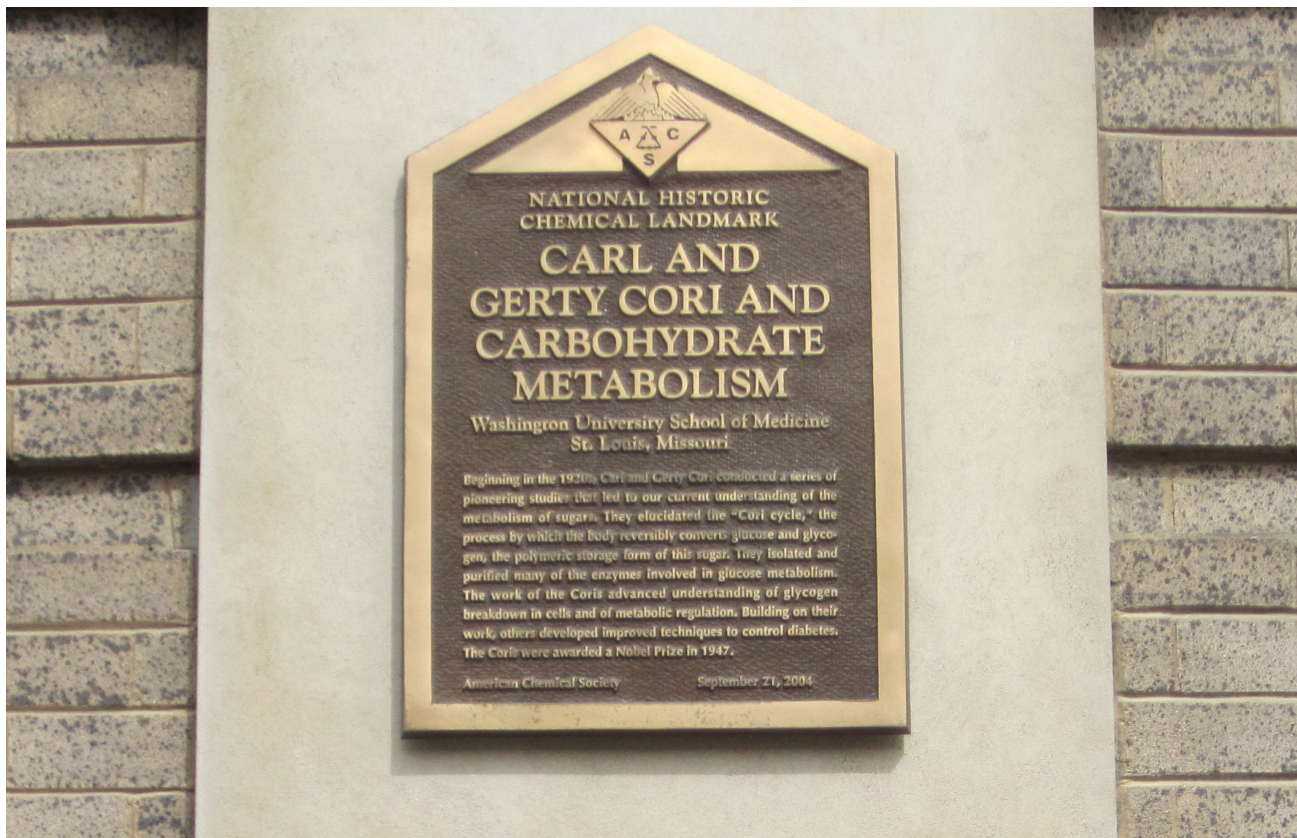


Department of

Biochemistry and Molecular Biophysics

Biennial Report 2016-18

 Washington
University in St. Louis
SCHOOL OF MEDICINE



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John A. Cooper, MD, PhD

Message from the Department Head

In 2017, our department experienced a year of change and progress. From my personal perspective, I remain honored to have the privilege of serving as head of the department. I continue to enjoy working with our department faculty and with campus leadership to move the department forward into challenging new areas of research and training.

The faculty is the core of our department, and we were pleased this year to welcome two new faculty members, Andrea Soranno, PhD, and Rui Zhang, PhD. Dr. Soranno is a world-class expert on the experimental and theoretical analysis of intrinsically disordered molecules, including proteins and RNAs. The structure and function of these molecules have been experimentally intractable heretofore, and Dr. Soranno brings sophisticated new state-of-the-art spectroscopic methods yielding unprecedented insight. These molecules form the basis of membrane-less organelles in cells, which is an important new area in cell biology. Some of these molecules form toxic supramolecular assemblies, which are the cause of human diseases, including neurodegenerative ones.

Dr. Zhang is a world-class expert in the new technology of cryo-electron microscopy, which is at the forefront of structural biology. CryoEM approaches provide atomic-level structures of molecules and they allow one to see the structures of molecular assemblies in cells. Dr. Zhang has collaborated on a variety of important topics, from viruses to amyloid, and the major focus of his own research program is microtubules — their structure, assembly and function. Washington University has a wonderful cilia group that will provide a strong context and support for his work.

Over the last two years, three of our faculty members were awarded tenure, an important benchmark in their academic careers. Roberto Galletto, PhD, studies the macromolecular complex of proteins and DNA at the telomere, which is important for aging and cancer. Eric Galburt, PhD, studies the mechanism of gene transcription, which is important for regulation of gene expression, using sophisticated single-molecule approaches. Jim Janetka, PhD, is a medicinal chemist, who has made important contributions for the development of new therapeutics in cancer and infections. He has collaborated with a number of researchers on campus, and he has helped to create new companies that bring the fruits of his research to the public.

We welcomed the arrival of Ron Dolle, PhD, to our Center for Drug Discovery. Dr. Dolle brings years of expertise in the biopharmaceutical industry to the task of assisting our faculty, from all over the campus, with the discovery and development of new therapeutics. He is doing a remarkable job in this important challenge.

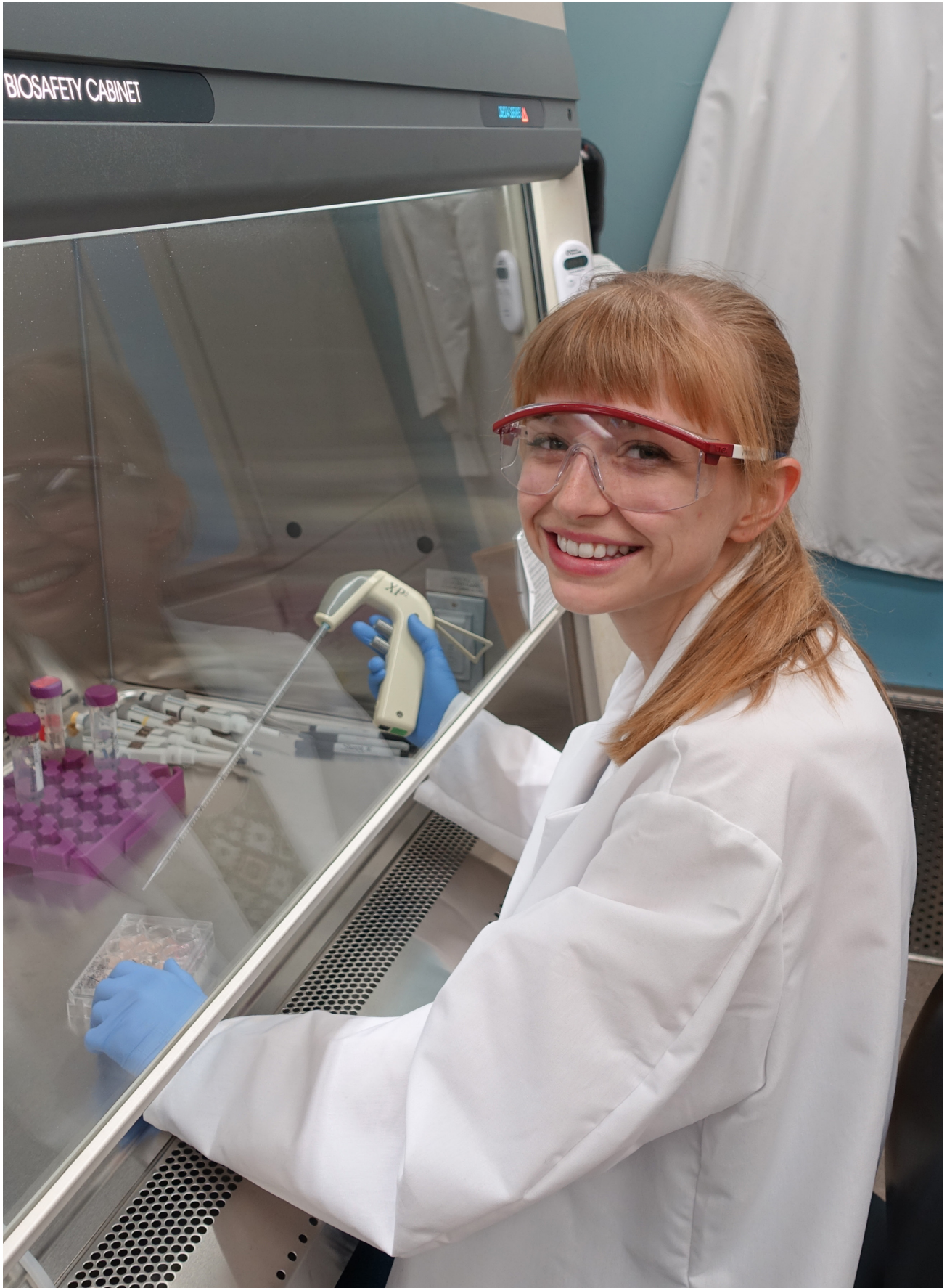
The most challenging and sad recent event for our department was the sudden passing of John Majors, PhD, who was a faculty member with us for many years. He was a valuable and special colleague and friend. We miss his kind smile and thoughtful outlook on science and life.

