

Alexandra N Cumbie

Postdoctoral Researcher
Department of Entomology
Virginia State University and Polytechnic Institute
(Virginia Tech)

Educational Background:

- 2020 *Doctor of Philosophy*, Biomedical Sciences
Old Dominion University
“Drivers of rickettsial pathogen transmission and spillover in local tick populations in southeastern Virginia.”
- 2014 *Bachelor of Science*, Biological Sciences
Virginia State University and Polytechnic Institute (Virginia Tech)

Courses Taught:

Virginia Tech, Guest Lecturer:

ENT 3264: Medical and Veterinary Entomology Lab, 1 semester (eight lectures)
Lecture(s): Ticks and Mites; Molecular Methods of Species Identification

PHS 4054: Concepts in One Health, 2 semesters (single lecture each semester)
Lecture(s): One Health and Vectors

Old Dominion University, Graduate Teaching Assistant:

BIOL250: Anatomy and Physiology Lab, Classroom, 3 semesters
BIOL251: Anatomy and Physiology Lab, Classroom, 3 semesters

Research history:

Jan 2021-Present

Postdoctoral researcher: This position is currently funded by The Assistant Secretary of Defense for Health Affairs through the Tick-Borne Disease Research Award, endorsed by the Department of Defense, through the Congressionally Directed Medical Research Programs under Award No. W81XWH-19-TBDRP-CDA awarded to Dr. Gillian Eastwood. My primary research objectives are to study the ecology of Powassan virus in *Ixodes scapularis* ticks from western Virginia and its transmission dynamics influenced by co-infection with other common tick-borne pathogens in the region, including *Borrelia burgdorferi*, *Anaplasma phagocytophilum*, and *Babesia microti*.

Aug 2015-Dec
2020

Doctoral Research: My doctoral work was funded in part through an NIH grant 1R01AI136035 as part of the joint NIH-NSF-USDA Ecology and Evolution of Infectious Diseases program awarded to Dr. Holly Gaff. My research focused on spotted fever group rickettsiae and two medically and veterinary important tick vectors: *Dermacentor variabilis* and *Amblyomma maculatum*. The first aim of my research was to determine small mammal playing host to immature *A. maculatum*, and to assess these host may play as potential reservoirs of *R. parkeri*. Six small mammal species were identified as hosts to immature *A. maculatum*; three of which play a potential role in the enzootic cycle of *R. parkeri* as both carriers of infected ticks and systemically infected hosts. The second aim of my research was to assess spillover of *R. parkeri* and *R. amblyommatis* into local *D. variabilis* populations. Wild-caught *D. variabilis* were found to harbor *R. montanensis*, *R. parkeri*, and *R. amblyommatis* at all life stages. Laboratory studies observed *R. parkeri* transmission during the larval and nymphal life stages of *D. variabilis* when co-feeding with infected *A. maculatum*. The final aim of my research was to determine the potential role of the microbiome in the prevalence of *R. parkeri* seen in *A. maculatum* populations from Virginia. Microbiome analyses were performed on lab-raised and wild-caught *A. maculatum* with high local prevalence of *R. parkeri*. Overall, site and host appear to play a large role in the microbiota seen in both lab-raised and wild-caught individuals.

Publications:

