



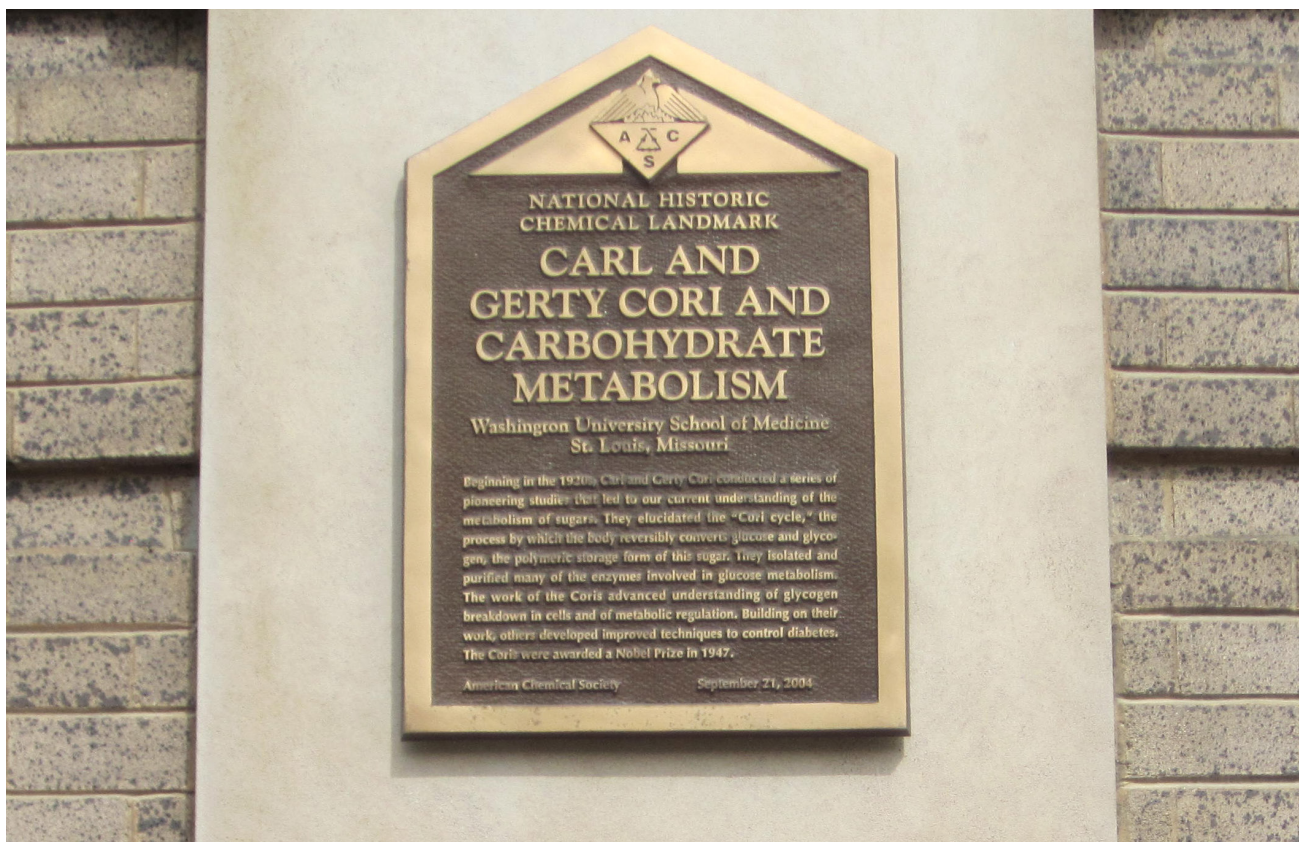
Department of

# Biochemistry and Molecular Biophysics

Annual Report 2014-15

 Washington  
University in St. Louis  
SCHOOL OF MEDICINE





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## Message from the Department Head



John A. Cooper, MD, PhD

2015 was a year of change and progress for our department. From my personal perspective, I was pleased to be appointed as permanent head of the department on July 1, when I transitioned from the role of interim head. It is an honor to have been offered this opportunity by the dean and the executive faculty. I am also pleased to have the chance to continue the work that the faculty and I have been performing to move the department forward into challenging new areas of research and training.