We are fortunate to have had many positive events and accomplishments to celebrate, which are listed and described in detail below. Several stand out for me. Paige Cloonan, an undergraduate researcher mentored by Michael Greenberg, PhD, won the Undergraduate Poster Award Competition at this year's Biophysical Society Meeting. Dr. Greenberg is an outstanding mentor for young people. Greg Bowman was chosen to receive a Packard Fellowship for Science and Engineering in recognition of his research on protein dynamics and enzyme function.

The total solar eclipse was seen in St. Louis last summer, and Jayma Mikes, our business manager, hosted a party to view the eclipse at her home, which had an optimal location. The experience was remarkable. Our holiday party in December was held at the Saint Louis Zoo, which has a wonderful evening lights display.

John A. Cooper, MD, PhD

Head, Department of Biochemistry and Molecular Biophysics



Mission Statement

Members of the Department of Biochemistry and Molecular Biophysics are dedicated to investigating the complex relationships and mechanisms that control biological processes. These processes are defined by interactions among proteins, nucleic acids (DNA and RNA) and between proteins or nucleic acids with small metabolites.

Our investigators use experimental structural, thermodynamic, kinetic and single-molecule methods as well as computational approaches to understand and quantify structural and dynamic aspects of macromolecular interactions. Our research provides fundamental knowledge that enables advances in medicine and improvements in the quality of life.

Teaching & Service

The Department of Biochemistry and Molecular Biophysics faculty members taught numerous professional and graduate courses in the 2016–17 and 2017–18 academic years.

Faculty also contributed to numerous committees, representing service to the Division of Biology and Biomedical Sciences, the department, the university, national and professional organizations and government agencies. Additionally, our faculty members served as reviewers for professional journals and as grant reviewers for governmental panels.

Graduate Courses

BIO 548 – Nucleic Acids and Protein Synthesis

BIO 5068 – Molecular Cell Biology

BIO 5312 – Macromolecular Interactions

BIO 5319 – Molecular Foundations of Medicine

BIO 5357 – Chemistry and Physics of Biological Molecules

BIO 5445 – DNA Metabolism Journal Club

For more information on courses, please visit:

[biochem.wustl.edu/studentinfo/ courses](http://biochem.wustl.edu/studentinfo/courses) or www.dbbs.wustl.edu

Faculty Recognition

Linda Pike, PhD, was installed as the Alumni Endowed Professor of Biochemistry and Molecular Biophysics in a ceremony attended by her family and presided over by Dean David Perlmutter, MD, and John Cooper, MD, PhD, on July 11, 2016. As part of the festivities, Dr. Pike presented a seminar entitled “*Parsley, Sage, Rosemary, and Thyme: The Fine ErbBs.*”



Michael Greenberg,
PhD



Linda Pike, PhD



Jim Janetka, PhD



Eric Galburt, PhD



William Frazier, PhD

The Alumni Professorship Endowment Fund was authorized by the Executive Committee of the Faculty of the Medical School in 1978. The program was initiated to help attract and retain the most distinguished faculty. These professorships are funded by unrestricted gifts from medical school alumni and former house staff combined with gifts from friends of the School of Medicine. The Alumni Endowed Professorship in Biochemistry and Molecular Biophysics was established in 1993. It was the fifth professorship under this program.

Michael Greenberg, PhD, was chosen to receive the 2016 Undergraduate Research Mentor of the Year Award. Dr. Greenberg’s summer student, Paige Cloonan, nominated him. She described his caring and diligent attention to her development as a researcher.

Linda Pike, PhD, received the 2016 Distinguished Service Teaching Award from the medical students in recognition of her teaching in the Molecular Foundations of Medicine course.

A story about the research of **Jim Janetka, PhD**, on antibiotic-sparing therapeutics, prompted by his new paper in *J Med Chem*, was published in *The Record*. His research group has developed small molecules that prevent bacteria from sticking to the bladder wall, halting development of urinary tract infections in mice.

Also, Dr. Janetka’s work on UTI treatments was featured in the *Proceedings of the National Academy of Sciences*. He contributed to research that may prevent the common problem of recurrent urinary tract infections with the use of a molecular decoy that targets *E. coli* bacteria.

One of the **Galburt Lab**’s publications entitled “*TFIIH generates a six-base-pair open complex during RNAP II transcription initiation and start-site scanning*” was featured on the *Saccharomyces Genome Database (SGD)* website.

You can view the article at nature.com and the piece from SGD entitled “*Squeezing Out a Tiny Bubble of DNA*” at yeastgenome.org.

William Frazier, PhD, will receive the Chancellor’s Award for Innovation and Entrepreneurship. Chancellor Mark S. Wrighton will present Dr. Frazier and two others with awards during a ceremony October 5, 2018, at The Ritz-Carlton Hotel in Clayton.

An article by **Michael Kinch, PhD**, about research on National Institutes of Health (NIH) budget cuts and their impact on drug development appeared in the November 16, 2017, issue of The Record. A proposal to slash funding for the NIH could severely impair the development of new, life-saving drugs, according to a new analysis by researchers at Washington University School of Medicine in St. Louis.

“NIH funding is instrumental in the early research needed to develop FDA-approved medicines,” said Dr. Kinch, also a professor of biochemistry and molecular biophysics. “Our data suggest that the development of newer drugs is becoming even more dependent on NIH funding.”

Awarding of Tenure

Congratulations to **Roberto Galletto, PhD**, whose promotion with tenure was officially approved by the Board of Trustees on March 3, 2017.

Congratulations to **Eric Galburt, PhD**, whose promotion with tenure was officially approved by the Board of Trustees on March 3, 2018.

Congratulations to **Jim Janetka, PhD**, whose promotion with tenure was officially approved by the Board of Trustees on March 3, 2018.