- Cumbie A.**, E. Walters, H. Gaff, and W. Hynes. 2020. First report of *Candidatus Rickettsia mendelii*, in *Ixodes brunneus* ticks collected in the United States. *Ticks and Tick-Borne Disease*. 11 (1), 101309.
- Cumbie, A.**, Espada, C.D., Nadolny, R.M., Rose, R.K., Dueser, R.D., Hynes, W.L., and Gaff, H.D., 2020. Survey of *Rickettsia parkeri* and *Amblyomma maculatum* associated with small mammals in southeastern Virginia. *Ticks and Tick-Borne Disease*. 11 (6), 101550.
- Cumbie, A.N.**, Heller, E.L., Bement, Z.J., Phan, A., Walters, E.L., Hynes, W.L. and Gaff, H.D., 2021. Passerine birds as hosts for *Ixodes* ticks infected with *Borrelia burgdorferi* sensu stricto in southeastern Virginia. *Ticks and Tick-borne Diseases*, 12(3), 101650.
- Cumbie, A.N.**, Whitlow, A.M., Eastwood, G. 2021. First evidence of Powassan virus (Flaviviridae) in *Ixodes scapularis* in Appalachian Virginia, USA. *American Journal of Tropical Medicine and Hygiene*. 2021 Dec 20: tpm210825. doi: 10.4269/ajtmh.21-0825. Epub ahead of print. PMID: 34929670.
- Whitlow, A., **Cumbie, A.**, Eastwood, G. 2021., Pathogen prevalence in *Amblyomma americanum* and *Ixodes scapularis* ticks from Central Appalachian Virginia, U.S.A. *Journal of Vector Ecology*. 47(1), 51-60.
- Cumbie, A.N.**, Trimble, R.N. and Eastwood, G., 2022. Pathogen Spillover to an Invasive Tick Species: First Detection of Bourbon Virus in *Haemaphysalis longicornis* in the United States. *Pathogens*, 11(4), 454.
- Cumbie A.**, Whitlow, A., Arneson, A., Du, Z., Eastwood, G., 2022. The distribution, seasonal abundance and environmental factors contributing to the presence of the Asian longhorned tick (*Haemaphysalis longicornis*, Acari:Ixodidae) in central Appalachian Virginia. *Journal of Medical Entomology*. *In review*.

Presentations:

- Cumbie A.** Lagomorphs as Reservoir Hosts for the Agents of Lyme Disease, Anaplasmosis, and Powassan Virus Infection in Southwest Virginia. Virginia Academy of Sciences Annual Meeting. May 2022.
- Cumbie A.** Evidence of Tick-Borne Viruses in Local Tick Populations in Virginia. Mid-Atlantic Tick Summit. Virtual. March 2022.
- Cumbie A.** Spotted fever group rickettsiae in local tick populations in Virginia. Virginia Tech Department of Entomology Seminar Series. April 2021.

Cumbie A., Benham, S., Gauthier, D., Gaff, H., and W. Hynes. Bacterial community analysis in *Amblyomma maculatum* ticks from southeastern Virginia. Entomological Society of America. Entomology 2020 Virtual Annual Meeting, November 2020.

Cumbie A., W. Hynes, and H. Gaff. Hampton Roads Ticks and Tick-Borne Diseases 2019 Report. Mid-Atlantic Tick Summit, Laurel, Maryland, March 2020.

Cumbie A., E. Heller, Z. Bement, A. Phan, E. Walters, H. Gaff, and W. Hynes. Role of avian hosts in the spread and maintenance of *Borrelia* spp. and *Rickettsia* spp. in *Ixodes* spp. collected off birds in southeastern Virginia. Biology Graduate Student Organization. Norfolk, Virginia, March 2019. 'Peoples' Choice' winner

Cumbie A., E. Heller, Z. Bement, A. Phan, E. Walters, H. Gaff, and W. Hynes. Role of avian hosts in the spread and maintenance of *Borrelia* spp. and *Rickettsia* spp. in *Ixodes* spp. collected off birds in southeastern Virginia. The Third Siyababanga Workshop on Ticks and Tick-Borne Diseases, South Africa, November 2018.

Cumbie A., E. Heller, Z. Bement, A. Phan, E. Walters, H. Gaff, and W. Hynes. Role of avian hosts in the spread and maintenance of *Borrelia burgdorferi* in *Ixodes* spp. collected off birds in southeastern Virginia. American Society for Microbiology Virginia Chapter, Radford, VA, November 2018.

Cumbie A., E. Walters, H. Gaff, and W. Hynes. First report of *Candidatus Rickettsia mendelii*, in *Ixodes brunneus* ticks collected in the United States. American Society for Microbiology Virginia Chapter, Norfolk, VA, November 2017. 3rd place winner

Cumbie A., E. Walters, H. Gaff, and W. Hynes. First report of *Candidatus Rickettsia mendelii*, in *Ixodes brunneus* ticks collected in the United States. Virginia Mosquito Control Association, Portsmouth, VA, January 2018.

