OMB No. 0925-0001 and 0925-0002 (Rev. 11/16 Approved Through 10/31/2018)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Robertson, Gregory T.

eRA COMMONS USER NAME (credential, e.g., agency login): GROBE3

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

| INSTITUTION AND LOCATION | DEGREE  (if applicable) | Completion Date  MM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| Louisiana Tech University, Ruston, LA | B.S. | 08/1993 | Microbiology |
| Louisiana State University Health Science Center | Ph.D. | 05/2000 | Molecular Biology |
| Eli Lilly and Co., Indianapolis, IN | post-doc | 12/2003 | Infectious Diseases |

**A. Personal Statement**

Dr. Robertson has more than 20 years of classical and clinical microbiology experience including extensive work with *in vivo* and *ex vivo* animal models, with emphasis in antibacterial discovery and mode-of-action studies for novel and existing classes of antimicrobials These efforts include research in academia, and also with larger pharmaceutical corporations (Eli Lilly and Co) and smaller bio-pharmaceutical groups (Cumbre Pharmaceuticals). Dr. Robertson led the team that undertook the *in vitro* and *in vivo* evaluations of CBR-2092 (a novel rifamycin-quinolone hybrid antibiotic), and completed the Investigation New Drug (IND)-enabling studies that supported two successful phase I clinical studies in humans (assets are now part of TenNor Therapeutics Ltd). It was during this time that Dr. Robertson first collaborated Anne Lenaerts’ group at Colorado State University. This productive collaboration ultimately led to his recruitment to join her group in 2014, being later promoted to Assistant Professor in January of 2017. Over the course of the past four years at Colorado State University, he has transitioned to run the day-to-day activities of her extensive *in vivo* TB research program. Professor Lenaerts continues to support his research and is available to assist with this program as needed (see her letter of support). As an Assistant Professor at Colorado State University in the Department of Microbiology, Immunology and Pathology (MIP) he currently serves to guide drug discovery and preclinical development efforts as part of the renowned Mycobacterial Research Laboratories (MRL), counting more than 20 faculty and 160 full time staff. As part of this team, he serves to help advance *in vivo* mouse models to study early stage pre-clinical development of novel therapies or drug regimens for treatment of human tuberculosis. Since April 2015, he became involved and was funded as a Co-I in the large TB Drug Accelerator (TBDA) program from the Gates Foundation where he has led numerous *in vivo* efficacy trials in acute and chronic mouse TB infection models from the various institutions and companies involved in the TBDA. His current efforts have also included the advancement of the spectinamides as novel narrow spectrum anti-tuberculosis agents, as part of a fruitful partnership with Dr. Richard Lee (St. Jude Children’s Research Hospital). He has led all recent *in vivo* efficacy trials for the spectinamide project, which led to two recent publications and a new R01.

In his efforts for this proposal, he will be providing Dr. Anderson with historical animal efficacy data and working with the team to improve the reproducibility of experimental data recording and processing.

**References that highlight experience and qualifications for this project:**

1. **Robertson, G.T.**, Scherman, M.S., Bruhn, D.F., Liu, J., Hastings, C., McNeil, M.R., Butler, M.M., Bowlin, T.L., Lee, R.B., Lee, R.E., A.J. Lenaerts. (2016) Spectinamides are effective partner agents for the treatment of tuberculosis in multiple mouse infection models. J Antimicrob Chemother. PMID: 27999020
2. Liu, J., Bruhn, D.F., Lee, R.B., Zheng, Z., Janusic, T., Scherbakov, D., Scherman, M.S., Boshoff H.I., Das, S., Rakesh, Waidyarachchi, S.L., Brewer, T.A., Gracia, B., Yang, L., Bollinger, J., **Robertson, G.T.**, Meibohm, B., Lenaerts, A.J., Ainsa, J., Böttger, E.C., R.E. Lee (2017) Structure-Activity Relationships of Spectinamide Antituberculosis Agents: A Dissection of Ribosomal Inhibition and Native Efflux Avoidance Contributions. ACS Infect Dis. 13:72-88. PMID: 28081607
3. Aggarwal, A, Parai, MK, Shetty, N, Wallis, D, Woolhiser, L, Hastings, C, Dutta, NK, Galaviz, S, Dhakal, RC, Shrestha, R, Wakabayashi, S, Walpole, C, Matthews, D, Floyd, D, Scullion, P, Riley, J, Epemolu, O, Norval, S, Snavely, T, **Robertson, GT**, Rubin, EJ, Ioerger, TR, Sirgel, FA, van der Merwe, R, van Helden, PD, Keller, P, Böttger, EC, Karakousis, PC, Lenaerts, AJ, Sacchettini, JC. (2017) Development of a Novel Lead that Targets *M. tuberculosis* Polyketide Synthase 13. Cell. 170(2):249-259. PubMed PMID: 28669536.
4. Silvers, M.A., **Robertson**, **G.T.,** Taylor, C.M., and G.L. Waldrop. (2014) Design, synthesis, and antibacterial properties of dual-ligand inhibitors of acetyl-CoA carboxylase. *J. Med. Chem.* 57:8947-8959. PMID: 25280369

