

# J. Royden Saah

*Curriculum Vitae*

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## SUMMARY OF QUALIFICATIONS

- Established operational protocols in North Carolina and Liberia during Ebola outbreak (see Honors & Awards 2014-2015)
- Experience in multiple crisis response models including Global Health (Médecins Sans Frontières), US Civilian (Incident Command System), and US Military (USMCR)
- External planner & evaluator of CDC-wide emergency response exercise (see Honors & Awards 2013)
- National Special Security Event preparations and response (see Honors & Awards 2012)
- Led laboratory activities across NC during 2003 SARS-coronavirus outbreak
- Coordinated pathogen & evidence acquisition, assessment and transfer between FBI, CDC and NC Public Health during 2001 anthrax attacks

## EPIDEMIC LEADERSHIP EXPERIENCE

**Senior Manager**, Bioterrorism and Emerging Pathogens (BTEP) Unit,  
North Carolina Department of Health and Human Services (NCDHHS), Raleigh, NC  
*June 2004-February 2016*

- Routinely collaborated with FBI and Secret Service partners during and outside of emergency situations, adapting to constantly changing projects, priorities and schedules
- Managed all high-consequence pathogen testing operations in North Carolina (population: 9 million, 24/7 response)
- Developed BTEP Strategic Plan through methodical stakeholder/team engagement
- Trained and worked within Incident Command System when implemented in NC
- Prepared hospital laboratories and biosafety activities in response to outbreaks including Ebola, SARS, MERS, Monkeypox, Anthrax and other pathogens
- Evaluated, developed and executed major portion (\$1.1-2.5M *per annum*) of the Centers for Disease Control and Prevention (CDC) Preparedness Grant
- Created the North Carolina Laboratory Response Forum consisting of Academic Laboratory Directors, Public Health Epidemiologists, veterinarians and other agenda participants
- Organized, managed and evaluated the operations of 4 laboratories including staff travel, unit program development (publications/reports/positions statements/presentations), and partner engagement

**Biosafety Referent, Médecins Sans Frontières/Doctors Without Borders, Monrovia, Liberia**

*February & March 2015-Ebola Response*

- Brought the pediatric hospital laboratory into operation during West African Ebola outbreak.
- Coordinated blood/body fluid biosafety during the construction, hiring and protocol development for MSF's Bardnesville Junction Hospital
- Coordinated the development of Blood Transfusion Protocols during Ebola outbreak
- Consulted to strengthen biosafety practices at James N. Davies Jr. Memorial Hospital
- Strengthened key Ministry of Health partners including the National Blood Safety Program Director, National Ebola Laboratory Coordinator, and other health system partners via engagement/coordination
- Hired, trained, and supervised national and expatriate MSF staff
- Current Status of Hospital: <https://www.youtube.com/watch?v=UcBLE8kQtf8>

**Cooperative Biological Engagement Program Consultant, American Society of Clinical Pathology/Defense Threat Reduction Agency (DTRA)**

*November - December 2014 Part-Time*

- Created a practical and written competency exam to pilot in the former Soviet Republic of Georgia-Medical Laboratory Qualification Program

**Infectious Disease/Global Health Consultant, Public Health Laboratory Twinning Project, CDC/Guyana Ministry of Health/Association of Public Health Laboratories, GUYANA**

*June 2008-June 2015, Annual Short-Term Consultations*

- Engaged Guyana Ministry of Health to conduct formal evaluations of the newly commissioned Guyana National Public Health Reference Laboratory (NPHRL) and initiate and/or strengthen capabilities
- Coordinated 9 staff exchanges between Guyana Ministry of Health and North Carolina State Laboratory of Public Health that included technical trainings, mentoring senior management, and strengthening both quality and safety to further develop the NPHRL
- Supported the strategic plan development and implementation for the NPHRL
- Assisted with emergency response to infectious disease emergencies – H1N1, Chikungunya, etc.

