

### **Imagining Innovative Applications of the One Health Commission's Mission**

Although the One Health concept is gaining popularity in academic and professional research institutions, highly interdisciplinary One Health research is still the exception rather than the norm in higher education which is unfortunate given the utility of One Health science in addressing complex problems at the intersection of animal, human, and environmental health. If the OHC were to target specific barriers to the adoption of the One Health concept, I believe the rate of adoption would increase exponentially and with it, the advancement of One Health.

The first barrier lies in academia. Students and young researchers have difficulty gaining the diverse skills necessary for completing their unique projects and struggle with communication barriers and mixed expectations of committee members from different disciplines. I propose that the OHC could serve as a resource by acting as a repository for information on how to mitigate these challenges and hosting an online forum where students and professionals can pose questions and act as mentors. The forum enables the OHC to crowdsource innovative strategies for overcoming this barrier and supporting more One Health science while simultaneously positioning itself as a leader in facilitating interdisciplinary research. University partners of OHC could collaborate in this endeavor by directing students to the OHC website and jointly sponsoring on-campus symposia that include workshops and discussion about overcoming challenges in pursuing One Health research. By sharing successful strategies, providing a support system for researchers, and creating an online platform for the exchange of ideas in One Health, the OHC can facilitate increased production of One Health research at academic and professional institutions. With more researchers engaged in productive One Health science, it would be possible to have a greater impact on global health issues and perhaps even reach a proactive, rather than reactive, position for protecting human, animal, and environmental health.

The second barrier lies in educating and engaging the public. Considering the significant impact on public health strategies and newsworthiness of One Health science, it's surprising that a majority of the public has never heard of it. A great deal of media attention has erupted in recent years around topics of One Health such as zoonotic diseases, repercussions of agricultural practices, and the proliferation of antimicrobial resistance. Despite the popularity of these topics however, scientists and science reporters have failed to adequately communicate the driving concept behind them: One Health. I propose that the OHC serve as a conduit for disseminating One Health science to the general public by becoming active in social and online media. The OHC could share new scientific research and easily digestible aspects of the One Health concept. By reaching outside of the typical academic and professional channels, the OHC can influence a wider audience and elevate the discussion around One Health science. Not only would this help to close the gap in the conversation between scientists and the public, it would expose younger generations to the One Health concept at an earlier age and drive the public demand for One Health science.

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## EDUCATION

**Ph.D. Ecology**, *in progress*, University of California Davis, 2014 - present

**M.S. Wildlife Science**, Virginia Polytechnic Institute and State University, 2011

**B.S. Biology**, Virginia Polytechnic Institute and State University, 2007

**B.S. Wildlife Science**, Virginia Polytechnic Institute and State University, 2006

## RESEARCH AND PROFESSIONAL EXPERIENCE

### **Graduate Student, Graduate Group in Ecology**

**June 2014 to Present**

Foley Laboratory of Infectious Disease Ecology, University of California at Davis, Davis CA

*Disease ecology, endangered species population management, conservation genetics, and One Health.*

- Collaborator on an *ad hoc* team including state and federal agencies as well as and local stakeholders for the conservation of the Amargosa vole (*Microtus californicus scirpensis*) and its associated habitat
- Laboratory scientist for the diagnostic testing of vector-borne diseases
- Colony manager for the captive breeding of endangered Amargosa voles
- Contributor to laboratory publications and grant submissions
- Social media manager for the Amargosa Vole Conservation Project
- Campaign manager for crowdfunding endeavors

### **Project Director, Prescriptive Software Designer, and Blog Manager**

**September 2012 to May 2014**

Rural System, Inc., Blacksburg VA

*A company engaging in entrepreneurial avenues of applied science with a focus on ecological principles and systems approach.*

- Directed innovative projects leading to company development, funding acquisition, and outreach efforts to connect with the target audience.
- Directed projects in collaboration with the Cabell Brand Center and Kissito Healthcare in rural Virginia and Uganda.
- Established collaborative agreements with researchers, state cooperative extension agents, and local community organizations.
- Motivated a dynamic team of founding members to investigate new business directions and concepts.
- Developed federal grant proposals, business plans, and educational materials to disseminate to stakeholders and the public.
- Designed a novel software application *SoilSmartRx* as an example of prescriptive software.
- Managed the Rural System Blog site as well as contributed posts to share ideas with the public.

