

**TATYANA (Tanya) A. SYSOEVA**

Department of Biological Sciences  
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**EDUCATION**

Ph.D. Biochemistry & Molecular Biology, The Pennsylvania State University, USA	2011
M.S.(Hons) Materials Science, Moscow State University, Russia	2004
B.S. Materials Science, Moscow State University, Russia	2002

**RESEARCH EXPERIENCE**

<b>The University of Alabama in Huntsville</b>	<b>Assistant Professor</b>	2018 - present
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Analyzing horizontal gene exchange mechanisms as it applies to spreading of antibiotic resistance; understanding human urinary microbiome development and interactions of uropathogens and commensal bacteria.

<b>Duke University</b>	<b>Duke KURe K12 Scholar</b>	2017 - 2018
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<b>PI: Lingchong You</b>	<b>Research Scientist</b>	2015 - 2017
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Developing approaches to detect and quantify horizontal gene transfer (HGT) and analyzing effects of stressors on HGT efficiency using a combination of synthetic and molecular biology tools.

Characterization of the antibiotic resistant uropathogens for their ability to mobilize resistance genes into urinary commensals, using functional and nextgen sequencing approaches.

2011- 2015

<b>Harvard University</b>	<b>Postdoctoral Fellow</b>	
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**PI: Briana Burton**

Studied function and mechanism of the Type VII secretion system in *Bacillus subtilis* and *Mycobacterium tuberculosis* with focus on the protein substrate recognition and mode of translocation by the secretion machinery using functional and biochemical assays and bacterial genetics.

Analyzed structure and function of proteins involved in DNA uptake in *B. subtilis*.

<b>Pennsylvania State University</b>	<b>Ph.D. Student</b>	2006-2011
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**PI: Tracy Nixon**

Studied structure-function aspects of sigma54-dependent transcription activation by a bacterial AAA+ ATPase applying methods of molecular biology, protein biochemistry in combination with structural methods such as small-angle solution X-ray and neutron scattering and X-ray crystallography.

Princeton University

Visiting Student

2010-2011

PI: Haw Yang

Applied protein labeling and slide immobilization methods for single molecule fluorescence microscopy analyses.

## PUBLICATIONS

- Sysoeva T.A., Kim Y., Rodriguez J., Lopatkin A.J., You L. Growth-stage-dependent regulation of conjugation, *AIChE Journal*, <https://doi.org/10.1002/aic.16848> 2020
- Zhu K., Chen S., Sysoeva T.A., You L. Universal antibiotic tolerance arising from antibiotic-triggered accumulation of pyocyanin in *Pseudomonas aeruginosa*. *PLoS Biol* 17(12): e3000573. <https://doi.org/10.1371/journal.pbio.3000573> 2019
- Dai Z., Lee A.J., Roberts S., Sysoeva T.A., Huang S., Dzuricky M., Yang X., Chilkoti A., You L. Versatile biomanufacturing by a hybrid biological-material system. *Nat Chem Biol*, **15**, 1017–1024. 2019
- Sysoeva T.A. Assessing heterogeneity in oligomeric AAA+ machines. *Cell Mol Life Sci*. 74 (6): 1001-1018. 2017
- Sysoeva T.A., Burton B.M. A new front for intermicrobial wars. *Nat Microbiology*, 2, 16254. 2016
- Lopatkin A.J., Sysoeva T.A., You L. Dissecting the effects of antibiotics on horizontal gene transfer: Analysis suggests a critical role of selection dynamics. *BioEssays* 38(12):1283-1290. 2016
- Lopatkin A.J., Huang S., Smith R., Srimani J., Sysoeva T.A., Bewick S., Karig D., You L. Antibiotics as a selective driver for conjugation dynamics. *Nat Microbiology*, 1, 16044. 2016
- Sysoeva T.A., Bane L.B., Xiao D.Y., Bose B., Chilton S.S., Gaudet R., Burton B.M., Structural characterization of the late competence protein ComFB from *Bacillus subtilis*. *Biosci Rep*, 35(2) 2015
- Ramsdell T.L., Huppert L.A., Sysoeva T.A., Fortune S.M., Burton B.M., Linked Domain Architectures Allow for Specialization of Function in the FtsK/SpoIIIE ATPases of ESX Secretion Systems, *J Mol Biol*, 427(5):1119-1132. 2015
- Sysoeva T.A., Huppert L.A., Zepeda-Rivera M.A., Burton B.M. Dimer recognition and secretion by the ESX Secretion System in *Bacillus subtilis*. *Proc Natl Acad Sci U S A*, 111(21):7653-7658. 2014
- Sysoeva T.A., Chowdhury S., Nixon B.T. Breaking symmetry in multimeric ATPase motors. *Cell Cycle*, 13(10):1509-1510. 2014
- Sysoeva T.A., Chowdhury S., Guo L., Nixon B.T. Nucleotide-induced asymmetry within ATPase activator ring directs sigma54-RNAP interaction and ATP hydrolysis. *Genes Dev*, 27:2500-2511. The paper was highlighted on the journal cover as “also in this issue”. 2013
- Sysoeva T.A., Yennawar N., Allaire M., Nixon B.T. Crystallization and preliminary X-ray analysis of a sigma54-dependent transcription activator NtrC1 from *Aquifex aeolicus* bound to ground state ATP analog Acta Cryst. F69, 1384-1388. 2013
- Chen B., Sysoeva T.A.\*, Chowdhury S., Guo L., De Carlo S., Hanson J.A., Yang H., and Nixon B.T., Engagement of arginine finger to ATP triggers large conformational changes