**Public Health Scientist, BTEP Unit, NCDHHS, Raleigh, NC**

*October 2002-June 2004*

- Created and implemented technologies to safely detect microbial and toxin threat agents and emerging pathogens
- Planned and led the laboratory Severe Acute Respiratory Syndrome (SARS) Response for NCDHHS
- Interfaced with partners, including epidemiology, emergency operations center, hospitals to prepare for and respond to infectious disease emergencies

**Laboratory Medical Specialist, BTEP Unit, North Carolina State Laboratory of Public Health, NCDHHS, Raleigh, NC**

*November 2001-September 2002*

- Analyzed threat samples from law enforcement agencies for the presence of biological weapons such as *Bacillus anthracis* and ricin using CDC methodologies

- Performed research and analyses on birds (*Corvidae*) and mosquito pools to detect and determine prevalence of West Nile Virus
- Implemented new diagnostic capability for *Francisella tularensis*, *Yersinia pestis*, ricin toxin, pox virus and other agents of concern for BTEP Unit

**Chief Microbiologist**, Food and Drug Protection Division, North Carolina Department of Agriculture, Raleigh, NC

*June 2000-October 2001*

- Managed the interactions between the Microbiology Branch and other State or Federal agencies including: Food and Drug Administration (FDA), Environmental Protection Agency (EPA), U. S. Department of Agriculture, Meat and Poultry Inspection Service (NCDA&CS), and NC Department of Health and Human Services
- Directed internal and external operations of the Microbiology Branch consisting of 15 employees in 4 sections (Food & Dairy, Meat & Poultry, Feed, Disinfectant Efficacy, and Media Preparation)
- Represented the Department of Agriculture during outbreak investigations

## OTHER TECHNICAL/SCIENTIFIC EXPERIENCE

**Program Coordinator**, Genetic Biocontrol of Invasive Rodents Program (GBIRd), Island Conservation, Santa Cruz, CA/Raleigh, NC

*February 2016 - Present*

- Coordinate activities for 30 people across 7 institutions in New Zealand, Australia and the US to develop biotechnology for conservation goals, ensuring principled approach and responsible societal engagement
- Synthesize partnership structure including Charter and 5 year \$30M business plan
- Establish engagements and presentations at high impact venues, including the White House (Office of Science and Technology Policy), the African Union (AUDA), and the United Nations (Convention on Biological Diversity), to describe our biotechnology and the potential benefit to global stability
- Managed engagement with Defense Advanced Research Project Agency (DARPA) and subsequent activities associated with \$2.8M Safe Genes Award (2016-2018)
- Visiting Scientist with CSIRO (Commonwealth Scientific and Industrial Research Organization) in Australia *May-Aug 2017*
- Communicate with parties to ensure accurate and relevant information is conveyed in the development of intergovernmental policies in the UN Convention on Biological Diversity and International Union for Conservation of Nature (IUCN)
- Develop Memorandum of Understanding and guide through the multilateral governmental approval processes – including US State Department
- Cross-cultural communication skills necessary to work in multiple countries and within intergovernmental agencies (UN & IUCN)

**Research Technician III**, Department of Microbiology/USDA-ARS, NC State University, Raleigh, NC

*March 1997 - June 2000*

- Utilized multiple, highly conserved RNA sequences to demonstrate that the genus *Azotobacter* is fundamentally intermingled with the phylogenetic clade *Pseudomonas*
- Isolated and characterized molybdenum-independent nitrogen-fixing bacteria in a variety of environmental samples including marine, estuary, lake, soil, and wastewater treatment plants

- Designed and implemented competition experimentation to elucidate the evolutionary advantage for an alternative nitrogenase in nitrogen fixing bacteria
- Devised and executed experiments to determine whether an exopolysaccharide biofilm produced by *Azotobacter* spp. acts as a barrier to nitrogen sources or metals to create differences between macro and microenvironments

**Research Technician III**, Depts. of Biochemistry & Microbiology, NC State University, Raleigh, NC

*July 1992- May 1995*

- Designed and conducted extensive experimentation that led to the discovery that the *Escherichia coli* hydroperoxidase II (HPII) gene, *katE*, is repressed by Fumarate Nitrate Reductase (FNR) at the transcriptional level
- Described the mechanism of Ferric Uptake Regulation (FUR) protein-mediated activation of HPII, showing its facilitation of the  $\Delta$ -aminolevulinic acid phase of heme biosynthesis at the translational level

## INSTITUTIONAL & COMMITTEE AFFILIATION

### International

- **Task Force on Human Health and Ecosystem Management** – IUCN July 2019-present
- **Gene Drive Research Forum** – Foundation for the National Institutes of Health 2018-present
- **Commission on Ecosystem Management** – IUCN July 2019-present
- **US National Committee** – IUCN July 2019-present
- **International Society on Biosafety Research**: 2019-present
- **Guyana Country Lead**: Association of Public Health Laboratories (APHL), President's Emergency Plan for Aids Relief (PEPFAR) funded CDC collaboration: 2012-2016
- **APHL Global Health Committee**: 2013-2016
- **African Society for Laboratory Medicine**: 2014-2017