Transitions

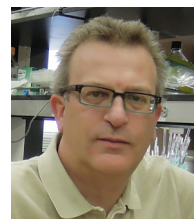
We welcomed two new faculty members — **Andrea Soranno, PhD**, and **Rui Zhang, PhD**. Dr. Soranno uses sophisticated single-molecule fluorescence spectroscopy and microscopy to study the structure, dynamics and functions of intrinsically disordered proteins and RNA. Dr. Zhang studies how microtubules assemble and function using biochemical and structural approaches, including cryo-electron microscopy.

Sadly, in 2018 we said goodbye to a longtime faculty member **John Majors, PhD**, and school and department benefactor **Raymond H. “Ray” Wittcoff**. Dr. Majors, professor emeritus of biochemistry and molecular biophysics at Washington University School of Medicine in St. Louis, died January 10, 2018, of a heart attack. He was 69. Dr. Majors made key contributions to the field of molecular biology, particularly work involving the expression of genes in yeast and viruses. He worked with a team led by Harold E. Varmus, MD, and J. Michael Bishop, MD, whose research revealing how viruses can cause cancer received the Nobel Prize in Physiology or Medicine in 1989.

Raymond Wittcoff, an emeritus trustee of Washington University in St. Louis and a member of the School of Medicine’s National Council since 2005, died Tuesday, January 2, 2018, at his home in Phoenix. He was 96. Mr. Wittcoff and his wife, Roma, also an emeritus trustee and School of Medicine National Council member, have been longtime supporters of Washington University, giving generously of their time, expertise and resources.



Michael Kinch, PhD



Roberto Galletto, PhD



Eric Galburt, PhD



Jim Janetka, PhD



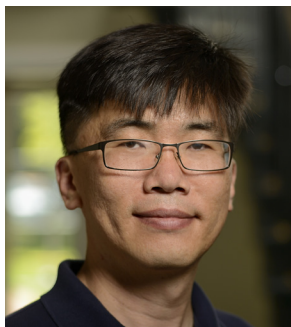
John Majors, PhD



Raymond H. Wittcoff

Seminars & Conferences

The department sponsors several seminars throughout the year. Our seminar series includes: the weekly Tuesday Seminar, Faculty Chalk Talks, Biophysical Evenings and the Cori Lecture.



Taekjip Ha, PhD



Taekjip Ha, PhD, from Johns Hopkins University, presented the 2017 Carl and Gerty Cori Lecture on February 28, 2017, in Connor Auditorium, Farrell Learning and Teaching Center. Dr. Ha is the Bloomberg Distinguished Professor of Biophysics and Biophysical Chemistry with the Johns Hopkins University and an investigator of the Howard Hughes Medical Institute.

He received his undergraduate degree in physics from Seoul National University, Seoul, Republic of Korea, in 1990. He earned his PhD in physics from the University of California at Berkeley in 1996, working with Dr. Steven Chu, who won the Nobel Prize in Physics in 1997. After postdoctoral training at Stanford University, he joined the physics department at the University of Illinois, Urbana-Champaign, in 2000, remaining there until his move to Johns Hopkins University in 2015.

Dr. Ha has pioneered the development and application of a wide range of single molecule fluorescence and optical tweezer approaches to manipulate and visualize the movements of single molecules to understand basic biological processes involving DNA and other molecules. He and his colleagues were the first to observe Forster Resonance Energy Transfer at the single molecule level. He has applied these approaches to a wide range of interacting systems, with particular emphasis on proteins and enzymes that function on nucleic acids, including translocases and helicases, a class of ATP-dependent enzymes that move along the DNA helix, while unwinding the two strands.

Dr. Ha has been recognized for his research by numerous awards. In 2011, he won the South Korean Ho-Am Prize in Science for his “pioneering application of fluorescence resonance energy transfer techniques to reveal the behavior and physical characteristics of single biomolecules.” In 2015, he was elected to membership in the National Academy of Sciences and the American Academy of Arts and Sciences. Dr. Ha serves on the editorial boards for *Science*, *Cell*, *eLife*, *PRX*, *Structure*, *PCCP*, *Physical Biology* and *Cancer Convergence*.

In addition to Dr. Ha visiting, many respected and world renowned scientists from across the country presented seminars for the 2016-2018 Biochemistry and Molecular Biophysics Seminar Series.

- **Jonathan Schleich, PhD**, postdoctoral scholar, Department of Biochemistry, Vanderbilt University School of Medicine. “*The Safety Dance: Biophysics of Membrane Protein Misfolding and Disease*,” January 12, 2016.
- **Tanja Mittag, PhD**, associate member, Department of Structural Biology, St. Jude Children’s Research Hospital. “*The Role of Protein Disorder and Multivalency in the Organization of the Cell*,” January 19, 2016.
- **Sarah Keane, PhD**, postdoctoral fellow, Department of Chemistry and Biochemistry, HHMI; University of Maryland, Baltimore. “*Structure of the HIV-1 5’ Leader*,” January 26, 2016.
- **Richard Hite, PhD**, postdoctoral fellow, Laboratory of Molecular Neurobiology and Biophysics, The Rockefeller University. “*CryoEM Structure of the Slo2.2 Na⁺-activated K⁺ Channel*,” February 2, 2016.
- **Ariele Follis, PhD**, postdoctoral fellow, Department of Structural Biology, St. Jude Children’s Research Hospital. “*Protein Dynamics Mediate Cell Signaling in Apoptotic Regulation by Cytosolic p53*,” February 9, 2016.
- **Andrea Soranno, PhD**, postdoctoral fellow, University of Zürich, Switzerland. “*Single Molecule Spectroscopy of Intrinsically Disordered Proteins*,” February 11, 2016.
- **Priya Banerjee, PhD**, postdoctoral fellow, Department of Integrative Structural and Computational Biology, The Scripps Research Institute. “*Functional Modulation of Protein Order-Disorder Transitions, One Molecule at a Time*,” February 16, 2016.
- **Rui Zhang, PhD**, postdoctoral fellow, Department of Molecular and Cell Biology, HHMI, University of California, Berkeley. “*Mechanistic Origin of Microtubule Dynamic Instability Revealed by High-resolution Cryo-EM*,” February 18, 2016.
- **Roland Dolle, PhD**, executive director, Principal, Brysten Biomedical, LLC. “*Analgesic Delta Opioid Receptor Agonists: Discovery to Clinical Trials*,” February 23, 2016.
- **James Havranek, PhD**, assistant professor, Department of Biochemistry and Molecular Biophysics, Washington University in St. Louis. “*Tools and Applications of Protein Engineering*,” March 8, 2016.
- **Matthew Lew, PhD**, assistant professor, Department of Electrical and Systems Engineering, Washington University in St. Louis. “*Single Molecules and Computational Optics for Nanoscale Biological Imaging*,” March 15, 2016.
- **Joseph D. Puglisi, PhD**, professor and chair, Department of Structural Biology, Stanford University. “*Dynamics of Translation*,” March 21, 2016.