***Complete List of Published Work in MyBibliography*** (36 references): <https://www.ncbi.nlm.nih.gov/sites/myncbi/1zsedpAM4wdko/bibliography/45253375/public/?sort=date&direction=ascending>

**B. Positions and Honors**

2000-2003 Postdoctoral Research Fellow – Laboratory of Dr. Malcolm Winkler; Infectious Diseases Research, Eli Lilly and Company, Lilly Research Laboratories; Indianapolis, IN

2003-2006 Scientist, Research Division, Cumbre Pharmaceuticals Inc., Dallas TX

2006-2008 Principal Scientist, Research Division, Cumbre Pharmaceuticals Inc., Dallas TX

2008-2010 Senior Research Scientist, Department of Microbiology, University of Texas Southwestern Medical Center, Dallas, TX

2010-2014 Assistant Professor (non-tenure track), Department of Microbiology, University of Texas Southwestern Medical Center, Dallas, TX

2014-2017 Senior Research Scholar III, Mycobacteria Research Laboratories, Department of Microbiology, Immunology and Pathology, Colorado State University, Fort Collins, CO

2017-present Assistant Professor, Mycobacteria Research Laboratories, Department of Microbiology, Immunology and Pathology, Colorado State University, Fort Collins, CO

**Honors**

1990-1993 The National Honor Society Phi Kappa Phi

1992-1993 Honored by the fraternity Alpha Zeta for academic excellence

1996 Who’s Who among American Universities and Colleges

1996, 1998 Arnold Ravin-Murial Rogers Fellowship-Travel Award, Wind River Conference on Prokaryotic Biology, Estes Park, CO

1997 The Donald E. Kahn Memorial Award for the Outstanding Overall Graduate Student Presentation, Conference for Research Workers in Animal Diseases, Chicago, IL

1998 Outstanding Overall Graduate Student Presentation Award, South Central Branch American Society for Microbiology

1998 ASM Sustaining Member Student Travel Grant

2000 Dean’s Award for Outstanding Performance in Graduate Studies, Department of Microbiology and Immunology, Louisiana State University Health Sciences Center at Shreveport

**C. Contributions to Science**

My research efforts have focused on drug discovery and development, the study of bacterial physiology and pathogenesis, the advancement of animal models to study infectious disease, and the development and application of genetic tools to inform innovative prophylactic and therapeutic strategies.