### **Executive Director**

**November 2012 to May 2014**

The Cabell Brand Center for Global Poverty and Resource Sustainability, Salem VA

*A non-profit dedicated to improving society by targeting the nexus of poverty, natural resources, and peace.*

- Contributed to revising the strategic plan to include sustainable revenue and operational strategies.
- Promoted cohesion and synergy among diverse team members.
- Designed and executed the event "Poverty Today: Challenges and Opportunities" including establishing a budget, fundraising, securing speakers, reviewing abstracts and commentating.
- Established collaborative projects with a non-profit based in a developing region of Uganda.

- Coordinated projects with Kissito Healthcare International “UGANDA ONE” involving sustainable development, Mt. Elgon zone reforestation, and clean drinking water in the Mbale region including field assembly of biological filters for household water purification.
- Managed social media outlets and enhanced public visibility of the Center.

**Graduate Researcher, Laboratory Technician and Manager**

**December 2009 to April 2012**

Wildlife Health Lab, Virginia Tech, Blacksburg VA

*Disease emergence at the human-wildlife interface, transmission dynamics of zoonotic diseases, water quality and human health. Thesis “Tracking Pathogen Transmission at the Human-Wildlife Interface: Banded Mongoose (*Mungos mungo*) and *Escherichia coli* as a Model System in Chobe, Botswana”*

- Developed an ecological model using Banded Mongoose as a sentinel species to research the transmission dynamics of microorganisms between humans and wildlife at the interface of a borderless national park protecting numerous endangered species.
- Conducted international field work for a total of 7 months in the developing region of Chobe, Botswana.
- Researched *Brucella abortus*, *Mycobacterium mungi*, *Aeromonas salmonicida*, and *Escherichia coli*.
- Coordinated and managed multiple ongoing research projects at both the university and field labs.
- Optimized standard PCR, BOX-PCR, and Multilocus Sequence Type-PCR phylogenetic analysis techniques for application to this study as well as conducted Rose Bengal and FPA testing.
- Developed expertise in the culture of *Escherichia coli* and extraction of DNA from numerous animal and environmental sources.
- Created and evaluated modified laboratory techniques in DNA extraction, bacterial culture and antibiotic susceptibility testing for use in challenging field conditions.
- Analyzed data using Arlequin population genetics, FPQuest, and Geneious bioinformatics software.
- Performed non-invasive sample collection by tracking numerous species including radio tracking of Banded Mongoose.
- Performed capture, immobilization, handling, collaring, and blood collection from Banded Mongoose.
- Performed capture, handling, treatment, and sampling from numerous injured or sick wildlife species.
- Led transect sampling efforts for the collection and identification of fecal samples from over 23 species of wildlife and collection of grab water and sediment samples.
- Supervised and trained up to 6 laboratory researchers and field assistants from diverse backgrounds.
- Developed grant proposals, publications, IACUC protocols, and standard operating procedures for BSL-2.
- Performed lab management duties including purchasing, grant budgeting, and safety compliance.

**Research Technician, Research and Development**

**August 2009 to December 2009**

TechLab, Inc., Blacksburg VA

*Medical corporation which develops, manufactures, and distributes rapid non-invasive intestinal diagnostics for gastrointestinal pathogens.*

- Researched and developed rapid bench-top assays for identification of *Clostridium difficile* infection.
- Performed enzyme linked immunosorbent assays (ELISAs) and evaluated results qualitatively and quantitatively.
- Performed DNA extraction, PCR, anaerobic bacterial culture, lateral flow tests, and clinical data collection.

