

# SPRING SEMINAR SERIES

## “Control of Virulence in the Bacterial Pathogen and Potential Bioweapon *Francisella tularensis*”

April 18, 2022 | 1:30 PM – 2:30 PM | 318 Wolf/Zoom

Zoom Link: <https://udel.zoom.us/j/96588940462?pwd=R29RaTV4eThleFBPNFBEdVJKbG1DQT09>



Dr. Kathryn Ramsey is an Assistant Professor in the Department of Cell and Molecular Biology and Department of Biomedical and Pharmaceutical Sciences at the University of Rhode Island. She received her Ph.D in Microbiology and Molecular Genetics from Harvard Medical School.

**Abstract:** Despite having been studied since its identification in the early 1900s and having been developed as a biological weapon, much remains to be learned about the Gram-negative intracellular bacterial pathogen *Francisella tularensis*. In this seminar, I will discuss the comprehensive identification of *F. tularensis* genes critical for virulence, the role of a host-derived peptide in bacterial survival, and how changes in ribosome composition lead to changes in gene expression.

### Kathryn Ramsey, Ph.D.

Assistant Professor

Department of Cell & Molecular Biology

Department of Biomedical & Pharmaceutical Sciences

University of Rhode Island

Host: Dr. Jeremy Bird, Assistant Professor

[jgbird@udel.edu](mailto:jgbird@udel.edu)



## Kathryn M. Ramsey, Ph.D.

Previously Kathryn M. Levasseur

Office 495Q, Lab 420 Avedisian Hall  
University of Rhode Island  
7 Greenhouse Road, Kingston, RI 02881  
kramsey@uri.edu  
(401) 874-2932

### Education

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Ph.D., Microbiology and Molecular Genetics Harvard University Advisor: Dr. Simon Dove, Boston Children's Hospital	2006 – 2014
B. Sc., Biochemistry and Molecular Biology University of Massachusetts, Amherst	2000 – 2004

### Academic Appointments

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Assistant Professor Department of Cell and Molecular Biology, College of Environment and Life Sciences Department of Biomedical and Pharmaceutical Sciences, College of Pharmacy University of Rhode Island	2019 – Present
Visiting Assistant Professor Department of Cell and Molecular Biology, College of Environment and Life Sciences University of Rhode Island	2018 – 2019

### Research Experience

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Postdoctoral Research Division of Infectious Diseases, Boston Children's Hospital Advisor: Dr. Simon Dove	2014 – 2018
Doctoral Research Division of Infectious Diseases, Boston Children's Hospital Advisor: Dr. Simon Dove	2010 – 2014
Doctoral Research Department of Molecular Biology, Massachusetts General Hospital and Broad Institute Advisor: Dr. Deborah Hung	2006 – 2010
Research Assistant Department of Immunology and Infectious Diseases, Harvard School of Public Health Supervisors: Drs. Johanna Daily and Dyann Wirth	2004 – 2006
Undergraduate Research Department of Biochemistry and Molecular Biology Advisor: Dr. Alice Cheung	2001 – 2004

### Peer-Reviewed Research Publications

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- 1 Finn MB, **Ramsey KM**, Dove SL, Wessels MR. 2021. Identification of Group A Streptococcus Genes Directly Regulated by CsrRS and Novel Intermediate Regulators. *mBio*. 12(4):e0164221.
- 2 Finn MB, **Ramsey KM**, Tolliver HJ, Dove SL, Wessels MR. 2021. Improved transformation efficiency of group A Streptococcus by inactivation of a type I restriction modification system. *PLoS One*. 16(4):e0248201.