1. **Drug Discovery and Development** – At Cumbre Pharmaceuticals, my research team helped to advance multiple chemical scaffolds that arose from Medicinal Chemistry-driven research efforts, whole cell screening, and novel high throughput screening efforts. Efflux based extrusion is a major contributor to intrinsic resistance of bacteria to biocides and antibiotics and has complicated whole cell discovery efforts employing classical chemical screening libraries. My team constructed panels of efflux-deficient pathogens that allowed the identification of novel chemical matter that could not have been identified using efflux-proficient bacteria. These assets (subsequently licensed by Merck) were used to identify novel indole compound family that inhibits the growth of *Pseudomonas aeruginosa* by targeting the essential MreB cytoskeletal protein. I also led the team that undertook the *in vitro* and *in vivo* evaluations of CBR-2092, and completed the Investigation New Drug (IND)-enabling studies that supported two successful phase I clinical studies in humans (assets are now part of TenNor Therapeutics Ltd). Our group employed and optimized multiple biofilm-based screening approaches for use in the support of this and other research programs. More recent efforts have included the advancement of the spectinamides as novel narrow spectrum anti-tuberculosis agents (PI: Dr. Richard Lee; St. Jude Children’s Research Hospital), the *in vivo* screening of novel anti-tuberculosis agents as part of the Bill and Melinda Gates Foundation TB Drug Accelerator consortium (Co-I, Dr Gregory Robertson, CSU) and more recently through a Global Health Innovation Technology fund (PI: Dr. Stuart Schrieber, The Broad Institute), in which Dr. Robertson serves as the PI of the CSU subaward.
   1. Xia, Y., Zhou, Y., Carter, D.S., McNeil, M.B., Choi, W., Halladay, J., Berry, P., Mao, W., Hernandez, V., O'Malley, T., Korkegian, A., Sunde, B., Flint, L., Woolhiser, L.K., Scherman, M.S., Gruppo, V., Hastings, C., **Robertson, G.T.**, Ioerger, T.R., Sacchettini, J., Tonge, P.J., Lenaerts, A.J., Parish, T., Alley, M.R.K., (2018) Discovery of a cofactor-independent inhibitor of *Mycobacterium tuberculosis* InhA. Life Science Alliance.1:1-12 (available online).
   2. **Robertson, G.T.**, Bonventre, E.J., Doyle, T.B., Du, Q., Duncan, L., Morris, T.W., Roche, E.D., Yan, D., and A.S Lynch (2008). In vitro evaluation of CBR-2092, a novel rifamycin-quinolone hybrid antibiotic: Studies of the mode of action in *Staphylococcus aureus*. *Antimicrob Agents Chemother*. 52: 2313-2323. PMID: 18443108
   3. **Robertson, G.T.**, Bonventre, E.J., Doyle, T.B., Du, Q., Duncan, L., Morris, T.W., Roche, E.D., Yan, D., and A.S Lynch (2008). In vitro evaluation of CBR-2092, a novel rifamycin-quinolone hybrid antibiotic: Microbiology profiling studies undertaken in *Staphylococci* and *Streptococci*. *Antimicrob Agents Chemother.* 52: 2324-2334. PMID: 18443106
   4. **Robertson, G.T.**, Doyle, T.B., Du, Q., Duncan, L., Mdluli, K., and A.S. Lynch (2007) A novel indole compound that inhibits *Pseudomonas aeruginosa* growth by targeting MreB is a substrate for MexAB-OprM. *J. Bacteriol.* 189:6870-6881. PMID: 17644596
2. **Spectinamide project** – Over the past three years, I have worked closely with Dr. Richard Lee, from St Jude Children’s Research Hospital and Michelle Butler of Microbiotix, on the spectinamides, which are semisynthetic protein synthesis inhibitors derived from the natural product spectinomycin. This productive collaboration includes the chemistry expertise of Professor Lee (St Jude), the anti-infective development knowledge of Michelle Butler (Microbiotix) and the PK/PD modelling knowledge of Professor Bernd Meibohm (U. Tenn). My team at CSU has worked closely with all three to support all *in vivo* efficacy studies of the spectinamides in mice. Collectively these combined studies have demonstrated that the spectinamides exhibit a novel mechanism of action, narrow activity spectrum against Mycobacteria, good *in vivo* efficacy in multiple mouse TB infection models, and a good safety record so far.
   1. Liu, J., Bruhn, D.F., Lee, R.B., Zheng, Z., Janusic, T., Scherbakov, D., Scherman, M.S., Boshoff H.I., Das, S., Rakesh, Waidyarachchi, S.L., Brewer, T.A., Gracia, B., Yang, L., Bollinger, J., **Robertson, G.T.**, Meibohm, B., Lenaerts, A.J., Ainsa, J., Böttger, E.C., R.E. Lee (2017) Structure-Activity Relationships of Spectinamide Antituberculosis Agents: A Dissection of Ribosomal Inhibition and Native Efflux Avoidance Contributions. ACS Infect Dis. 13:72-88. PMID: 28081607
   2. **Robertson, G.T.**, Scherman, M.S., Bruhn, D.F., Liu, J., Hastings, C., McNeil, M.R., Butler, M.M., Bowlin, T.L., Lee, R.B., Lee, R.E., A.J. Lenaerts. (2016) Spectinamides are effective partner agents for the treatment of tuberculosis in multiple mouse infection models. J Antimicrob Chemother. PMID: 27999020
3. **Bacterial Physiology and Pathogenesis –** My research helped to advance the understanding of stress response as a component of virulence for multiple human pathogens. I was the first to demonstrate a role for Hfq in pathogenesis, which resulted in a highly cited publication. As a post-doctoral fellow, I identified the first essential proteolytic chaperone and demonstrated critical role for proteolysis in the pathogenesis of *Streptococcus pneumoniae* (now a target of drug development for Mtb). These efforts also led to the discovery that YycF is a key sensor of cell wall metabolism and hydrolysis in this pathogen. Later as an Assistant Professor at UT Southwestern Medical Center, my group made major contributions to the understanding of certain lipoproteins as both virulence factors, and contributors to cell wall stability *in vivo*. My current focus centers on mechanisms and contributions of acquired drug-resistance to *M. tuberculosis* fitness and treatment response in mouse models demonstrating advanced pulmonary pathology.
4. Ng, W.L., **Robertson**, **G.T.,** Kazmierczak, K.M., Zhao, J.Y., Gilmour, R., and M.E. Winkler (2003) Constitutive expression of *pcsB* suppresses the requirement for the essential VicR (YycF) response regulator in *Streptococcus pneumoniae* R6. *Mol. Microbiol*. 50:1647-1663. PMID: 14651645.
5. **Robertson, G.T.**, W.L. Ng, W.L., Gilmour, R., and M.E. Winkler (2003) Essentiality of *clpX*, but not *clpP*, *clpL*, *clpC*, or *clpE*, in *Streptococcus pneumoniae* R6. *J. Bacteriol*. 185:2961-2966. PMCID: PMC154392.
6. Ng, W.L., Kazmierczak, K., **Robertson, G.T.**, Gilmour, R. and M.E. Winkler (2003) Transcriptional regulation and signature patterns revealed by microarray analyses of *Streptococcus pneumoniae* R6 challenged with sub-lethal concentrations of translation inhibitors. *J. Bacteriol*. 185:359-370. PMID: 12486074.
7. **Robertson, G.T.**, Ng, W.-L., Foley, J. Gilmour, R. and M.E. Winkler (2002) Global transcriptional analysis of *clpP* mutations of type 2 *Streptococcus pneumoniae* and their effects on physiology and virulence. *J. Bacteriol.* 184:3508-3520. PMCID: PMC135132.
8. **Advancement of Genetic Tools for the Study of Human Pathogens -** I have helped to progress many areas of infectious disease research through the advent and/or construction of new tools and technologies to help elucidate the mode-of-action of novel antibiotics and better understand pathogenic mechanisms. I have published numerous studies employing animal models to investigate efficacy and pathogenesis. Many of the genetic tools developed during my scientific career are still considered the state of the art. This knowledge is now being applied to the active study of drug resistance mechanisms and its specific impact on antibiotic efficacy in advanced TB murine infection models.