- **Patrick Loria, PhD**, professor, Department of Chemistry, Yale University. *“The Role of Microsecond-Millisecond Motions in Enzyme Function,”* March 22, 2016.
- **Ken Dill, PhD**, professor, Department of Chemistry, Stony Brook University. *“Towards a Physical Chemistry of the Cell,”* March 29, 2016.
- **Evgeny Nudler, PhD**, professor, Department of Biochemistry and Molecular Pharmacology, New York University. *“New Principles of Transcription-Coupled DNA Repair,”* April 5, 2016.
- **H. Jane Dyson, PhD**, professor, Department of Integrative Structural and Computational Biology, The Scripps Research Institute. *“Disorder and Partial Order in Protein-Protein Interactions,”* April 12, 2016.
- **Tony Koleske, PhD**, professor, Department of Molecular Biophysics and Biochemistry, Yale University. *“Adhesive and Cytoskeletal Control of Dendrite and Synapse Stability,”* April 18, 2016.
- **Jonathan Howard, PhD**, professor, Department of Molecular Biophysics and Biochemistry, Yale University. *“Beat Generation: Ciliary and Flagellar Motion Driven by Cooperative Molecular Motors,”* April 19, 2016.
- **Min Lu, PhD**, associate professor, Department of Molecular Biology, Rosalind Franklin University of Medicine and Science. *“Mechanistic Studies of MATE Multidrug Transporters,”* April 26, 2016.
- **Roberto Galletto, PhD**, assistant professor, Department of Biochemistry and Molecular Biophysics, Washington University in St. Louis. *“Helicases, Polymerases and Protein Blocks: What Does What at Telomeres?”* April 28, 2016.
- **Weikai Li, PhD**, assistant professor, Department of Biochemistry and Molecular Biophysics, Washington University in St. Louis. *“Structural Biology of Bloody Membrane Proteins,”* May 10, 2016.
- **Xuhui Huang, PhD**, associate professor of science, Department of Chemistry, The Hong Kong University of Science and Technology. *“From Molecular Dynamics to Genomic Biology: Constructing Kinetic Network Models to Elucidate Transcriptional Fidelity of RNA Polymerase II,”* September 12, 2017.
- **Kristen Lynch, PhD**, professor and chair, Department of Biochemistry and Biophysics, University of Pennsylvania. *“Getting Sick of Splicing: Alternative Splicing and the Human Immune System,”* September 19, 2017.
- **Vince Voelz, PhD**, associate professor, Department of Chemistry, Temple University. *“Molecular Simulation and Markov State Model Approaches for Folding, Binding and Design,”* October 3, 2017.

- **Mario Feldman, PhD**, associate professor, Department of Molecular Microbiology, Washington University in St. Louis. “*Biogenesis of Outer Membrane Vesicles in Pathogenic and Commensal Bacteria*,” October 10, 2017.
- **Whitney Yin, MD, PhD**, assistant professor, Department of Pharmacology & Toxicology, University of Texas Medical Branch at Galveston. “*A United Mechanism for Mitochondrial DNA repair*,” October 17, 2017.
- **Greg Bowman, PhD**, assistant professor, Department of Biochemistry and Molecular Biophysics, Washington University in St. Louis. “*Understanding and exploiting allosteric networks*,” October 26, 2017.
- **Manu Platt, PhD**, assistant professor, Department of Biomedical Engineering, Georgia Tech. “*Quantitative Dissection of Proteolytic Networks Governing Tissue Remodeling in Health and Disease*,” October 31, 2017.
- **Julie Biteen, PhD**, associate professor, Department of Chemistry, University of Michigan. “*Measuring Biochemistry with Biophysics: Watching How Single Molecules Work Together Inside Living Bacteria Cells*,” November 7, 2017.
- **Jeff Gelles, PhD**, professor, Department of Biochemistry and Molecular Pharmacology, Brandeis University. “*Non-Equilibrium Regulation of DNA Transcription*,” November 14, 2017.
- **Courtney Aldrich, PhD**, associate professor, Department of Medicinal Chemistry, University of Minnesota. “*Rationale Design of Antibiotics from First Principles*,” November 28, 2017.
- **Yann Chemla, PhD**, associate professor, Department of Physics, University of Illinois at Urbana-Champaign. “*Molecular Switch Control of Nucleic-Acid Processing Machines*,” December 5, 2017.
- **Jacqueline Elise Payton, MD, PhD**, assistant professor, Department of Pathology and Immunology, Washington University in St. Louis. “*Transcriptional Deregulation in Lymphoma: the Role of Enhancers and LncRNAs*,” December 12, 2017.
- **Caitlin Marlatt Davis, PhD**, postdoctoral fellow, Center for the Physics of Living Cells, University of Illinois at Urbana-Champaign. “*Fast Protein Dynamics: From Protein Folding In Vitro to Protein-RNA Interactions Inside Cells*,” January 23, 2018.
- **Samara Reck-Peterson, PhD**, Department of Cellular and Molecular Medicine, School of Medicine, and Biological Sciences Division, Cell and Developmental Biology Section, University of California San Diego. “*The Molecular Mechanisms Driving Microtubule-based Intracellular Transport*,” January 30, 2018.
- **Fred Hughson, PhD**, professor, Department of Molecular Biology, Princeton University. “*Chaperoning SNARE Assembly to Control Membrane Fusion*,” February 6, 2018.

- **Andrew Carter, PhD**, MRC Laboratory of Molecular Biology. “*Transporting Cargo Over Long Distances: Insights from Dynein/Dynactin Structures*,” February 13, 2018.
- **Gerald Dorn, PhD**, professor, Department of Internal Medicine, Pharmacogenomics, Washington University in Saint Louis. “*Mitofusin Agonists — from Peptides to Small Molecules to Drug*,” February 27, 2018.
- **Daniel Rosenbaum, PhD**, associate professor, Department of Biophysics, UT Southwestern. “*Membrane Protein Conformational Changes in Human Physiology and Disease*,” March 6, 2018.
- **Samantha Harris, PhD**, associate professor, Department of Cellular and Molecular Medicine, University of Arizona. “*Through Thick and Thin: Regulation of Cardiac Contraction by cMyBP-C*,” March 13, 2018.
- **Anna Loveland, PhD**, postdoctoral associate, RNA Therapeutics Institute, University of Massachusetts Medical School. “*Ensemble Cyro-EM Reveals Ribosome Dynamics*,” March 21, 2018.
- **Tom Record, PhD**, professor, Department of Biochemistry, University of Wisconsin. “*Open Complex Formation, Stabilization, and Transcription Initiation by E. coli RNA Polymerase*,” April 3, 2018.
- **Jianmin Cui, PhD**, professor, Department of Biomedical Engineering, Washington University in St. Louis. “*Allosteric Gating of a Ca²⁺-Activated Potassium Channel*,” April 20, 2018.
- **Janice Robertson, PhD**, assistant professor, Department of Molecular Physiology and Biophysics, The University of Iowa. “*Driving Forces of Greasy Membrane Protein Assembly in Greasy Membranes*,” April 12, 2018.
- **John Kuriyan, PhD**, professor, Department of Molecular & Cell Biology and Chemistry, University of California-Berkeley. “*Deconstruction of the Ras Switching Cycle Through Saturation Mutagenesis*,” April 16, 2018.
- **Weikai Li, PhD**, assistant professor, Department of Biochemistry and Molecular Biophysics, Washington University of St. Louis. “*Structural Basis of Vitamin K Antagonism*,” April 17, 2018.
- **Amir Aharoni, PhD**, professor, Department of Molecular Engineering & Sciences, University of Washington. “*Live-Cell Measurement of Eukaryotic DNA Replication Rates*,” April 24, 2018.
- **Jens Gundlach, PhD**, professor, Department of Physics, University of Washington. “*Enzyme Studies with Single-Molecule Picometer Resolution Nanopore Tweezers, SPRNT*,” May 1, 2018.
- **Enrico Di Cera, PhD**, chair, Department of Biochemistry & Molecular Biology, Saint Louis University. “*Interplay Between Conformational Selection and Zymogen Activation in the Trypsin Fold*,” May 8, 2018.