### National

- **APHL Biosafety & Biosecurity Committee**: 2015-2017
- **APHL Emergency Preparedness and Response Committee**: 2009-2015
- **National Special Security Event Planning Committee (US Secret Service)**: 2012
- **CDC Risk Communication Measurement Subgroup**: CDC PH Emergency Prep. Grant, 2008-2010
- **CDC Biosurveillance Measurement Subgroup**: CDC PH Emergency Preparedness Grant, 2008-2010

### State of North Carolina

- **NC Laboratory Response Forum, Founder/Coordinator**: Established 2006-2016
- **NCSU Institutional Biosafety Committee**: 2002-2011
- **Laboratory Subcommittee, (NC Food Safety and Defense Task Force)**: 2003-2011 (Chair 2006-2008)
- **NC State Laboratory of Public Health (NCSLPH) Select Agent Program**:
  - Responsible Official: 2012-2015
  - Alternate Responsible Official: 2007-2012
  - Principal Investigator: 2003-2007
- **North Carolina Listeriosis Outbreak Task Force**: 2000-2001

## EDUCATION

MS, Microbiology, 2000, North Carolina State University, Raleigh, NC

**Thesis Title:** The role of Arc, FNR, and Fur in the expression of *katE*, *katG*, and *hemA*: Effects on Hydroperoxidases in *Escherichia coli*

BS, Zoology, 1990, North Carolina State University, Raleigh, NC

## MANAGEMENT CERTIFICATIONS

CPM, 2010, Certified Public Management Program, National Certified Public Manager® Consortium, Raleigh, NC

## HONORS & AWARDS

- **Certificate of Recognition** – NC Public Health Association: For outstanding work preparing for and responding to potential Ebola response needs in North Carolina 2015
- **Director's Recognition Award** – CDC: National Center for Emerging and Zoonotic Infectious Diseases: For outstanding effort in evaluating CDC leadership and Emergency Operations Center during the CDC-wide exercise to test response capabilities 2013
- **FBI Certificate of Recognition** – Director Robert Muller: For work during a National Special Security Event 2012
- **CDC Certificate of Appreciation** – National Biosurveillance Metrics Development, Public Health Emergency Preparedness Cooperative Agreement 2008: These metrics were applied to >\$1B of grant funding

## TEACHING AND WORKSHOP EXPERIENCE

- **Workshop Coordinator** – Improving Homing Endonuclease Efficiency 2019
- **Moderator and Presenter** – FBI's Joint Criminal and Epidemiological Investigation Workshop 2013
- **Moderator and Presenter** – NCDHHS Clinical Laboratory Preparedness Workshop 2002-Present (3x annually)
- **Guest Lecturer** – NCSU Microbiology Department 2006-2016 (various guest lectures)
- **Presenter** – FBI Weapons of Mass Destruction Comprehensive Integrated Training & Exercise 2009
- **Presenter** – Forensic Epidemiology Training Course 2003-2006 (annually)
- **Presenter** – NC Office of Chief Medical Examiner Medical Legal Seminar 2001
- **Instructor** – NCSU Microbiology Laboratory 1999
- **Instructor** – UNC Pre-College Program, Mathematics and Science Education Network 1999

## REPORTS AND GUIDANCE DOCUMENTS

- **GBIRd Business Plan (\$30M, 5-year plan)** – 2019
- **GBIRd Steering Committee Charter** – 2019
- **Multilateral Memorandum of Understanding** – 2017
- **Biological Risk Assessment for Laboratory Associated Activities in Ebola Context** –2015
- **BTEP Annual Reports and Strategic Plans** – Multiple
- **International Laboratory Assessments** – Multiple
- **Carbapenem-Resistant Enterobacteriaceae Screening and Confirmatory Testing for Infection Control Purposes in North Carolina** – 2014
- **Prevention and Management of Laboratory Exposure to *Brucella*** – 2011

## PUBLICATIONS

### Peer Reviewed and Invited Manuscripts

Godwin J., M. Serr, S.K. Barnhill-Dilling, D.V. Blondel, P.R. Brown, K. Campbell, J. Delborne, A.L. Lloyd, K.P. Oh, T.A.A. Prowse, **R. Saah**, and P. Thomas. 2019. Rodent gene drives for conservation: opportunities and data needs. *Proc. R. Soc. B* 286: 20191606.