Posters:

Cumbie A., H. Gaff, and W. Hynes. *Dermacentor variabilis* and its associated rickettsiae in southeastern Virginia; the potential role of pathogen spillover from local sympatric tick species. American Society of Tropical Medicine and Hygiene Annual Conference. Virtual. November 2021.

Cumbie A., H. Gaff, and W. Hynes. *Dermacentor variabilis* in southeastern Virginia and changes in its associated rickettsiae influenced by pathogen spillover from other local tick species. Entomological Society of America International Virtual Symposium. April 2020.

Cumbie A., C. Espada, R. Nadolny, R. Rose, R. Dueser, W. Hynes, and H. Gaff. Small mammals as hosts for *Amblyomma maculatum* and their role in the enzootic cycle of

Rickettsia parkeri in southeastern Virginia. Virginia Mosquito Control Association, Virginia Beach, VA, January 2020. 2nd place winner

Cumbie A., E. Heller, Z. Bement, A. Phan, E. Walters, H. Gaff, and W. Hynes. Role of avian hosts in spread and maintenance of *Borrelia* spp. and *Rickettsia* spp. in *Ixodes* spp. collected off birds in southeastern Virginia. ODU Graduate Achievement Poster Fair, Norfolk, VA, March 2019.

Cumbie A., E. Heller, Z. Bement, A. Phan, E. Walters, H. Gaff, and W. Hynes. Role of avian hosts in spread and maintenance of *Borrelia* spp. and *Rickettsia* spp. in *Ixodes* spp. collected off birds in southeastern Virginia. Tick Summit, Patuxent Research Refuge, MD, March 2019.

Cumbie A., E. Walters, H. Gaff, and W. Hynes. First report of *Candidatus Rickettsia mendelii*, in *Ixodes brunneus* ticks collected in the United States. ODU Graduate Achievement Poster Fair, Norfolk, VA, March 2018.

Cumbie A., E. Walters, H. Gaff, and W. Hynes. First report of *Candidatus Rickettsia mendelii*, in *Ixodes brunneus* ticks collected in the United States. Tick Summit, Patuxent Research Refuge, MD, February 2018.

Cumbie, A., A. Morris, E. Walters, H. Gaff, and W. Hynes. Phenology of *Ixodes* spp. ticks on birds in southeastern Virginia and implication for the spread of *Borrelia burgdorferi*. ODU Graduate Achievement Poster Fair, Norfolk, VA, March 2017.

Cumbie, A., A. Morris, E. Walters, H. Gaff, and W. Hynes. Phenology of *Ixodes* spp. ticks on birds in southeastern Virginia and implication for the spread of *Borrelia burgdorferi*. Virginia Mosquito Control Association, Newport News, VA, February 2017.

Community Educational Outreach and Extension:

- **Invited Talks**

- VDACS Commercial Applicator Recertification Course. Public Health Pest Control Training Session. Spotted Fever Group Rickettsiae in Tick Populations. Jan. 5, 2022.
- American Society of Foresters 2021 Field Tour. Ticks and Tick-Borne Pathogens in Central Appalachia. Aug. 19, 2021.
- North Wilkes Middle School, Wilkes County Schools, NC. Ask an Entomologist Virtual Field Trip. Mar. 18, 2021.
- Zoetis. Veterinarian Tick Education Seminar. Ticks and Tick-borne Pathogens of Hampton Roads 2020. Feb. 25, 2020.
- Virginia Association of Forest Health Professionals. Annual Conference. Ticks and Tick-borne Diseases in Virginia. Jan. 29, 2020.