**Laboratory Specialist II****August 2007 to August 2009**

Molecular Neuroendocrinology and Genetics Lab, Virginia Tech, Blacksburg VA

*Role of bHLH transcription factors in hypothalamic gene expression, especially in the regulation of body weight, exercise and motivation using transgenic and knockout mice as model animals.*

- Managed genotyping, breeding, and record keeping for 3 strains of BSL-1 knockout and mutant mice
- Conducted lab management duties including purchasing, grant budgeting, and safety compliance.
- Supervised and trained up to 7 laboratory researchers from diverse backgrounds.
- Performed DNA and RNA isolation, standard and real time PCR, primer design, gene sequence analysis.
- Performed electron mobility shifting assays (EMSA) and assisted in cell culture.
- Conducted and supervised individual research projects and data analysis for technical reports.
- Developed standard operating procedures and IACUC addendums.
- Contributed to the development of grant proposals

**Research Specialist, Field Station****May 2006 to August 2007**

Yerkes National Primate Research Center, Emory University, Lawrenceville GA

*Center for primate breeding, behavioral research, vaccine development and production of specific-pathogen-free (SPF) animals. Captive population studies for applied international conservation practices as well as insights for cognitive capacity and social behavior of primates.*

- Conducted venipuncture and Ketamine anesthesia for simian immunodeficiency virus (SIV) and Herpes simian B virus positive primates.
- Conducted blood, tissue, and bone sample collection and processing in a BSL-2 environment.
- Produced genealogies, dominance hierarchies and cohort life tables.
- Performed behavioral observations, assisted with veterinary care and overall colony management for over 500 Rhesus macaques (*Macaca mulatta*) and over 60 Sooty Mangabeys (*Cercocebus atys*).
- Conducted capture, handling, training, health surveys, and enrichment activities for captive primates.

**Student Technician****August 2004 to August 2005**

Marcella Kelly's Camera Trapping Lab, Virginia Tech, Blacksburg VA

*Remote sensing photography for studying the ecology and population dynamics of mammal species, especially large predatory cats as well as ecosystem biodiversity for conservation purposes.*

- Led outings to set cameras in the appropriate location using GPS and compass orienteering.
- Managed camera equipment and maintenance.
- Performed distinct jaguar identification using spot pattern method.
- Performed identification of diverse species, counts, and data entry.

**Student Technician****September 2002 to May 2004**

Neural Basis of Behavior Lab, Virginia Tech, Blacksburg VA

*Neuroethology and sensory ecology using knockout mice, Drosophila, newts and frogs as model animals.*

- Completed the undergraduate project "Learned Auditory Compass Orientation in C57BL/6J Mice"
- Performed experiments using the specialized testing arena canceling out the natural magnetic field.
- Trained experimental animals prior to testing.
- Performed all aspects of animal husbandry and colony management of 3 strains of knockout mice.
- Recorded experimental data, performed analysis and developed technical reports.
- Colony management of two strains of transgenic C57BL/6J mice

## **PUBLICATIONS**

**Pesapane, R.,** M. Ponder, et al. (2013). "Tracking Pathogen Transmission at the Human–Wildlife Interface: Banded Mongoose and Escherichia coli." *EcoHealth*: 1-14.

Alexander KA , Blackburn JK , Vandewalle ME , **Pesapane R** , Baipoledi EK , et al. (2012) "Buffalo, Bush Meat, and the Zoonotic Threat of Brucellosis in Botswana." *PLoS ONE* 7(3): e32842.doi:10.1371/journal.pone.0032842

**Pesapane, R.** (2009). Seizures in a colony of genetically-obese mice. *Lab Animal* 38(3):81

(in prep) **Pesapane, R.,** Roy, A., Enge, B., Burns, J. Bronson, L., Clifford, D., and Foley, J.E. "Island in the Sun: The absence of Sin Nombre Virus in an isolated Mojave Desert wetland"