The faculty are the core of our department, and we were pleased this year to welcome our newest faculty member, Michael Greenberg, PhD. His research on myosin motor proteins extends the department's focus on molecular biophysics; he employs sophisticated optical methods to measure kinetic rate constants for single molecules under load. Michael will use these methods to understand the cause of heart diseases in which proteins — including myosin — carrying subtle mutations affect the function of the heart. These diseases can lead to tragic outcomes of sudden death among apparently healthy young people, including fit athletes.

To honor a senior member of our faculty, the department created the Elliot L. Elson Training Endowment to recognize the tremendous contributions of Dr. Elson to education and training of students and fellows in molecular biophysics. A number of generous individuals have combined efforts with the department to establish the endowment, which will allow for the recognition of Dr. Elson's contributions for years to come. For others who wish to participate, our department's website has more information.

The department also honored and supported two young women scientists, who are currently graduate students working toward their doctoral degrees. First, Ms. Nicole Fazio received the 2015 Sigma Fellowship in memory of Gerty Cori, PhD, who won the Nobel Prize for her research in our department. Ms. Fazio is working in the laboratory of Timothy Lohman, PhD, a distinguished molecular biophysicist. Second, Ms. Brittany Smith was named as the 2015 Gary K. Ackers Fellow. This fellowship was awarded with funds generously provided by Paul Darling III, PhD, who was a graduate student with Dr. Ackers in our department, receiving his PhD in 1999. Dr. Ackers was the head of our department and had a key role in bringing molecular biophysics into our mission.

With respect to our students and postdoctoral trainees, the department has continued its support of a number of educational and professional activities to foster education and career development, including graduate program retreats, Science Fridays, and Biophysical Evenings, all of which combine discussions of current research with fellowship. We sponsored our departmental seminar series, with presentations and discussions of current research by international experts from near and far. All these activities are open to all members of the scientific community, and they promote the disbursement of new knowledge and the establishment of new collaborations.

