility, and disease dynamics of Usutu virus. Oral presentation at: BMVS Research in Progress Seminar Series, Virginia-Maryland College of Veterinary Medicine; 2020 Mar 4; Blacksburg, VA.

Kuchinsky S, Frere F, Pietrobono N, LeRoith T, Duggal N. Assessing Usutu virus pathogenesis in avian models. Oral presentation at: BMVS Annual Graduate Research Symposium, Virginia-Maryland College of Veterinary Medicine; 2019 Nov 6; Blacksburg, VA.

Kuchinsky S, Hawks S, Duggal, N. Determining the susceptibility of avian species to Usutu virus (USUV). Oral presentation at: Integrated Life Sciences Building Seminar Series, Virginia Tech Corporate Research Center; 2019 Mar 21; Blacksburg, VA.

Examination Graduate Committee

Major Advisor/Chair:

Nisha Duggal, PhD
Assistant Professor
Department of Biomedical Sciences and Pathobiology

Graduate Advising Committee Members:

Clay Caswell, PhD
Associate Professor
Department of Biomedical Sciences and Pathobiology

Dana Hawley, PhD
Professor
Department of Biological Sciences

Tanya LeRoith, DVM, PhD
Clinical Professor
Department of Biomedical Sciences and Pathobiology

XJ Meng, MD, PhD
University Distinguished Professor
Department of Biomedical Sciences and Pathobiology



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