BIOGRAPHICAL SKETCH
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NAME: Bogomolnaya, Lydia M.

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

POSITION TITLE: Assistant Professor of Biomedical Sciences

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
Kazan State University, Kazan, Russia	B.S	06/1997	Microbiology
Kazan State University, Kazan, Russia	Ph.D.	03/2001	Microbiology
Texas A&M University, College Station	Postdoctoral	08/2005	Yeast genetics, cell cycle regulation
Texas A&M University Health Science Center	Postdoctoral	09/2010	*Salmonella* pathogenesis

A. Personal Statement

I have been working in the field of microbiology for a number of years. In the past 15 years I was mainly focusing on the identification of *Salmonella* Typhimurium genes important for virulence in a wide range of animal models (1-3). In the course of these studies, I routinely used an extended arsenal of microbiological and molecular biology techniques, while also taking advantage of robust genetic tools available for *Salmonella* researchers to assign functions to previously uncharacterized genes in this bacterium. In addition, I initiated studies aimed to understand the strategies used by opportunistic pathogen *Serratia marcescens* to successfully colonize different surfaces (4). Recently, I became interested in understanding of physiological role of bacterial drug efflux pumps in two bacterial species, *Salmonella* Typhimurium and *Serratia marcescens*. As a faculty at Marshall University, I am currently interested in the identification of natural substrates of MacAB efflux pump in these bacteria. Identification of natural substrates of drug efflux pumps and the more complete understanding of their regulation will promote the discovery of alternative strategies to control bacterial infections.

1) Bogomolnaya LM, Andrews KD, Talamantes M, Maple A, Ragoza Y, Andres Vazquez-Torres A and Andrews-Polymenis H. (2013). The ABC-type efflux pump MacAB protects *Salmonella enterica* ser.Typhimurium from oxidative stress. **mBio,** 4(6): e00630-13. PMCID: PMC3809562
2) Elfenbein JR, Endicott-Yazdani T, Porwollik S, Bogomolnaya LM, Cheng P, Guo J, Zheng Y, Yang HJ, Talamantes M, Shields C, Maple A, Ragoza Y, Deatley K, Tatsch T, Cui P, Andrews KD, McClelland M, Lawhon SD, Andrews-Polymenis H. (2013). Novel Determinants of Intestinal Colonization of Salmonella enterica Serotype Typhimurium Identified in Bovine Enteric Infection. **Infect Immun.** 81(11): 4311-4320. PMCID: PMC3811824
3) Yang H-J, Bogomolnaya LM, Elfenbein JR, Endicott-Yazdani T, Reynolds MM, Porwollik S, Cheng P, Xia X-Q, McClelland M, Andrews-Polymenis H. Novel two-step hierarchical screening of mutant pools reveals mutants under selection in chicks. (2016) **Infection and Immunity**, 84(4), pii: IAI.01525-15. PMCID: PMC4807481
4) Mitrofanova O., Mardanova A., Evtugin V., Bogomolnaya L. and Sharipova M. (2017) Effects of *Bacillus* serine proteases on the bacterial biofilms. **BioMed Research International**, doi.org/10.1155/2017/8525912.PMCID: PMC5585633

B. Positions and Honors

Positions and Employment

2001-2005	Post-Doctoral Research Associate, Texas A&M University, College Station, TX
2005- 2010	Post-Doctoral Research Associate, Texas A&M HSC, College Station, TX
2010-2019	Assistant Professor Research (non-tenure track), Dept. of Microbial Pathogenesis and Immunology, Texas A&M University HSC, Bryan, TX.
2019-present	Assistant Professor (tenure-track), Dept. of Biomedical Sciences, Marshall University Joan C. Edwards School of Medicine, Huntington, WV

Awards

1998 George Soros Foundation "Soros Graduate Student" Award
2000 George Soros Foundation "Soros Graduate Student" Award

Professional Memberships

2010-present American Society for Microbiology

C. Contribution to Science

1. My early publications focused on regulation of G1 to S phase cell cycle transition in budding yeast. Under supervision of Dr. Michael Polymenis I described a role of new regulators of START, namely, Dcr1p and Dcr2p as well as Hym1p and other members of RAM network (regulation of Ace2 and morphogenesis) in cell cycle progression. This work contributed to understanding of what is currently known as protein kinase signaling pathway conserved among eukaryotes from yeast to humans.
    a. Bogomolnaya L.M., Pathak R., Guo J., Cham R., Aramayo R., Polymenis M. (2004) Hym1p affects cell cycle progression in *Saccharomyces cerevisiae*. ***Curr. Genet.*** 46(4):183-92.
    b. Pathak R., Bogomolnaya L.M., Guo J., Polymenis M. (2004) Gid8p (Dcr1p) and Dcr2p function in a common pathway to promote START completion in *Saccharomyces cerevisiae*. ***Eukaryot. Cell*** 3(6): 1627-1638
    c. Pathak R., Bogomolnaya L.M., Guo J., Polymenis M. (2005) A role for KEM1 at the START of the cell cycle in *Saccharomyces cerevisiae*. ***Curr.Genet.*** 48(5):300-9.
    d. Bogomolnaya L.M., Pathak R., Guo J., Polymenis M. (2006) Roles of the RAM signaling network in cell cycle progression in *Saccharomyces cerevisiae*. ***Curr.Genet****.* 49(6):384-92. PMCID: PMC539013
2. After moving to the field of bacterial pathogenesis I started to work on identification of previously uncharacterized genetic factors required for *Salmonella* virulence in different animal models. To this end, together with a team of researchers I generated a unique library of *Salmonella* Typhimurium mutants that harbor targeted deletions in approximately 3800 genes. That allowed us to screen mutants in the library in individual or pooled fashion to address many important questions related to *Salmonella* pathogenesis. For instance, I used a subset of this library (~1000 mutants) to identify genes involved in modulation of *Salmonella* motility (an important component of *Salmonella* pathogenesis) and concluded that many *Salmonella*-specific genes with previously unknown functions are in fact required for proper motility of this bacterium. Moreover, I also uncovered a new class of mutants with enhanced motility, a phenomenon that has not been well described in *Salmonella*. Recently, in collaboration with other investigators I used a different approach by infecting calf ligated ileal loops with this pool of deletion mutants to identify genetic factors essential for *Salmonella* fitness in bovine model of infection. These labor-intensive experiments required team effort for completion and resulted in identification of two previously uncharacterized genes, *STM3846* and *STM3602,* as essential factors required for *Salmonella* fitness in the bovine intestines. Defined single-gene deletion mutant collection in *Salmonella* Typhimurium is a unique tool currently used by many researchers in our field.
    a. Porwollik S, Santiviago CA, Cheng P, Long F, Desai P, Fredlund J, Srikumar S, Silva CA, Chen X, Canals R, Reynolds MM, Bogomolnaya L, Shields C, Cui P, Guo J, Zheng Y, Endicott-Yazdani T, Yang H-J, Maple A, Ragoza Y, Blondel CJ, Valenzuela C, Andrews-Polymenis H., McClelland M. (2014). Defined single-gene and multi-gene deletion mutant collections in *Salmonella enterica* sv Typhimurium . ***PLoS One***. 9(7):e99820. PMCID: PMC4089911