in NtrC1 AAA+ ATPase for remodeling bacterial RNA polymerase. *Structure* (Cell Press), 18(11):1420-1430. \**Co-first author*. The paper was chosen for the journal cover. Publication was accompanied by a comment of Professors Timothy Hoover and Martin Buck.

Chen B., Sysoeva T.A., Chowdhury S., Guo L., and Nixon B.T. ADPase activity of recombinantly expressed thermotolerant ATPases may be caused by co-purification of adenylate kinase of *Escherichia coli*. *FEBS J*, 276:807-815. 2009

Chen B., Sysoeva T.A., Chowdhury S., and Nixon B.T. Regulation and action of the bacterial enhancer binding AAA+ ATPases. *Biochem. Soc. Transact*, 36:89-93. 2008

#### **PUBLISHED CONFERENCE ABSTRACTS**

Sysoeva T.A., Kim Y., You L. Regulation of conjugative transfer of  $\beta$ -lactam resistance from uropathogenic strains of *Escherichia coli*, *The Journal of Urology*, 2018, 199(4):e285, doi: 10.1016/j.juro.2018.02.743

Sysoeva T.A., You L. Regulation of conjugative transfer of  $\beta$ -lactam resistance from uropathogenic strains of *E. coli*. *Neurourology and urodynamics*, 2018, 37, S529-S530

Sysoeva T.A., Huppert L.A., Ramsdell T.L., Fortune S.M., Burton B.M. Recognition of the WXG Substrate YukE by the Type VII Secretion System in *Bacillus subtilis* *FASEB J*, 2013 27:554.6

Sysoeva T.A., Chowdhury S., Guo L., Nixon B.T. Structural mechanism of sigma54-dependent AAA+ ATPases *FASEB J*, 2011 25:699.13

Nixon B.T., Sysoeva T.A., Chowdhury S., Chen B., Guo L. Sequential Action of ATP on the Enhancer Binding AAA+ ATPase NtrC1 *FASEB J*, 2009 23:495.21

Nixon B.T., Sysoeva T.A., Chen B., Chowdhury S., Guo L., De Carlo S., Hanson J., Yang H. AAA+ ATPase Mechanism *Biophysical J*. 2011 100 (3):1, 38a