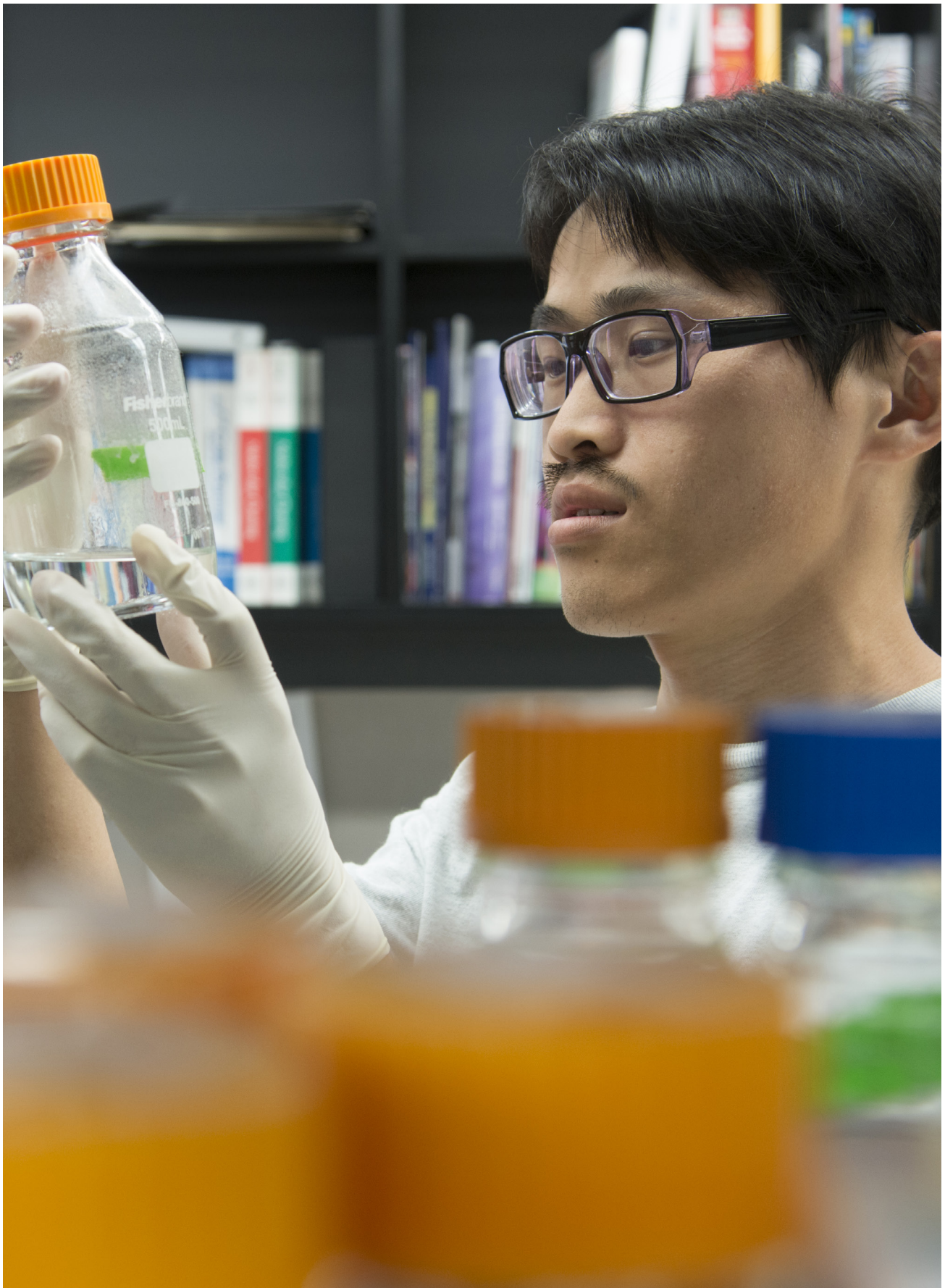
As a service to the university community, the department continues to support three facilities. The High-Throughput Screening Core helps researchers begin to identify potential therapeutics that focus on new molecular targets for disease. In support of Structural Biology, we operate and participate in facilities that perform X-ray crystallography and nuclear magnetic resonance (NMR). Structural approaches often provide critical new information for understanding how molecules function in disease and provide ideas for how to develop new therapies.

One new exciting development is the creation of the Center for Drug Discovery, which will use existing and new resources to help university faculty translate their knowledge of molecular targets, including lead compounds identified by high-throughput screening, into practical advances that bring new therapeutics and diagnostics to the bedside. Michael Kinch, PhD, will serve as director of the center. He brings a unique combination of skills to this role, based on years of experience in drug development in industry and academics. The efforts of the center will be coordinated across our campus, and the center will work in conjunction with partners in the St. Louis region and beyond, in order to maximize efficiency and productivity.

I draw your attention to a number of recognitions of outstanding accomplishments of our faculty, discussed in this report. Timothy Lohman, PhD, was selected as a fellow of the Biophysical Society, and he received a Distinguished Faculty Award from the School of Medicine. Linda Pike, PhD, received a Distinguished Teaching Award from the School of Medicine. A portrait of Carl Frieden, PhD, was unveiled and placed in our seminar and teaching room in recognition of his many distinguished accomplishments and contributions.

**John A. Cooper, MD, PhD**

Head 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 during the 2014-15 academic year.

Faculty also contributed to various 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 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](http://www.dbbs.wustl.edu)**

## Faculty Recognition



Timothy Lohman, PhD

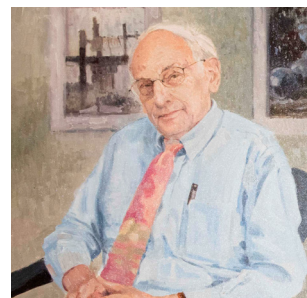
**Timothy Lohman, PhD**, was honored by the Biophysical Society for his pioneering biophysical studies of the mechanisms and energetics of protein-DNA interactions, including the enzymology and kinetic mechanisms of DNA helicases and translocases, and single-stranded DNA binding proteins. The awards ceremony was held at the Biophysical Society's 59th Annual Meeting in February 2015. Dr. Lohman also received a 2015 Washington University School of Medicine Distinguished Faculty Award. The award ceremony was held on February 18 at the Eric P. Newman Education Center.