<http://dx.doi.org/10.1098/rspb.2019.1606>

Sudweeks J., B. Hollingsworth, D.V. Blondel, K.J. Campbell, S. Dhole, J.D. Eisemann, O. Edwards, J. Godwin, G.R. Howald, K. Oh, A.J. Piaggio, T.A.A. Prowse, J.V. Ross, **J.R. Saah**, A.B. Shiels, P. Thomas, D.W. Threadgill, M.R. Vella, F. Gould, A.L. Lloyd. 2019. Locally Fixed Alleles: A method to localize gene drive to island populations. *Sci Rep.* 9: 15821.

<https://doi.org/10.1038/s41598-019-51994-0>

Campbell K.J., **J.R. Saah**, P.R. Brown, J. Godwin, F. Gould, G.R. Howald, A. Piaggio, P. Thomas, D.M. Tompkins, D. Threadgill, J. Delborne, D.M. Kanavy, T. Kuiken, H. Packard, M. Serr and A. Shiels. A potential new tool for the toolbox: assessing gene drives for eradicating invasive rodent populations. In: C.R. Veitch, M.N. Clout, A.R. Martin, J.C. Russell and C.J. West (eds.) 2019. Island invasives: scaling up to meet the challenge, pp. 6–14. Occasional Paper SSC no. 62. Gland, Switzerland: IUCN.

<https://research.ncsu.edu/ges/files/2019/03/IUCN-potential-new-tool-for-the-toolbox-Assessing-gene-drives-for-eradicating-invasive-rodent-populations-Campbell-et-al-2019.pdf>

Hutchins, A., M. Astwood, **J.R. Saah**, P.A. Michel, B.R. Newton, and L.A. Dauphin. Evaluation of automated and manual DNA purification methods for detecting *Ricinus communis* DNA during ricin investigations. 2014. *Forensic Sci. Int.* 236C:10-15.

<https://doi.org/10.1016/j.forsciint.2013.12.011>

Husain, M., J. Jones-Carson, L. Liu, M. Song, **J.R. Saah**, B. Troxell, M. Mendoza, H. Hassan, and A. Vazquez-Torres. 2014. Ferric uptake regulator-dependent antinitrosative defenses in *Salmonella enterica* serovar Typhimurium pathogenesis. *Infect. Immun.* 82:1 333-340.

<https://doi.org/10.1128/IAI.01201-13>

Traxler, R.M., M.A. Guerra, M.G. Morrow, T. Haupt, J. Morrison, **J.R. Saah**, C.G. Smith, C. Williams, A.T. Fleischauer, P.A. Lee, D. Stanek, I. Trevino-Garrison, P. Franklin, P. Oakes, S. Hand, S.V. Shadomy, D.D. Blaney, M.W. Lehman, T.J. Benoit, R.A. Stoddard, R.V. Tiller, B.K. De, W. Bower, and T.L. Smith. 2013. Review of Brucellosis Cases from Laboratory Exposures in the United States, 2008-2011 and Improved Strategies for Disease Prevention. *J. Clin. Microbiol.*, 51:9 3055-3062. <https://doi.org/10.1128/JCM.00813-13>

Sautter, R.L., J. Holmes, S. Maynard, and **J.R. Saah**. 2012. Brucellosis, an Age-Old Infection Now Associated with Bioterrorism. American Society of Clinical Pathology Checksample® Microbiology: No. MB12-7 (MB-388).

Pien, B.C., **J.R. Saah**, S.E. Miller, and C.W. Woods. 2006. Use of Sentinel Laboratories by Clinicians to Evaluate Potential Bioterrorism and Emerging Infections. *Clin. Infec. Dis.*, 42:1311-1324. <https://doi.org/10.1086/503260>

MacDonald, P.D.M., R.D. Whitwam, J.D. Boggs, J.N. MacCormack, K.L. Anderson, J.W. Reardon, **J.R. Saah**, L.M. Graves, S.B. Hunter, and J. Sobel. 2005. Outbreak of Listeriosis among Mexican Immigrants Caused by Illicitly Produced Mexican-style Cheese. *Clin. Infect. Dis.*, 40(5):677-682. <https://doi.org/10.1086/427803>