#### **AWARDS/FUNDING**

New Faculty Research grant, UAH	2018-2019
NIH NIDDK K12 Career Development Award (KURe Scholar in Benign Urology)	2017-2018
Duke Scholar in Molecular Medicine (Infectious Diseases Track)	2017-2018
Keystone Symposia Future of Science Fund Scholarship	2011
Honorable mention for the Robert T. Simpson Innovative Research Award	2010
WISE Travel Grant	2010
Braddock Graduate Fellowship	2006
2 <sup>nd</sup> Prize Poster competition, Conference Lomonosov-1999, Moscow State University, Moscow, Russia	1999

#### **CONFERENCE PARTICIPATION AND SEMINAR SERIES**

##### **Oral presentations**

Invited seminar, HudsonAlpha Institute for Biotechnology, Huntsville, AL 2020

Invited Seminar, Department of Biological Sciences, UT Dallas, Richardson, TX 2019

- Early Career Investigator Workshop AUA Linthicum, MD. *Growth-stage regulation of plasmid conjugation in uropathogenic E. coli* 2018
- O'Brien Urology Center Spring Symposium, University of Wisconsin in Madison, WI, *Regulation of conjugative transfer of  $\beta$ -lactam resistance from uropathogenic strains of Escherichia coli.* 2018
- Duke Pelvic Medicine Research Consortium, Durham, NC, *Contribution of Antibiotic Resistant Urinary Tract Infections in Spreading of Drug Resistance Genes.* 2017
- Bacillus Supergroup Meeting, MIT, Cambridge, MA *Dimer recognition and secretion by the ESX Secretion System in Bacillus subtilis.* 2014
- Gordon Research Conference "Protein Transport Across Cell Membranes", Galveston, TX, *Dimer recognition and secretion by the ESX Secretion System in Bacillus subtilis (selected from abstracts).* 2014
- Gordon Research Seminar "Protein Transport Across Cell Membranes", Galveston, TX, *Characterization of recognition and translocation of WXG substrate by Type VII Secretion System in Bacillus subtilis (selected from abstracts).* 2014
- Cellular Dynamics Seminar Series, Harvard University, MA, *Dimer recognition and secretion by the ESX Secretion System in Bacillus subtilis.* 2014
- ASBMB Annual meeting, Boston, MA, *Recognition of the WXG Substrate YukE by the Type VII Secretion System in Bacillus subtilis (selected from abstracts).* 2013
- Seminar at Department of Molecular Biosciences, Northwestern University, IL, *Structural studies of the AAA+ ATPase NtrC1 from Aquifex aeolicus.* 2011
- Keystone Symposium "AAA+ and Related ATP-Driven Protein Machines: Structure, Function and Mechanism", Granlibakken Resort, Tahoe, CA, *Intricate interactions among subunits within the ring of an AAA+ ATPase (selected from abstracts).* 2011
- Workshop "Hydrodynamic and Thermodynamic Analysis of macromolecules with SEDFIT and SEDPHAT", NIH, Bethesda, MD, *Structural studies of the Enhancer-Binding, AAA+ ATPase NtrC1 upon nucleotide binding.* 2010
- ASBMB Annual meeting, New Orleans, LA, *Sequential action of ATP on the enhancer binding AAA+ ATPase NtrC1.* 2009

### Poster presentations

- 105<sup>th</sup> Meeting of the Southeastern Branch of the American Society for Microbiology, The University of Alabama in Huntsville, Huntsville, AL – February 21-23, 2020 2020
- The American Urogynecologic Society (AUGS) and International Urogynecological Association (IUGA) Joint Meeting 2019, Nashville, TN – September 24-28, 2019 2019
- 2019 Clinical and Scientific Advances in Urinary Tract Infections, Nationwide Children's Hospital, Columbus, OH - June 28 - 30, 2019 2019
- 4<sup>th</sup> Annual Multidisciplinary Benign Urology Research Day, Duke University, Durham, NC – April 26, 2019 2019
- Collaborating of the Advancement of Interdisciplinary Research in Benign Urology (CAIRIBU) Meeting, Ellicott City, MD. *Composition of Urinary Microbiome in Children.* Kelly M., Sysoeva T.A. 2018