Linda Pike, PhD

**Linda Pike, PhD**, received a 2015 Distinguished Teaching Award for her Molecular Foundations of Medicine course, which is a central component of the curriculum for first-year medical students.

On June 5, 2015, the department unveiled a portrait of **Carl Frieden, PhD**, at a reception and dinner to recognize Dr. Frieden's accomplishments and service to our department, Washington University and the scientific community. The portrait hangs in the seminar room, McDonnell Medical Sciences Building 264.



Carl Frieden, PhD

## Transitions

**John A. Cooper, MD, PhD**, was named head of the Department of Biochemistry and Molecular Biophysics effective July 2015. **Elliot Elson, PhD**, transitioned to emeritus status, effective July 2015. Dr. Elson continues to play valuable roles in the department with active participation in research, teaching and administration.

**Katie Henzler-Wildman, PhD**, and **Scott Wildman, PhD**, accepted new positions at the University of Wisconsin-Madison.

We welcomed two new faculty members: **Greg Bowman, PhD**, and **Michael Greenberg, PhD**. Dr. Bowman studies the dynamics of protein conformation using computational and experimental approaches. His goal is to identify novel drugs to modulate the activities of disease-causing molecular targets. Dr. Greenberg studies the function of cardiac muscle using sophisticated single-molecule approaches that allow him to measure the kinetics of molecular transitions under load.



## Seminars & Conferences

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

The 2015 Cori Lecture was given by Yale University's **Joan Steitz, PhD**, in the Eric P. Newman Education Center's Main Auditorium on November 18, 2014. Dr. Steitz presented her talk on "Noncoding RNAs: With a Viral Twist" to a packed house.



Joan Steitz, PhD

In addition, many respected and world renowned scientists from across the country presented seminars for the 2014-2015 Biochemistry and Molecular Biophysics Seminar series:

- **Bruce Sullenger, PhD**, Professor, Duke University, "*Nucleic Acid Aptamers and Scavengers for Treatment of Thrombosis and Inflammation.*" November 2, 2014
- **Denton Hoyer, PhD**, Director of Chemistry, Yale Center for Molecular Discovery, Yale University, "*Kickstarting Academic Research. Lessons Learned in New Target Discovery and Validation.*" November 6, 2014
- **R. Kip Guy, PhD**, Chairman and member, Department of Chemical Biology and Therapeutics, St. Jude Children's Research Hospital, "*(+)-SJ733, a Clinical Candidate for Malaria Targeting PfATP4.*" November 13, 2014
- **Gunda Georg, PhD**, Head and Professor, Department of Medicinal Chemistry, University of Minnesota, "*Drug Discovery in Academia: Minnelide for Pancreatic Cancer and Gamendazole for Male Contraception.*" November 20, 2014
- **Matthew Bogoy, PhD**, Professor, Department of Pathology, Stanford University, "*Using Small Molecules to Discover and Dissect Regulators of Pathogenesis.*" December 2, 2015
- **Stephen C. Blacklow, MD, PhD**, Professor and Chair, Department of Cancer Biology, Harvard University, "*Unraveling the Mechanism of Normal and Oncogenic Notch Signaling.*" December 9, 2014
- **David Millar, PhD**, Professor, Department of Integrative Structural and Computational Biology, Scripps Research Institute, "*Visualizing Protein Function at the Single-Molecule Level.*" December 10, 2014
- **Mikhail Grigoriev**, Group Leader, Laboratoire de Biologie Moléculaire Eucaryote (LBME), "*TIP49 (Pontin/Reptin) AAA+ ATPases: Conformational Flexibility and ATP Hydrolysis.*" January 20, 2015