Biophysical Evenings

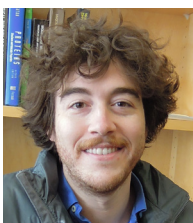
- **Jay Ponder, PhD**, professor, Department of Chemistry, Washington University in St. Louis. “*Computational Modeling of Ligand Binding: Current Status and Future Prospects*,” January 12, 2016.
- **David Piston, PhD**, professor and head, Department of Cell Biology and Physiology, Washington University in St. Louis. “*Quantitative Microscopy of Mechanisms Underlying Hormone Secretion*,” February 9, 2016.
- **Steven George, MD, PhD**, professor and head, Department of Biomedical Engineering, Washington University in St. Louis. “*Vascularizing Engineered (Cardiac and Tumor) Tissue In Vitro*,” March 8, 2016.
- **Michael Greenberg, PhD**, assistant professor, Department of Biochemistry, Washington University in St. Louis. “*Mechanosensing by Myosin Molecular Motors*,” April 12, 2016.
- **Patricia Clark, PhD**, professor, Department of Biochemistry, University of Notre Dame. “*Translation Rate Effects on Protein Maturation*,” May 11, 2016.
- **Chris Lingle, PhD**, professor, Department of Anesthesiology, Washington University in St. Louis. “*Defining Stoichiometry of Regulatory Subunits in Single BK Channels*,” October 11, 2016.
- **Tao Ju, PhD**, professor, Department of Computer Science and Engineering, Washington University in St. Louis. “*Protein Modeling from Cryo-EM Density Maps Using Geometric Skeletons*,” December 13, 2016.
- **Alex Evers, MD**, professor and head, Department of Anesthesiology, Washington University in St. Louis. “*Using Photo-Crosslinking, Click Chemistry, and Mass Spectrometry to Map Steroid Binding Sites on Membrane Proteins*,” January 10, 2017.
- **Rui Zhang, PhD**, assistant professor, Department of Biochemistry and Molecular Biophysics, Washington University in St. Louis. “*Mechanistic Origin of Microtubule Dynamic Instability Revealed by High-resolution Cryo-EM*,” February 7, 2017.
- **Linda Pike, PhD**, professor, Department of Biochemistry and Molecular Biophysics, Washington University in St. Louis. “*Allostery in the EGF Receptor*,” March 14, 2017.
- **Timothy Lohman, PhD**, professor, Department of Biochemistry and Molecular Biophysics, Washington University in St. Louis. “*How Does a Helicase Motor Unwind DNA?*,” April 11, 2017.
- **Andrea Soranno, PhD**, assistant professor, Department of Biochemistry and Molecular Biophysics, Washington University in St. Louis. “*Single-Molecule Spectroscopy of Intrinsically Disordered Proteins*,” September 12, 2017.

- **Shankar Mukherji, MD**, assistant professor, Department of Physics, Washington University in St. Louis. “*The Statistical Physics of Organelle Biogenesis*,” October 10, 2017.
- **Meredith Jackrel, PhD**, assistant professor, Department of Chemistry, Washington University in St. Louis. “*Re-Engineering a Prion Disaggregase, Hsp104, to Counter Protein-Misfolding Disorders*,” December 12, 2017.
- **Daved Fremont, PhD**, professor, Department of Pathology and Immunology, Washington University in St. Louis. “*Much Ado about Viral Immune Invasion*,” February 6, 2018.
- **Kathleen Hall, PhD**, professor, Department of Biochemistry and Molecular Biophysics, Washington University in St. Louis. “*From Secondary Structure to Tertiary Structure: RNA Needs Ions*,” March 13, 2018.
- **Michael Gross, PhD**, professor, Department of Chemistry, Washington University in St. Louis. “*Role of Mass Spectrometry in Biophysics and Structural Biology*,” April 10, 2018.

Student Recognition

Several students were recognized for their outstanding research efforts and academic success through fellowships and teaching awards.

Center for Biological Systems Engineering (CBSE) Graduate Student Scholar Award



Maxwell Zimmerman

Maxwell Zimmerman, a Computational & Molecular Biophysics student in the laboratory of Greg Bowman, PhD, was selected as a 2016-2017 CBSE Graduate Student Scholar. Zimmerman was recognized for the early promise he has shown in the development of novel sampling algorithms that are aiding feature-based sampling of high dimensional conformational spaces. He has also been selected as a three-year Monsanto Fellow, which will give him a unique opportunity to interact with Monsanto scientists in a variety of venues.



Lindsey Steinberg

David F. Silbert Outstanding Teaching Assistant Award

The 2015-2016 David F. Silbert Outstanding Teaching Assistant Award went to **Lindsey Steinberg** for her work in the Microbes & Pathogenesis course. Steinberg was nominated by Henry Huang, PhD. She exemplified the spirit of this award through her dedication and lasting contribution to the course, the course master and the students in the class.

Arthur Sletton was awarded the 2016-2017 David F. Silbert Outstanding Teaching Award for his work with the Fall Human Body course. Sletton was nominated by Kari Allen, PhD, Glenn Conroy, PhD, and Jane Phillips-Conroy, PhD. He exemplified the spirit of this award through his dedication and lasting contribution to the course, the course instructors and the students in the class.



Arthur Sletton

MilliporeSigma Fellowship Award

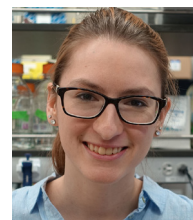
The MilliporeSigma Fellowship Award recognizes graduate students for their achievements in academics and research, and for having outstanding potential for success as a graduate student and researcher. The award provides funds for educational expenses.

Sarem Hailemariam received the 2016 MilliporeSigma Fellowship Award. Hailemariam received her undergraduate degree in biology from Shaw University in Raleigh, North Carolina. She joined the Division of Biological and Biomedical Sciences (DBBS) at Washington University in St. Louis in 2012 as part of the Molecular Cell Biology Program. Hailemariam has always had scientific interests in mechanisms employed by different organisms to maintain genome integrity. Prior to joining DBBS, she worked on the mammalian DNA replication origin-licensing factor, Cdt1.



Sarem Hailemariam

Catherine Knoverek received the 2018 MilliporeSigma Fellowship Award. Knoverek is a graduate student in the Biochemistry, Biophysics and Structural Biology Program. She is doing her PhD thesis work in the lab of Greg Bowman, PhD. Knoverek is pursuing questions involving how mutations interact to affect the biophysical properties of proteins and how those interactions ultimately affect protein evolution.



Catherine Knoverek

David F. Silbert Summer Fellowship Award

Margery Gang received the 2016 David F. Silbert Summer Fellowship Award. Supported by this award, Gang performed research in the laboratories of Matthew Christopher, MD, PhD, and Timothy Ley, MD, in the Division of Oncology of the Department of Medicine. Her project was entitled “*WT1 Loss-of-Function Mutations in Acute Myeloid Leukemia.*”



Margery Gang

The 2017 Silbert Summer Fellowship Award was given to **Divya Natarajan**. Natarajan worked with Rohit Pappu, PhD, and Ammon Posey, PhD, in the Department of Biomedical Engineering. Her project was entitled “*Toward Rational Design of Huntington’s Disease Therapeutics Using Profilin as a Model of Huntington Aggregation Suppression Via Multivalent Interactions.*”



Divya Natarajan

Ceil M. DeGutis Prize

The Ceil M. DeGutis Prize is presented to a senior graduate student, in their fifth or sixth year of graduate study, who has made a significant contribution to the field of chemical biology or medicinal chemistry disciplines broadly defined.



Whitney Grither

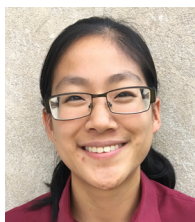
On May 5th, 2017, **Whitney Grither** was awarded the 2017 Ceil M. DeGutis Prize in Chemical Biology/Medicinal Chemistry. Grither presented her research entitled, “*Selective Small Molecule Inhibition of Discoidin Domain Receptor 2.*” She defended her thesis on June 9, 2017, from the biochemistry graduate program. She finished her PhD work in the laboratory of Greg Longmore, PhD, with the express purpose of identifying novel modes of inhibiting an underappreciated collagen receptor, DDR2, which they had just shown was critical for breast cancer metastasis in experimental mouse models and humans (Nature Cell Biology, 2013).



Melissa Budelier

On May 22, 2018, **Melissa Budelier** and **Lucy Li** were awarded the 2018 Ceil M. DeGutis Prize in Chemical Biology/Medicinal Chemistry.

Budelier presented her research entitled “*Mapping Ligand Binding Sites in Integral Membrane Proteins.*” She graduated in May 2018, and will begin a clinical chemistry fellowship within the Division of Laboratory and Genomic Medicine at Washington University in St. Louis.