- American Urological Association (AUA) Meeting 2018, San Francisco, CA. *Regulation of conjugative transfer of  $\beta$ -lactam resistance from uropathogenic strains of Escherichia coli.* Sysoeva T.A., Kim Y., You L. 2018
- Duke Benign Urology Research Day 2018, Durham, NC. *Regulation of conjugative transfer of  $\beta$ -lactam resistance from uropathogenic strains of Escherichia coli.* Sysoeva T.A., Kim Y., Rodriguez J., You L. 2018
- O'Brien Urology Center Spring Symposium, University of Wisconsin in Madison, WI, *Regulation of conjugative transfer of  $\beta$ -lactam resistance from uropathogenic strains of Escherichia coli.* Sysoeva T.A., Kim Y., Rodriguez J., You L. 2018
- Society of urodynamics, female pelvic medicine and urogenital reconstruction (SUFU) meeting, Austin, TX. *Regulation of conjugative transfer of  $\beta$ -lactam resistance from uropathogenic strains of Escherichia coli.* Sysoeva T.A., You L. 2018
- Duke Benign Urology Research Day 2017, Durham, NC. *Horizontal Gene Transfer of Antibiotic Resistance Genes in the Human Urinary Microbiome in Health and Disease.* Sysoeva T.A. 2017
- SBGrid/NE-CAT meeting, Boston, MA. *Structural characterization of the late competence protein ComFB from Bacillus subtilis.* Bane L.B., Sysoeva T.A., Xiao D., Gaudet R., Burton B.M. 2014
- Boston Bacterial Meeting, Cambridge, MA, *Protein interactions within the ESX secretion system in Bacillus subtilis.* Sysoeva T.A., Schulz K., Berenson A.F., Huppert L.A., Burton B.M. 2014
- ASM General Meeting, Boston, MA, *Protein interactions within the ESX secretion system in Bacillus subtilis.* Sysoeva T.A., Schulz K., Burton B.M. 2014
- Gordon Research Conference "Protein Transport Across Cell Membranes", Galveston, TX, *Dimer recognition and secretion by the ESX Secretion System in Bacillus subtilis.* Sysoeva T.A., Huppert L.A., Zepeda-Rivera M.A., Burton B.M. 2014
- Gordon Research Seminar "Protein Transport Across Cell Membranes", Galveston, TX, *Characterization of recognition and translocation of WXG substrate by Type VII Secretion System in Bacillus subtilis.* Sysoeva T.A., Huppert L.A., Zepeda-Rivera M.A., Burton B.M. 2014
- ASBMB Annual meeting, Boston, MA, *Recognition of the WXG Substrate YukE by the Type VII Secretion System in Bacillus subtilis.* Sysoeva T.A., Huppert L.A., Ramsdell T.L., Fortune S.M., Burton B.M. 2013
- Boston Bacterial Meeting, Cambridge, MA, *Characterization of a Novel ESX-type Secretion System in Bacillus subtilis* Huppert L.A., Sysoeva T.A., Ramsdell T.L., Fortune S.M., Burton B.M. 2012
- ASBMB Annual meeting, Washington, DC, *Structural mechanism of sigma54-dependent AAA+ ATPases* Sysoeva T.A., Chowdhury S., Chen B., Guo L. 2011
- Keystone Symposium AAA+ and Related ATP-Driven Protein Machines: Structure, Function and Mechanism, Granlibakken Resort, Tahoe, CA, *Intricate interactions among subunits within the ring of an AAA+ ATPase.* Sysoeva T.A., Chowdhury S., Chen B., Guo L., Nixon B.T. 2011
- Bridges STEM Symposium, Penn State, University Park, PA, *Structural studies of the AAA+ ATPase NtrC1 from Aquifex aeolicus.* Sysoeva T.A., Chowdhury S., Chen B., Guo L., Nixon B.T. 2010
- Graduate exhibition, Penn State, University Park, PA, *How a Biological Motor uses ATP to Perform Mechanical Work.* Sysoeva T.A., Chowdhury S., Chen B., Guo L., Nixon B.T. 2010