- **Ashok Deniz, PhD**, Associate Professor, Department of Integrative Structural and Computational Biology, The Scripps Research Institute, “*Single-Molecule Biophysics of Protein Disorder.*” January 27, 2015
- **Benjamin Wylie, PhD**, Assistant Professor, Department of Chemistry and Biochemistry, Texas Tech University, “*Transmembrane Allostery in K<sup>+</sup> Channels.*” February 3, 2015
- **Gavin King, PhD**, Associate Professor, Department of Physics and Astronomy, University of Missouri, Columbia, “*A Precise Three-Dimensional Force Microscope for Biophysics.*” February 24, 2015
- **Jessica Tyler, PhD**, Professor, Department of Epigenetics and Molecular Carcinogenesis, University of Texas MD Anderson Cancer Center, “*Chromatin Packaging as a Mediator of Nuclear Processes and Aging.*” February 23, 2015
- **Jon Ellman, PhD**, Professor, Department of Chemistry, Yale University, “*New Strategies for the Discovery of Small Molecule Inhibitors of Enzymes.*” March 17, 2015
- **John Gross, PhD**, Associate Professor, Department of Pharmaceutical Chemistry, University of California, San Francisco, “*Resolving the Host-Pathogen Conflict Between APOBEC3 Innate Immunity and the Lentiviral Protein Vif.*” March 24, 2015
- **Yifan Cheng, PhD**, Associate Professor, Department of Biochemistry and Biophysics, University of California, San Francisco, “*Study Integral Membrane Proteins by Single Particle cryoEM.*” April 7, 2015
- **Jianmin Gao, PhD**, Associate Professor, Department of Chemistry, Boston College, “*Novel Strategies for Targeting Membrane Lipids.*” April 14, 2015
- **Andrew Marcus, PhD**, Head and Professor, Department of Chemistry and Biochemistry, University of Oregon, “*Studies of Structure and Dynamics of Protein-DNA Complexes by Single Molecule and Two-Dimensional Fluorescence Spectroscopy.*” April 28, 2015
- **Joseph Corbo, MD, PhD**, Assistant Professor, Department of Pathology and Immunology, Washington University School of Medicine in St. Louis, “*Seeing Red: A Biochemical Switch for Far-Red Vision.*” May 12, 2015
- **Stephen Frye, PhD**, Professor, Division of Medicinal Chemistry, and Director, Center for Integrative Chemical Biology and Drug Discovery, School of Pharmacy, University of North Carolina at Chapel Hill, “*Targeting Chromatin Regulation: Progress Towards Chemical Probes for Methyl-Lysine Readers.*” September 1, 2015

- **Michael Summers, PhD**, Investigator, HHMI and Professor, Department of Chemistry and Biochemistry, University of Maryland-Baltimore, “*Insights into the Structural Basis and Mechanism of HIV-1 Genome Packaging.*” September 15, 2015
- **Melanie Ott, MD, PhD**, Senior Investigator, Gladstone Institutes and professor, University of California, San Francisco, “*Epigenetic Regulation of HIV Transcription.*” September 22, 2015
- **Eva Nogales, PhD**, Professor, Department of Biochemistry, Biophysics and Structural Biology, University of California-Berkeley, “*Macromolecular Assembly and Function Visualized Using Cryo-EM.*” October 13, 2015
- **Keir Newman, PhD**, Senior Investigator, Laboratory of Single Molecule Biophysics National Heart, Lung, and Blood Institute, National Institutes of Health, “*A Chink in the Armor: Spontaneous Periodic Defects in Collagen Control Collagenase Activity.*” October, 20, 2015
- **Vince Hilser, PhD**, Chair and Professor, Department of Biology, Johns Hopkins University, “*Parallel Tuning of Activation and Repression in Intrinsic Disorder-Mediated Allostery.*” November 17, 2015
- **Jessica Brown, PhD**, Postdoctoral Fellow, Yale University, “*Structural Insights into the Stabilization of MALAT1 Noncoding RNA by a Bipartite Triple Helix.*” November 18, 2015
- **David Baker, PhD**, Professor, Department of Biochemistry, University of Washington, Seattle, “*Post-Evolutionary Biology: Design of Novel Protein Structures, Functions and Assemblies.*” December 1, 2015
- **Steve Sligar, PhD**, Professor, Departments of Biochemistry, Chemistry, Center for Biophysics and Quantitative Biology, the Institute for Genomic Biology and Beckman Institute, University of Illinois, Urbana, “*Revealing the Structures and Function of Membrane Proteins Through Nanotechnology.*” December 2, 2015