b. Identification of novel factors modulating motility of *Salmonella enterica* serotype Typhimurium. Bogomolnaya LM, Aldrich L, Ragoza Y, Talamantes M, Andrews KD, McClelland M, Andrews-Polymenis HL. (2014). ***PLoS One***. 9(11):e111513. PMCID: PMC4219756
c. Elfenbein JR, Endicott-Yazdani T, Porwollik S, Bogomolnaya LM, Cheng P, Guo J, Zheng Y, Yang HJ, Talamantes M, Shields C, Maple A, Ragoza Y, Deatley K, Tatsch T, Cui P, Andrews KD, McClelland M, Lawhon SD, Andrews-Polymenis H. (2013). Novel Determinants of Intestinal Colonization of Salmonella enterica Serotype Typhimurium Identified in Bovine Enteric Infection. **Infect Immun.** 81(11): 4311-4320. PMCID: PMC3811824

3. In addition to calf ligated loop model of infection, I also used mice and chickens to elucidate different aspects of *Salmonella* pathogenesis in each of these models. For instance, I have shown that minor modification of O12 antigen that takes place during infection is required for persistence of *Salmonella* Typhimurium in murine intestines. I also showed that *Salmonella* macrolide-specific efflux pump MacAB plays an important role during infection and protects bacteria against reactive oxygen species through secretion of unknown heat-stable molecule. In collaboration with other researchers I have also identified multicopy single-stranded DNA as required for *Salmonella* organ colonization in mice.
    a. Sivula C.P., Bogomolnaya L.B., and Andrews-Polymenis H.L. (2008) A comparison of cecal colonization of *Salmonella enterica* serotype Typhimurium in white leghorn chicks and *Salmonella*-resistant mice. **BMC Microbiology**, 8, 182. PMCID: PMC2596157
    b. Bogomolnaya L.M., Santiviago C.A., Yang H.J., Baumler A.J., and Andrews-Polymenis H.L. (2008) 'Form variation' of the O12 antigen is critical for persistence of *Salmonella* Typhimurium in the murine intestine. **Mol Microbiol**, 70(5), 1105-1119.
    c. Bogomolnaya LM, Andrews KD, Talamantes M, Maple A, Ragoza Y, Andres Vazquez-Torres A and Andrews-Polymenis H. (2013). The ABC-type efflux pump MacAB protects *Salmonella enterica* ser.Typhimurium from oxidative stress. **mBio,** 4(6): e00630-13. PMCID: PMC3809562.*
        * - *selected for F1000Prime*
    d. Elfenbein JR, Knodler LA, Nakayasu ES, Ansong C, Brewer H, Bogomolnaya L, Adams LG, McClelland M, Adkins JN, Andrews-Polymenis HL. Multicopy single-stranded DNA directs intestinal colonization of enteric pathogens. (2015) **PLos Genetics**, 11(9): e1005472. PMCID: PMC4569332.*
        * - *selected for F1000Prime*

Complete List of Published Work in MyBibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/1TKAUem4ntcA5/bibliography/48161650/public/?sort=date&direction=ascending.

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

Completed Research Support

1R21AI123965 Andrews-Polymenis (PI) 02/01/16-01/31/18
Defining the molecular mechanisms of MacAB in protection of *Salmonella* from oxidative stress.
The goal of this study is to identify a natural substrate of *Salmonella* Typhimurium MacAB efflux pump and to define its outer membrane component during oxidative stress.
Role: Co-Investigator

RFBR (Russian Foundation for Basic Research) 15-04-02110 Bogomolnaya (PI) 01/01/15-12/31/17
Siderophores of *Serratia marcescens* and their role in protection of bacteria against oxidative stress.
The goal of this project is to characterize siderophores produced by two *Serratia marcescens* strains of different origin and to evaluate their role in protection of bacteria from oxidative stress.

RSF (Russian Science Foundation) 16-14-10200 Bogomolnaya (PI) 05/01/2016-12/31/18
The role of ABC-type effux pump MacAB in physiology of Gram-negative bacteria.
The goal of this project is to characterize the role of efflux pump MacAB in physiology *Serratia marcescens* and to understand regulation of expression of this pump.