ASBMB Annual meeting, New Orleans, LA, <i>Sequential action of ATP on the enhancer binding AAA+ ATPase NtrC1</i> . Nixon B.T., <u>Sysoeva T.A.</u> , Chowdhury S., Chen B., Guo L.	2009
14 <sup>th</sup> European Bioenergetics Conference Moscow, Russia, <i>Age-dependent character of mitochondria targeted antioxidants (MTA) mediated protective effect on cardiolipin peroxidation and creatine kinase functioning in rat heart mitochondria</i> . Vyssokikh M.Yu., Ivanova D.P., Nevedomskaya E.V., Pustovidko A.V., Plotnikov E.Yu., <u>T.A.Sysoeva</u> , Zorov D.B.	2006
1 <sup>st</sup> International Pirogov Student's scientific medical conference, Moscow, Russia, <i>Morphological studies of the rat's oocytes</i> . T.G.Khryapenkova, <u>Sysoeva T.A.</u> , M.Yu.Vyssokikh	2005
Conference "Bioenergetics: from molecules to cell" Moscow, Russia, <i>Design and synthesis of DNA construction for expression and purification of human apoptosis-inducing factor (AIF)</i> . <u>Sysoeva T.A.</u> , Pustovidko A.V., Plotnikov E.Yu., Vyssokikh M.Yu., Zorov D.B.	2005
Conference "Reception and intracellular signaling", Puschino, Russia, <i>Role of the protein complexes of the mitochondrial contact sites in Bax-inducing cytC release</i> . Vyssokikh M.Yu., Banninkova S.Yu., Brdichka D., Zorova L.D., <u>Sysoeva T.A.</u> , Zorov D.B.	2003
Conference Lomonosov-2000, Moscow State University, <i>Interaction between NdF<sub>3</sub> and alpha-BiO<sub>x</sub>F<sub>3-2x</sub></i> . <u>Sysoeva T.A.</u> , Serov T.V., Ardashnikova E.I.	2000
Conference Lomonosov-1999, Moscow State University, Moscow, <i>Study of the interaction in the NaF-LuF<sub>3</sub>-Lu<sub>2</sub>O<sub>3</sub> system</i> . <u>Sysoeva T.A.</u> , Ardashnikova E.I.	1999

#### ADDITIONAL TRAINING & COURSES

Duke Scholar in Infectious Diseases	2017-2018
Duke Genomic and Computational Biology Academy 2017 (Introduction to DNA Sequencing Technologies; Introduction to Scientific Computing for Genomics, 16S Analysis Workshop)	2017
SBGrid/NE-CAT 2014: Data Processing in Crystallography, Boston, MA	2014
Advanced Bacterial Genetics Course at Cold Spring Harbor Laboratory, NY	2013
Workshop "Hydrodynamic and Thermodynamic Analysis of Macromolecules with SEDFIT and SEDPHAT", NIH, Bethesda MD	2010
Workshop "Solution Studies of Macromolecules: Global and Local Structure", Brookhaven National Laboratory, Upton NY	2009
Rapid Data Collection and Structure Solving at the NSLS, Brookhaven National Laboratory, Upton NY	2008
Workshop "Cryo and 3D electron microscopy", Penn State, University Park, PA	2007