- Rappahannock Electric Cooperative. Multiple tick safety talks across four branch office. Aug. 13-15, 2019.
- **News Interviews**
 - Fox 5 Morning on WTTG-Fox 5. Tick and Meat Allergy. May 3, 2022.
<https://www.fox5dc.com/video/1064669>
 - WSLs Channel 10 News. Watch out! Experts say black-legged tick sightings surge during fall and into winter. Oct. 25, 2021.
<https://www.wsls.com/news/local/2021/10/25/watch-out-experts-say-black-legged-tick-sightings-surge-during-fall-and-into-winter/>
 - NBC 4 News. Ticks in the DC Area: How to Be Safe This Summer. July 6, 2021.
<https://www.nbcwashington.com/news/local/ticks-in-the-dc-area-how-to-be-safe-this-summer/2710704/>
 - The News and Advance. Students conduct tick research on Amherst county farm. July 4, 2018. Physical newspaper.
- **Community Events**
 - Girl Scout Day 2022- Society of Women Engineers virtual STEM chats in conjunction with the Alwood Society at the Virginia Tech Dept of Entomology and the Girl Scouts of Skyline Drive. April 2, 2022.
 - Hokie Bug Fest virtual booth. Virginia Tech, Dept of Entomology. October 2, 2021.
 - Virtual LAB Chat as part of RCPS's 21st Century Community Learning Center Program. Westside Elementary School. May 4, 2021.
 - Ticks and Mosquitoes of Virginia. Earth Day event hosted by Beliveau Winery. Blacksburg, VA. April 24-25, 2021.
 - Girl Scouts of Colonial Coast: Virtual Summer Program. Tick Safety During Summer Activities (Video). Chesapeake, VA. Summer 2020.
 - Virginia Beach Winter Wildlife Festival. Virginia Beach, VA. January 25, 2020.
 - Newport News Bug Fest. Yorktown, VA. June 30, 2018.
 - Girl Scouts of Colonial Coast. World Environment Day. Chesapeake, VA. June 2, 2020.
 - Girl Scouts of the Colonial Coast. Zoo Fest. Norfolk, VA. April 15, 2018.
 - Hoffer Creek Wildlife Foundation. Wings and Things Spring Fling. Portsmouth, VA. March 25, 2018.
 - Zoetis. Continuing Education Day for Veterinarians, Norfolk, VA. January 27, 2018.
- **Other Volunteer Activities**
 - Animal Hope Alliance. Animal care volunteer. Christiansburg, VA. Jan. 2021-present.
 - Hidden Springs Mission. Mission worker and children's mentor. Navajo Reservation (Tuba City, AZ). July 2021, Dec. 2021, and July 2022.

- First Church at Port Warwick. Children’s Ministries. Newport News, VA. 2018-2020.
- Biology Graduate Student Organization. Local wetland clean-ups. Norfolk, VA. 2016-2020.
- Cat Rescue Inc. Animal care volunteer. Chesapeake, VA. 2016-2020.

Professional Associations:

- Mid-Atlantic Mosquito Control Association. 2021-present
- Society of Vector Ecology. 2021-present
- The Alwood Society in the Virginia Tech Dept of Entomology. 2021-present.
- American Society of Tropical Medicine & Hygiene. 2020-present
- Virginia Academy of Science. 2020-present
- Entomological Society of America, 2020-present
- Virginia Mosquito Control Association, 2016-present
- National Center for Faculty Development and Diversity, 2018-2020
- Fellowship of Women in Science, Old Dominion University, 2016-2020
- Biology Graduate Student Organization, Old Dominion University, 2016-2020

Professional Services:

- Member of the Website Committee with the Virginia Mosquito Control Association. 2022-2023.
- Member of the Student Competition Committee with the Virginia Mosquito Control Association. 2022-2023.
- Member of the Photography Committee with the Virginia Mosquito Control Association. 2022-2023.
- Entomology Social Committee, Department of Entomology, Virginia Tech. 2021-2022.

Grants and Awards:

- 2021. Virginia Academy of Sciences Small Research Grant, \$1250.
- 2017-2020. ODU Biology Graduate Student Organization Research and Travel Award, \$1200.
- 2018. American Society for Microbiology- Virginia Branch Travel Award, \$75.
- 2017. American Society for Microbiology- Virginia Branch 3rd Place in Presentations Annual Meeting Award, \$50.
- 2016. ODU Student Engagement and Enrollment Services, \$200.

Assistantships and Fellowships:

- 2021. Postdoctoral Fellowship, Virginia Tech, Entomology Department under advisor Gillian Eastwood, \$45,000.
- 2017-2020. Graduate Research Assistantship, Old Dominion University Research Foundation, NIH/NSF EEID grant awarded to Holly Gaff, \$67,000.
- 2015-2017. Graduate Teaching Assistantship, Old Dominion University Dept of Biology, Anatomy and Physiology Lab, \$38,000 + tuition waver.