Loveless, T.M., **J.R. Saah**, and P.E. Bishop. 1999. Isolation of nitrogen-fixing bacteria containing molybdenum-independent nitrogenases from natural environments. *Appl. Environ. Microbiol.* 65(9) 4223-4226. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC99764/>

Kroll, J.S., P.R. Langford, **J.R. Saah**, and B.M. Loynds. 1993. Molecular and Genetic Characterization of Superoxide Dismutase in *Haemophilus influenzae* type b. *Mol. Microbiol.* 10(4) 839-848. <https://doi.org/10.1111/j.1365-2958.1993.tb00954.x>

## Selected Invited Presentations

**Saah, J.R.**, J. Godwin, and K. Oh. 2019. Genetic Biocontrol of Invasive Rodents Program: Annual GBIRD Update. Presented at the Gene Drive Research Forum, African Union Headquarters, Addis-Ababa, Ethiopia.

**Saah, J.R.** 2019. Safeguarding Gene Drive Research: Measures to Support Responsible Research Using Gene Drives. Presented at the 15<sup>th</sup> Symposium of the International Society for Biosafety Research, Terragona, Spain.

**Saah, J.R.** 2018. Annual Program Update. Presented at GBIRD Annual Meeting Exmouth, WA, Australia.

**Saah, J.R.**, D. Tompkins, O. Edwards, and K. Campbell. 2017. Genetic Biocontrol of Invasive Rodents Program: Innovative Development for Preventing and Responding to Extinction Threats, Pandemics and Food Insecurity. Presented at the Pandemic Prediction & Forecasting Science & Technology Working Group, The White House, Washington, D.C.

**Saah, J.R.** 2016. Genetic Biocontrol of Invasive Rodents. Presented at the Symposium on the Use of Gene Drive Technology in Controlling Pests and Diseases, Canberra, Australia.

**Saah, J.R.** 2013. Laboratory Adventures with *Brucella* and *Francisella*: Preventing Exposures and Laboratory Acquired Illness. Presented at the Southeastern Association for Clinical Microbiology, Charlotte, NC.

**Saah, J.R.** 2013. Preparing for National Special Security Events: LRN Laboratory Transitions for the Democratic National Convention. Presented at the Public Health Preparedness Summit, Atlanta, GA.

**Saah, J.R.,** C. Williams, L. Benbow, M. Haskell, D. Stanek, and P.A. Lee. 2012. Efforts at Reducing *Brucella* Exposures in Clinical Laboratories. Presented at the Council of State and Territorial Epidemiologists Annual Conference, Omaha, NE.

Lee, P.A. and **J.R. Saah.** 2012. Strengthening the Laboratorian and Epidemiologist Relationship for Rapid Response. Co-Presented at the Association of Public Health Laboratories Annual Meeting, Seattle, WA.

**Saah J.R.,** A.T. Fleischauer, C.G. Smith, M. Blocker, D. Stanek, and D. Blaney. 2010. An Investigation of Sequential Exposures to *Brucella* in Three Laboratories and Post Exposure Prophylaxis Failure - Florida and North Carolina, 2009. Presented at the 2010 International Conference on Emerging Infectious Diseases, Atlanta, GA.

**Saah, J.R.** 2007. Responding to a Positive Ricin Signal in North Carolina. Presented at the National Meeting of the Laboratory Response Network, Portland, Oregon.

**Saah, J.R.** and P.E. Bishop. 1999. Phylogenetic Evidence of Diazotrophs within the Pseudomonads. In F. O. Pedrosa, M. Hungria, M. G. Yates, and W. E. Newton (eds.), *Nitrogen Fixation: from molecules to crop productivity*. Kluwer Academic Publishers b.v. March 2000. Presented at the 12th International Congress on Nitrogen Fixation, Iguassu Falls, Parana, Brazil.

**Saah, J.R.,** T.M. Loveless, and P.E. Bishop. 1998. Isolation of Diazotrophic Bacteria that have Molybdenum-Independent Nitrogenase Systems from Natural Environments. Presented at the Gordon Research Conference on Nitrogen Fixation, New London, New Hampshire.

## MILITARY SERVICE

**U.S. Marine Corps Reserve**, Lance Corporal (E-3), Field Radio Operator (MOS 2531)

- 4<sup>th</sup> Force Service Support Group, Communications Battalion, Greensboro, NC  
June 1987 – 1989 Medical Discharge, Service-Connected Disability: 10% (Training Injury)