## **AWARDS AND HONORS**

National Science Foundation Graduate Research Fellowship Program Award (2015)

National Science Foundation S-STEM Scholar (2010-2012)

Who's Who Among Students in American Universities and Colleges (2011-2012)

Burd Sheldon McGinnes Graduate Fellowship (2011)

Exemplary Interdisciplinary Research of the Year 2011 Award (2011)

2<sup>nd</sup> Place, Oral Presentation, 27<sup>th</sup> Annual Graduate Research Symposium (2011)

Graduate Research Development Program Award (2010)

Phi Sigma Biological Sciences Honor Society, Alpha Psi Chapter (2010-2012)

Gamma Sigma Delta Honor Society of Agriculture (2011)

Iota Delta Rho Interdisciplinary Research Honor Society (2010-2012)

## **LEADERSHIP & OUTREACH**

### **President, Founding Member**

**2011 to 2012**

Iota Delta Rho Interdisciplinary Research Honor Society, Virginia Tech, Blacksburg VA

- Orchestrated two conferences and one symposium for over 150 participants including establishing a budget, fundraising, booking speakers, reviewing abstracts and commentating.
- Hosted monthly "spotlight speaker" events to engage researchers in interdisciplinary discussion.

### **Program Chair**

**2011 to 2012**

Graduate – Undergraduate Mentoring Program (GUMP), Virginia Tech, Blacksburg VA

- Redesigned and implemented the entirety of the GUMP program to include shadowing and immersion opportunities for an in-depth understanding of graduate life.
- Recruited over 50 participants from colleges across campus in its pilot year alone.
- Designed applications, program requirements, created announcements, and held information sessions.
- Evaluated student experience and partnered with the Office of Undergraduate Research to improve available opportunities for undergraduate research.

### **Committee Member**

**2011 to 2012**

University Strategic Planning 2012-2016 Student Advisory Committee, Virginia Tech, Blacksburg VA

- Motivated the university to create undergraduate and graduate level interdisciplinary degree programs.
- Motivated the university to consider further expanding on experiential learning opportunities.

**Educational Volunteer****2010-2012**

Center for African Resources: Animals, Communities, And Lands (CARACAL), Botswana non-profit

- Student tours of the biodiversity center
- Guest visits to local classrooms for ecological education displays

**TEACHING AND PRESENTATION EXPERIENCE****Graduate Teaching Assistantships:**

Principles of Ecology and Evolution, BIS 2B Laboratory Section, UC Davis (2015)

Structure and Function of Biomolecules, BIS 102, UC Davis (2014)

Principles of Fisheries and Wildlife Management, FiW 2114, Virginia Tech (2011)

Wildlife Biology, FiW 2314, Virginia Tech (2011)

**Guest Lectures:**

“Parasitism, Immune Defense, and Sexual Selection” FiW 4984, Virginia Tech (2011)

“Applications in Wildlife Disease Ecology” The Wildlife Society meeting, Virginia Tech (2011)

**Moderator:**

Panel Discussion “Should I Stay or Should I Go? The pros and cons of staying for graduate school at your undergraduate institution.” Tenth Annual Undergrad Research Conference, Virginia Tech (2012)

**Conference Presentations:**

International Conference on Emerging Infectious Disease (ICEID) “Tracking Pathogen Transmission at the Human-Wildlife Interface” Center for Disease Control (2012). Oral presentation.

American Society for Microbiology, Annual Meeting “Tracking Pathogen Transmission at the Human-Wildlife Interface” Virginia Tech (2011). Oral presentation.

27<sup>th</sup> Annual Graduate Research Symposium “Tracking Pathogen Transmission at the Human-Wildlife Interface” Virginia Tech (2011). Oral presentation.

6<sup>th</sup> Annual Undergraduate Research and Prospective Graduate Student Conference “ESA Recovery Plan Review: Biological Predictors of Success” Virginia Tech (2008). Poster presentation.