#### STUDENTS MENTORED

Bram Sterling – graduate rotation student, January-March 2012  
 Aaron Bose – graduate rotation student, January-March 2013  
 Martha Zepeda-Rivera – graduate rotation student, January-March 2013  
 Denise Sirias – graduate rotation student, January-March 2013  
 Kathrin Schulz – master exchange student, May-November 2013  
 Alice Berenson – spring volunteer and PRISE summer student, January-August 2013

Sydney Reed – undergraduate student and MSI summer student, January 2014-May 2015  
 Lauren Bougioukas – summer intern, June-August 2014  
 Alana Ganz – undergraduate student, February-May 2015  
 Jonathan Bethke – graduate rotation student, March 2016  
 Gideon Pfeffer – summer student, May- July 2016  
 Youlim Kim – independent research project undergraduate student October 2016-May 2018  
 Ahmed Ahad – undergraduate volunteer October 2016 – July 2017  
 Connor Pfeiffer – independent study student, August 2017 – April 2018  
 Jonathan Rodriguez - independent Study undergraduate student, September 2017 - May 2018  
 Quiana Vidal – rotation graduate student, October 2018 - December 2018  
 Shahid Khan – rotation graduate student, January 2019 - February 2019  
 Savanie Fernando – graduate student, August 2018 – September 2019  
 Tamara Zaza – undergraduate and RCEU student, August 2018 - present  
 Vasudhasri Devarasetty – honors capstone student, December 2018 - present  
 Carolina Dolislager – undergraduate student, January 2019 – May 2019  
 Robert Chappell – undergraduate student, January 2019 – May 2019  
 Lauren Elam – undergraduate and RCEU student, November 2018 – present  
 Yo-Ann Velez – rotation graduate student, January 2019 – May 2019  
 Ray Griffin – undergraduate student, May 2019 – present  
 Brad Land – MS student, September 2019 – present  
 Antonio Bradley – MS student, November 2019 – present  
 Katelyn Lott – MS student, January 2020 - present

#### **PROFESSIONAL SOCIETIES**

Member of American Urological Association	2018-present
Member of American Society for Microbiology	2013-present
Member of American Association for the Advancement of Science	2010-2018
Member of American Society for Biochemistry & Molecular Biology	2009-2015

#### **SCIENTIFIC COMMUNITY SERVICE**

*Ad hoc* reviewer for Nucleic Acids Research, Journal of Molecular Biology, Acta Crystallographica (Section F), Antonie van Leeuwenhoek Journal of Microbiology, Biochemistry (Moscow), Bulletin of RSMU, PLOS One, Scientific Reports, Communications Biology, JoVe

Chair of the 2020 Southeastern Branch of ASM meeting, The University of Alabama in Huntsville, AL 2020

Organizing Blue Devil Resistome Bass Connection Research Project, Duke University 2017-2018

Co-chair of the Gordon Research Seminar on Bacterial Cell Surfaces 2016

Member of the organizing committee for Boston Bacterial Meeting 2014 and 2015

Fellowship Review Coordinator for Graduate Women in Science (GWIS, organizing review process for annual fellowship awards 2012-2013 cycles)

Assistance in preparation of 2010 Bridges STEM Symposium, Penn State University

#### **TEACHING AND LEADERSHIP EXPERIENCE**

President of the Southeastern Branch of American Society for Microbiology	2019- present
Lecturer for General Microbiology, Microbial Genetics, Senior Capstone (BYS 321, 419, 490, 619), University of Alabama in Huntsville	2018-2020
Member of the organizing committee of Women in Science and Engineering Annual Symposium, Duke University	2017
Instructor for LS100r Life Science research project, Harvard University	2014
Microbial Science Initiative (MSI) Journal Club leader at Harvard University	2014
Mentoring and instructing undergraduate and graduate students in their research projects in the lab	2012-2017
Mentor and active member at Harvard Graduate Women in Science and Engineering (HGWISE) and the Association for Women in Science, Massachusetts Chapter (MassAWIS)	2012-2014
Teaching Assistant for BMB 212 Elementary Biochemistry Laboratory, Penn State University	2007