- 3 Peña JM, Prezioso SM, McFarland KA, Kambara TK, **Ramsey KM**, Deighan P, Dove SL. 2021. Control of a programmed cell death pathway in *Pseudomonas aeruginosa* by an antiterminator. *Nat Commun.* 12(1):1702.
- 4 Travis BA, **Ramsey KM**, Prezioso SM, Tallo T, Wandzilak JM, Hsu A, Borgnia M, Bartesaghi A, Dove SL, Brennan RG, Schumacher MA. 2021. Structural Basis for Virulence Activation of *Francisella tularensis*. *Mol Cell.* 81(1):139-152.e10.
- 5 **Ramsey KM\***, Ledvina HE\*, Tresko TM, Wandzilak JM, Tower CA, Tallo T, Schramm CE, Peterson SB, Skerrett SJ, Mougous JD, Dove SL. 2020. Tn-Seq reveals hidden complexity in the utilization of host-derived glutathione in *Francisella tularensis*. *PLoS Pathog* 16:e1008566  
\*Authors contributed equally to this work
- 6 Gebhardt MJ, Kambara TK, **Ramsey KM**, Dove SL. 2020. Widespread targeting of nascent transcripts by RsmA in *Pseudomonas aeruginosa*. *Proc. Natl. Acad. Sci.* 117:10520-10529.
- 7 Kambara TK, **Ramsey KM**, Dove SL. 2018. Pervasive Targeting of Nascent Transcripts by Hfq. *Cell Rep.* 23:1543-1552.
- 8 Rohlfing AE, **Ramsey KM**, Dove SL. 2018. Polyphosphate kinase antagonizes virulence gene expression in *Francisella tularensis*. *J. Bacteriol.* 200:e00460–17.
- 9 Eshraghi A, Kim J, Walls AC, Ledvina HE, Miller CN, **Ramsey KM**, Whitney JC, Radey MC, Peterson SB, Ruhland BR, Tran BQ, Goo YA, Goodlett DR, Dove SL, Celli J, Veessler D, Mougous JD. 2016. Secreted Effectors Encoded within and outside of the Francisella Pathogenicity Island Promote Intramacrophage Growth. *Cell Host Microbe.* 20:573-583.
- 10 **Ramsey KM** and Dove SL. 2016. A response regulator promotes *Francisella tularensis* intramacrophage growth by repressing an anti-virulence factor. *Mol Microbiol.* 101:688-700.
- 11 McFarland KA, Dolben EL, LeRoux M, Kambara TK, **Ramsey KM**, Kirkpatrick RL, Mougous JD, Hogan DA, Dove SL. 2015. A self-lysis pathway that enhances the virulence of a pathogenic bacterium. *Proc. Natl. Acad. Sci.* 112:8433–8438.
- 12 **Ramsey KM**, Osborne ML, Vvedenskaya IO, Su C, Nickels BE, Dove SL. 2015. Ubiquitous promoter-localization of essential virulence regulators in *Francisella tularensis*. *PLoS Pathog* 11:e1004793
- 13 Nibau C, Tao L, **Levasseur K**, Wu H-M, Cheung AY. 2013. The *Arabidopsis* small GTPase AtRAC7/ROP9 is a modulator of auxin and abscisic acid signalling. *J. Exp. Bot.* 64:3425–3437.
- 14 Yu F, Qian L, Nibau C, Duan Q, Kita D, **Levasseur K**, Li X, Lu C, Li H, Hou C, Li L, Buchanan BB, Chen L, Cheung AY, Li D, Luan S. 2012. FERONIA receptor kinase pathway suppresses abscisic acid signaling in *Arabidopsis* by activating ABI2 phosphatase. *Proc. Natl. Acad. Sci.* 109:14693–14698.
- 15 Daily JP, Scanfeld D, Pochet N, Le Roch K, Plouffe D, Kamal M, Sarr O, Mboup S, Ndir O, Wypij D, **Levasseur K**, Thomas E, Tamayo P, Dong C, Zhou Y, Lander ES, Ndiaye D, Wirth D, Winzeler EA, Mesirov JP, Regev A. 2007. Distinct physiological states of *Plasmodium falciparum* in malaria-infected patients. *Nature* 450:1091–1095.
- 16 de Graaf BHJ, Cheung AY, Andreyeva T, **Levasseur K**, Kieliszewski M, Wu H-M. 2005. Rab11 GTPase-regulated membrane trafficking is crucial for tip-focused pollen tube growth in tobacco. *Plant Cell* 17:2564–2579.

## Grants and Fellowships

NIH: Center for Antimicrobial Resistance and Therapeutic Discovery COBRE P20GM121344 Subproject PI “Investigating the role of ribosome heterogeneity in a bacterial pathogen”	2022
NIH: RI-INBRE Early Career Development Award P20GM103430 Subproject PI “Control of gene expression by specialized ribosomes in <i>Francisella tularensis</i> ”	2020

Rhode Island Foundation Medical Research Grant Medical Research Grant #2798_20190602 “Investigating specialized ribosomes and gene regulation in <i>Francisella tularensis</i> ”	2019
Pediatric Infectious Diseases Training Grant, NICHD T32 HD055148-08	2016

### Honors and Awards

Poster Prize, 8 <sup>th</sup> International Conference on Tularemia	2015
Poster Prize Finalist, Molecular Genetics of Bacteria and Phages Meeting	2014
NSF Graduate Research Fellowship Program, Honorable Mention	2007
Graduated <i>summa cum laude</i> from UMass Commonwealth College Honors Program	2004
Election to Phi Beta Kappa	2004
Ray Ethan Torrey Scholarship, summer undergraduate research scholarship	2003
Linda Slakey Award, summer undergraduate research scholarship	2003
Election to Golden Key Honors Society	2002
Election to Alpha Lambda Delta	2001

### Selected Invited Oral Presentations

Virtual North East Regional IDEa Conference (v-NERIC)	2021
Invited Seminar, Molecular Medicine Seminar, Cornell University, Ithaca, NY	2020
RI-INBRE Summer Retreat, Kingston, RI	2020
Invited Seminar, Lambda Lunch, NIH, Bethesda, MD	2017
Invited Seminar, University of Massachusetts Amherst Microbiology Department	2017
Mechanism and Regulation of Prokaryotic Transcription FASEB conference, Saxtons River, VT	2017
Harvard Graduate Student Program in Genetics and Genomics Invited Speaker, Boston MA	2017
Molecular Genetics of Bacteria and Phages Meeting, Madison, WI	2016
Boston Bacterial Meeting, Cambridge MA	2016
Harvard Infectious Diseases Consortium Retreat, Boston, MA	2016
8 <sup>th</sup> International Conference on Tularemia, Opatija, Croatia	2015
Mechanism and Regulation of Prokaryotic Transcription FASEB conference, Saxtons River, VT	2015
Keynote Speaker, Simmons College Beta-Beta-Beta Honors Induction	2014

### Selected Poster Presentations

9 <sup>th</sup> International Conference on Tularemia, Montreal, Canada	2018
Mechanism and Regulation of Prokaryotic Transcription FASEB conference, Saxtons River, VT	2017
8 <sup>th</sup> International Conference on Tularemia, Opatija, Croatia	2015
Mechanism and Regulation of Prokaryotic Transcription FASEB conference, Saxtons River, VT	2015
Molecular Genetics of Bacteria and Phages Meeting, Madison, WI	2014
Boston Bacterial Meeting, Cambridge MA	2014
Boston Bacterial Meeting, Cambridge MA	2013
7 <sup>th</sup> International Conference on Tularemia, Breckenridge, CO	2012