Lucy Li

Li presented her research entitled “*Glycan precursor transport in Cryptococcus neoformans.*” She defended her thesis in August 2017 and then returned to medical school in order to finish the last two years of her degree. Li anticipates graduating in May 2019 and is planning to complete her residency after graduation.

Gary K. Ackers Fellowship Award

The Gary K. Ackers Fellowship was funded by Paul Darling III, PhD, who studied in the Division of Biology and Biomedical Sciences and graduated in 1999. Dr. Ackers served as the thesis advisor for Dr. Darling. The Ackers Fellowship award provides funds for educational expenses.



Drake Jensen, PhD

The 2016 Gary K. Ackers Fellowship was awarded to **Drake Jensen**, a first-year graduate student in the Computational and Molecular Biophysics Program. Jensen received his bachelor’s in chemistry and biology from Southern Illinois University Edwardsville in 2013. During this time, he began pursuing research in equilibrium and kinetic studies of Calmodulin target recognition. After graduation, he continued research in the same lab and graduated in 2015 with a master’s degree in chemistry.

Elliot Elson Fellowship Award

The Elliot L. Elson Education Training Endowment supports opportunities for students and the very best post-doctoral trainees in the Department of Biochemistry and Molecular Biophysics.

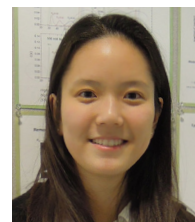
Rob Welty received the inaugural Elliot Elson Fellowship Award in 2016. Welty received his bachelor's degree, double majoring in chemistry and biochemistry, from the University of Minnesota Duluth. During that time, he began doing research studying the effects of molecular crowding on diffusion using fluorescence correlation spectroscopy (FCS). After graduation, he continued working in the same laboratory and in 2013 graduated with a master's degree in chemistry. Welty joined the Division of Biological and Biomedical Sciences at Washington University the same year as part of the Computational and Molecular Biophysics program.



Rob Welty

Two students received the 2017 Elson Fellowship: **Min Kyung Shinn** and **Drake Jensen**.

Min Kyung Shinn received her bachelor's degree in physics and chemistry from Bard College in 2014. After graduation, Shinn joined the PhD program at Washington University in St. Louis in the department of physics and joined the laboratory of Tim Lohman, PhD. In 2016, she received her master's degree in physics.



Min Kyung Shinn

Shinn is currently working on two projects in the laboratory of Dr. Lohman. The first project involves the role of the intrinsically disordered C-Terminal tails of the SSB protein in cooperativity and interactions with other proteins. Her second project involves a study of the dynamics of the nuclease domain of the recombination helicase/nuclease, RecBCD.

Drake Jensen, PhD, is pursuing his thesis work under the mentorship of Eric Galburt, PhD, in the Department of Biochemistry and Molecular Biophysics. Here, Jensen evaluates mycobacterial transcription initiation mechanisms using ensemble and single-molecule biophysical methods. His work is focused on two essential mycobacterial RNA Polymerase- and DNA-binding transcription factor proteins termed CarD and RbpA. Specifically, he addresses how each factor is implicated in mycobacterial stress responses and possible links to antibiotic efficacy currently used to treat tuberculosis. Following graduation, Jensen plans to pursue post-doctoral positions with an interest in understanding mechanisms of molecular pathogenesis through a biophysical lens.



Drake Jensen, PhD

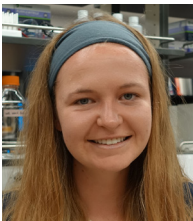


Joseph Stodola, PhD

Olin Biomedical Science Fellow

Joseph Stodola, PhD, was named the 2016 Olin Biomedical Science Fellow. Dr. Stodola obtained his PhD in May 2016 in the lab of Peter Burgers, PhD. He is currently working at Sigma-Aldrich.

These fellowships were created by a generous gift from the Olin Foundation. The Olin Fellowships are presented to PhD and MD/PhD students conducting research in the biomedical sciences in any Washington University graduate program who have made significant contributions, and demonstrated the potential to become outstanding research scientists.



Paige Cloonan

Undergraduate Awards

Congratulations to **Paige Cloonan**, an undergraduate researcher in Michael Greenberg's lab, for winning the Undergraduate Poster Award Competition at the 2018 Biophysical Society Meeting.

Cloonan is currently in her fourth year, majoring in biomedical engineering. The winning poster was entitled "*Mechanical and Structural Analysis of Cardiomyopathies at the Single Cell Level.*"

Staff Recognition



Darrell Baldwin

On May 24, 2018, **Darrell Baldwin** received the Washington University School of Medicine 2018 Operations Staff Service Award. The Operations Staff Service award is given to a staff member who has demonstrated outstanding leadership, exceptional performance in their position and superior service. The department surprised Baldwin with an award ceremony and celebration in the seminar room where David Perlmutter, MD, Dean of the School of Medicine, said a few words and presented the award.

Department Activities

Retreats

2016

The first SLU/WU Biochemistry Joint Retreat was held on October 7, 2016, at the Donald Danforth Plant Science Center. The day featured various talks from students, postdocs and faculty from the biochemistry departments at both institutions.

The 23rd BCM/CMBP Graduate Student Program Retreat was held October 21-22, 2016, at the Cedar Creek Conference Center. Various student talks were presented during the day by senior students in the program. The guest speakers for the evening session were presented by two Washington University faculty members. The first talk was presented by **Greg Bowman, PhD**, assistant professor in biochemistry and molecular biophysics, whose talk was entitled, “*Controlling Proteins’ Functions by Exploiting their Uncharted Conformations.*” The second talk was presented by **Sergej Djuranovic, PhD**, assistant professor in cell biology, whose talk was entitled, “Mechanisms of Translational Control During Translation Elongation.” **Alex Holeshouse** won best student talk.



2017 BBSB Retreat

2017

The 24th Annual Biochemistry, Biophysics and Structural Biology (BBSB) Graduate Student Program retreat was held October 20-21, 2017, at the Cedar Creek Conference Center. This year the keynote speakers were: **Andrea Soranno, PhD**, and **Rui Zhang, PhD**, assistant professors in the Department of Biochemistry and Molecular Biophysics. Dr. Soranno presented on “*Single-Molecule Fluorescence Spectroscopy of Intrinsically Disordered Proteins.*” Dr. Zhang presented on “*What Can You Do with Cryo-EM.*” Friday evening concluded with a poster session. In addition to the two keynote speakers, various students presented talks on their research during the day on Friday and Saturday. The winner for best talk was awarded to Anne Robinson in the lab of Jeff Henderson, MD. Best Student Poster went to Yerdos Ordabayev in the lab of Tim Lohman, PhD, and the Best Postdoc Poster was awarded to Dr. John Robinson in the lab of Steve Beverley, PhD.



2016 Chili Cook-Off: Lohman Lab

Science Fridays (TGIF)

Weekly informal presentations of current research by students, fellows and faculty, followed by refreshments and fellowship. Each year we have a special TGIF Chili Cook-off. The winner receives a fabulous trophy and lunch for the lab. Below are pictures from the 2016 and 2017 competitions along with the winners.



2017 Chili Cook-Off: Burgers Lab

The 2016 Chili Cook-off was held on February 19. The competition was intense, and the chili was good! The 2016 chili cook-off winner was the Lohman lab.

The 2017 cook-off included a few non-chili options such as vegan and Chinese selections with the Burgers Lab taking home first prize.



2016 Welcome BBQ



Eclipse Party



2017 Holiday Party

Annual Welcome BBQs

Every August we hold an annual Joint BCM/CMBP Graduate Program and BMB Department BBQ. In 2016 it was moved from Tower Grove Park to Forest Park. Faculty, postdocs, students and staff attended the BBQ to help welcome the new BCM/CMBP graduate program students. Everyone enjoyed yard games, plenty of food and drink, and getting to know the new students.