**D. Additional Information: Research Support and/or Scholastic Performance**

**Active Research Support**

**NIH/NIAID 04/01/2018-03/31/2022**

PI of CSU Subcontract: Gregory Robertson

“Development of Novel Proteins Synthesis Inhibitors for MDR Tuberculosis”

Goal: The continued development of the spectinamides as combination agents for MDR-TB, with a focus on their utility to treat chronic infections and as tools to understand the role of native efflux in tuberculosis drug persistence.

**Global Health Innovation Technology Fund 03/14/2018-03/13/2020**

PI of CSU Subcontract: Gregory Robertson

“The objective of this proposal is to deliver an optimized small-molecule allosteric inhibitor of Mtb tryptophan synthase suitable for pre-clinical development for the treatment against tuberculosis.”

**TenNor Therapeutics, Ltd 01/02/2018-08/31/2018**

PI of CSU Subcontract: Gregory Robertson

“In vivo validation of TenNor dual-acting antibiotics”

Goal: evaluate exploratory dual-acting antimicrobials in TB mouse infection models

**Bill and Melinda Gates Foundation** **11/01/2015-10/31/2018**

Co-I: Gregory Robertson

TB Drug Accelerator: TB mouse in vivo models

Goal: evaluation of new compounds and generating new tools for accelerating TB drug development

**Past Support**

**NIH/NIAID SBIR grant, Phase II 05/1/2014-04/30/2018**

PI: Microbiotix, PI of CSU Subcontract: Anne J. Lenaerts

“Novel Spectinamide Antibiotics for the treatment of MDR/XDR Tuberculosis”

Goal: perform advanced late stage preclinical development of the spectinamides, against *M. tuberculosis*.

**TenNor Therapeutics, Ltd 08/01/2017-10/31/2017**

PI of CSU Subcontract: Gregory Robertson

“Extended MIC Testing of TNP-2198 against a Panel of H. pylori and C. difficile Isogenic Strains with Defined Drug Resistance Determinants”

Goal: in vitro testing of anti-infective agents against isogenic engineered panels of drug-resistant bacteria

**Bill and Melinda Gates Foundation - OPP1032518 10/01/2016-09/30/2017**

PI of CSU Subcontract: Gregory Robertson

“Broad Institute-CSoft TB Therapeutic Effort”

Goal: evaluation of new compounds as anti-infective agents for *M. tuberculosis*

**NIH/NIAID - AI098271 06/01/2014-05/31/2017**

PI of CSU Subcontract: Anne J. Lenaerts

“Novel Spectinamide Antibiotics for the Treatment of MDR/XDR Tuberculosis”

**TenNor Therapeutics, Ltd 03/03/2015-07/02/2015**

PI of CSU Subcontract: Gregory Robertson

“In vitro Activity of TNP-2198 Against a Panel of *H. pylori* and *C. difficile* isogenic Strains with Defined Drug Resistance Determinants”

Goal: establishment and in vitro testing of anti-infective agents against isogenic engineered panels of drug-resistant bacteria