Eclipse Party

On Monday, August 21, 2017, Mrs. Jayma Mikes invited members of the BMB Department out to her house to get a good view the total eclipse of the sun.

Holiday Parties

Our 2016 Holiday Party was delayed due to weather. It was eventually held on January 8 at the Saint Louis Zoo. We missed the Zoo Lights, but a fun time was held by all. In 2017, we tried again and the weather cooperated. The party was great and the Zoo Lights were fantastic!

Research Grants & Awards

Gregory Bowman, PhD, assistant professor of biochemistry and molecular biophysics, received a new five-year grant from the National Science Foundation for his research entitled “*CAREER: FAST Methods for Protein Folding and Design.*”

Gregory Bowman, PhD, assistant professor of biochemistry and molecular biophysics, received a BWF Ad Hoc grant in support of a workshop entitled “*The 2016 Workshop on Kinetics and Markov State Models (MSMs) in Drug Design*” that was held May 19-20 at the Novartis Institutes for Biomedical Research in Cambridge, Massachusetts.

Gregory Bowman, PhD, assistant professor of biochemistry and molecular biophysics, received a two-year subcontract from the National Institute of Allergy and Infectious Diseases for his project entitled “*Therapeutics Targeting Filoviral Interferon-Antagonist and Replication Functions.*” This project is a subcontract with Drs. Gaya Amarasinghe (Wash U) and Christopher Basler (Georgia State University).

Peter M. Burgers, PhD, Marvin A. Brennecke Professor of Biological Chemistry, Department of Biochemistry and Molecular Biophysics, received a five-year MIRA grant from the National Institute of General Medical Sciences for his research entitled “*Mechanisms of DNA Replication and Maintenance in Eukaryotes.*”

John A Cooper, MD, PhD, Wittcoff Professor and Head of Biochemistry and Molecular Biophysics, received a new five-year MIRA grant from National Institute of General Medical Sciences for his research entitled “*Actin Assembly and Cell Motility: Mechanisms and Regulation.*”

Eric Galburt, PhD, assistant professor, Department of Biochemistry and Molecular Biophysics, along with Christina Stallings, PhD, assistant professor, Department of Molecular Microbiology, received an equipment supplement grant award from the National Institute of General Medical Sciences for their MPI research entitled “*Investigating Novel Mechanisms of Transcription Initiation Regulation in Mycobacteria.*”

Eric Galburt, PhD, assistant professor, Department of Biochemistry and Molecular Biophysics, received a new four-year grant award from the National Institute of General Medical Sciences for his research entitled “*Mechanisms of Eukaryotic Transcription Initiation.*”

Roberto Galletto, PhD, associate professor of biochemistry and molecular biophysics, received a four-year grant award renewal from the National Institute of General Medical Sciences for his research entitled “*Helicase Activity and its Role in Telomere and Telomerase Regulation.*”

Michael Greenberg, PhD, assistant professor of biochemistry and molecular biophysics, was awarded a CDI Micro-Grant from the Washington University Center for Cellular Imaging to use high-resolution imaging techniques to study familial cardiomyopathies in stem cell-derived cardiomyocytes.

Michael Greenberg, PhD, assistant professor of biochemistry and molecular biophysics, received an award from the CDI hPSC Core Pilot Grant Program to develop models of familial cardiomyopathies using stem cells.

Jim Janetka, PhD, associate professor of biochemistry and molecular biophysics and chemistry adjunct, along with Scott Hultgren, PhD, Helen L. Stoeber Professor of Molecular Microbiology, received a four-year grant award from the National Institute of Diabetes and Digestive and Kidney Diseases for their research entitled “*Small Molecule Bacterial Lectin Antagonists for UTI Treatment and Prevention.*”

Jim Janetka, PhD, associate professor, Department of Biochemistry and Molecular Biophysics, received a new two-year grant award from the Alvin J. Siteman Cancer Research Fund for his research entitled “*Inhibitors of Growth Factor Activation as New Adjunct Chemotherapy for Cancer.*”

Jim Janetka, PhD, associate professor of biochemistry and molecular biophysics and chemistry adjunct, received a two-year, Career Catalyst Research (CCR) Competitive Renewal Grant Program award from Susan G. Komen for the Cure for his research entitled “*Multifunctional inhibitors of MET/RON signaling and cross-talk with EGFR/HER2.*” The work is focused on developing new drugs to treat breast cancer by dual targeting of the tumor and its microenvironment.

Timothy M. Lohman, PhD, Marvin A. Brennecke Professor of Biophysics, Department of Biochemistry and Molecular Biophysics received a four-year grant from the National Institute of General Medical Sciences for his research entitled “*SSB Protein/ DNA Interactions.*”

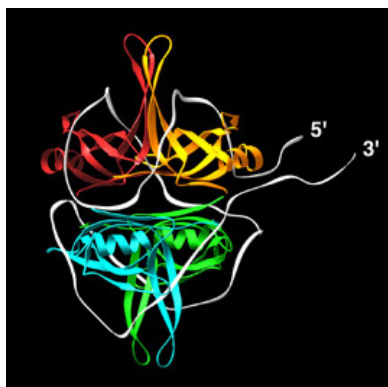


Timothy M. Lohman, PhD, professor of biochemistry and molecular biophysics, received an equipment supplement grant award from the National Institute of General Medical Sciences for his research entitled “*SSB Protein/DNA Interactions.*”

Timothy M. Lohman, PhD, professor of biochemistry and molecular biophysics, received a four-year grant award from the National Institute of General Medical Sciences for his research entitled “*Helicase Catalyzed DNA Unwinding.*”

Publications

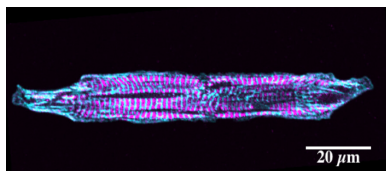
The Department of Biochemistry and Molecular Biophysics published over 123 articles in various journals.



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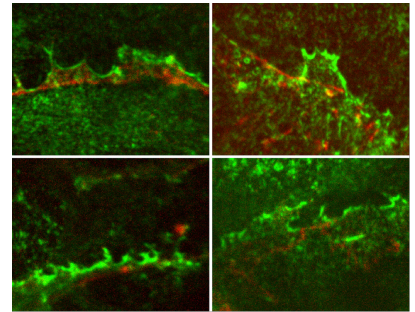
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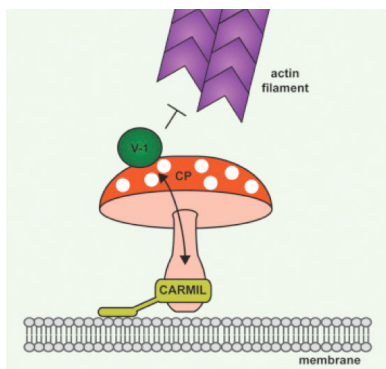
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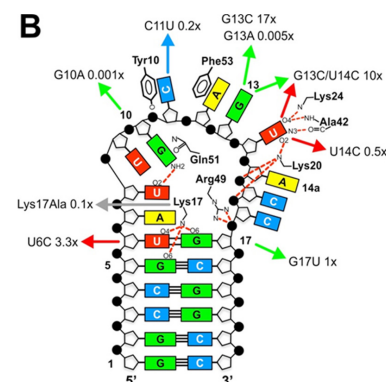
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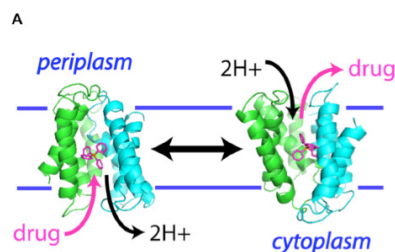
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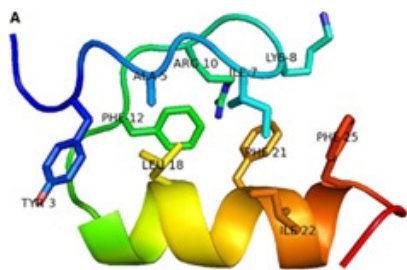
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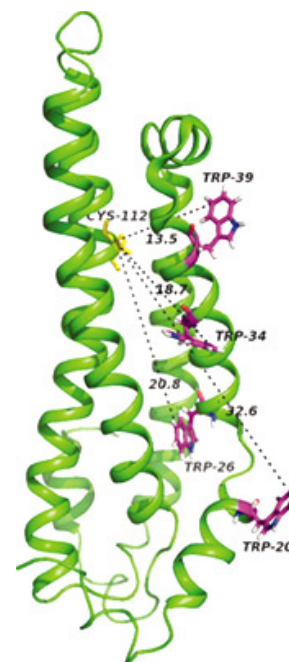
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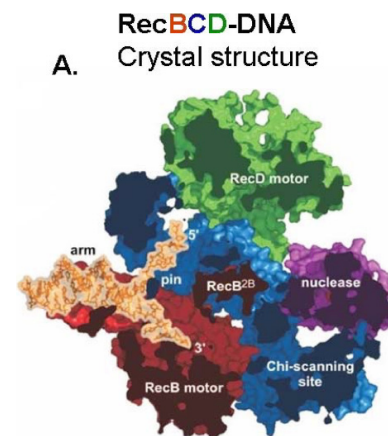
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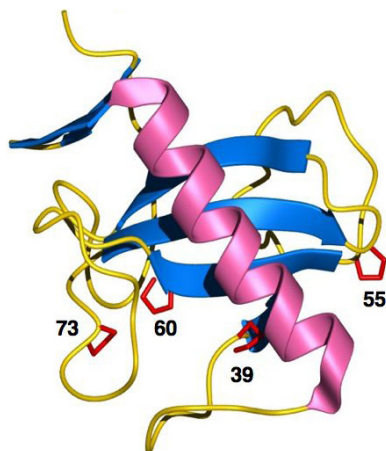
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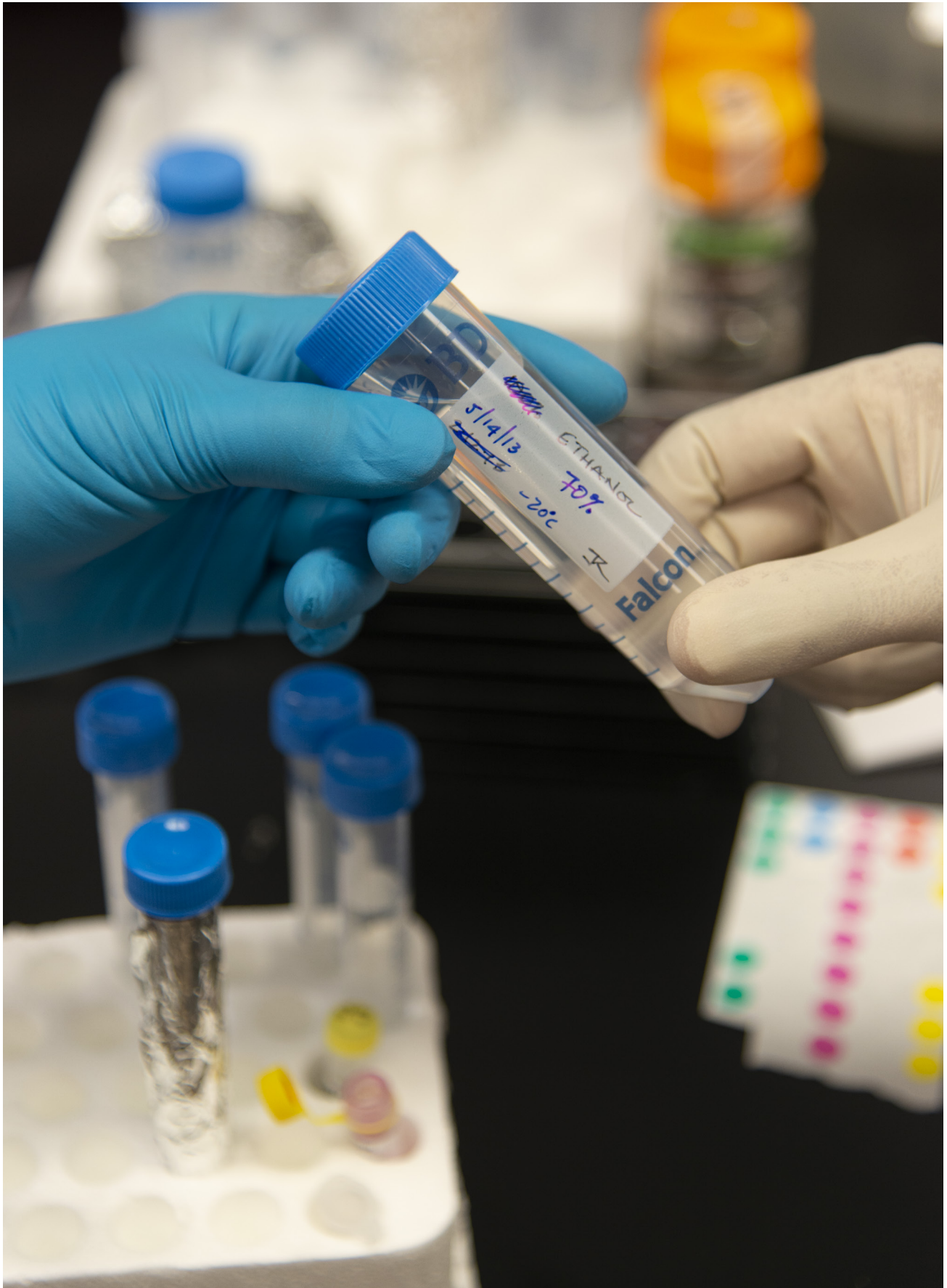
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Kimberly Jo Gerik..... Staff Scientist
Lina Greenberg..... Staff Scientist
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Binh Kiem Thanh Nguyen..... Staff Scientist
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Jennifer Lucille ObermannResearch Lab Manager
Ana Maria Ruiz Manzano..... Staff Scientist
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Changguo Tang Staff Scientist
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Melissa Budelier	Graduate Student
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Sarah Clippinger.....	Graduate Student
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Matthew Cruz	Graduate Student
Jasmine Cubuk.....	Graduate Student
Elizabeth DeLassus	Graduate Student
Roseane dos Reis Silva.....	Graduate Student
Jabari Elliott	Graduate Student
Nicole Fazio	Graduate Student
McKenna Feltes	Graduate Student
Edward Fisher.....	Graduate Student
Ronald Fowle Grider	Graduate Student
Whitney Grither	Graduate Student
Sarem Hailemariam.....	Graduate Student
Paige Hall.....	Graduate Student
Linxuan Hao	Graduate Student
Ian Harvey	Graduate Student
James Heffernan.....	Graduate Student
Mariah Hoyer	Graduate Student
Drake Jensen	Graduate Student
Britney Johnson.....	Graduate Student
Patrick Judge.....	Graduate Student
Vasilios Kalas.....	Graduate Student
George Katumba	Graduate Student
Roger Klein	Graduate Student
Catherine Kloverek	Graduate Student
Brendan Mathias	Graduate Student
Justin Miller	Graduate Student
Elisa Murray	Graduate Student
Yerdos Ordabayev	Graduate Student

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Cameron SargentGraduate Student
Apurwa Sharma.....Graduate Student
Min Shinn.....Graduate Student
Sukrit SinghGraduate Student
Brittany SmithGraduate Student
Melanie Sparks Graduate Student
Lindsey Steinberg..... Graduate Student
Tyson Todd Graduate Student
Michael WardGraduate Student
Robb Welty Graduate Student
Huiming XiaGraduate Student
Lu Yu.....Graduate Student
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