## Biophysical Evenings

- **Colin Nichols, PhD**, Professor, Department of Cell Biology and Physiology, Washington University School of Medicine in St. Louis, “*Chasing the Next Frontier: Ion Channel Structural Dynamics by FRET.*” September 9, 2014
- **Greg Bowman, PhD**, Assistant Professor, Department of Biochemistry and Molecular Biophysics, Washington University School of Medicine in St. Louis, “*Embracing Protein Flexibility Provides New Opportunities for Drug Design.*” October 14, 2014
- **Tom Ellenberger, DVM, PhD**, Professor, Department of Biochemistry and Molecular Biophysics, Washington University School of Medicine in St. Louis, “*poly-(ADP-ribose) Metabolism and Cancer Therapeutics.*” November 14, 2014
- **Rohit Pappu, PhD**, Professor, Department of Biomedical Engineering, Washington University School of Medicine in St. Louis, “*Form & Functions of Intrinsically Disordered Proteins Inferred from Physical Principles.*” January 13, 2015
- **Ron Bose, MD, PhD**, Assistant Professor, Internal Medicine, Molecular Oncology, Washington University School of Medicine in St. Louis, “*Probing the Structure of Tyrosine Kinases with Mass Spectrometry.*” February 10, 2015
- **Weikai Li, PhD**, Assistant Professor, Department of Biochemistry and Molecular Biophysics, Washington University School of Medicine in St. Louis, “*How Warfarin Works: Blocking the Redox Shift of a Redox Enzyme in ER Membrane.*” March 10, 2015
- **Philip Bayly, PhD**, Chair, Department of Mechanical Engineering and Materials Science, Washington University School of Medicine in St. Louis, “*Making Waves: The Mechanics of Cilia and Flagella.*” April 14, 2015
- **Joseph Jez, PhD**, Professor, Department of Biology, Washington University School of Medicine in St. Louis, “*Structural Biology of Plant Hormone Controls.*” September 8, 2015
- **Jiamin Cui, PhD**, Professor, Department of Biomedical Engineering, Washington University School of Medicine in St. Louis, “*The Slow Potassium Channel in the Heart: Activation Mechanisms and a Drug Target.*” October 13, 2015
- **Peter Burgers, PhD**, Professor, Department of Biochemistry and Molecular Biophysics, Washington University School of Medicine in St. Louis, “*How to Get Rid of Ribonucleotides in Our Genomes.*” November 10, 2015

## Student Recognition

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

### David F. Silbert Outstanding Teaching Award

**Putzer Joseph Hung** received the David F. Silbert Outstanding Teaching Assistant Award in recognition for his excellent work in the first-year medical school course Microbes & Pathogenesis.



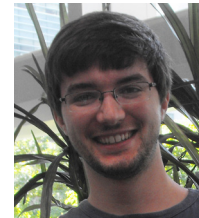
Putzer Joseph Hung

### Sigma Fellowship

The Sigma 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 also provides funds for educational expenses.

2014

The 2014 Sigma Fellowship was awarded to **Ted Christensen**, a graduate student in the Computational & Molecular Biophysics graduate program, and **McKenna Feltes**, a graduate student in the Biochemistry graduate program.



Ted Christensen



McKenna Feltes

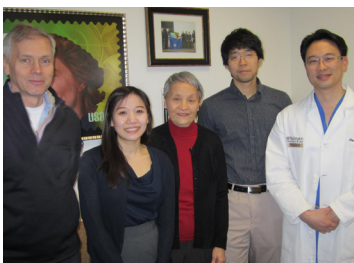
2015

The 2015 Sigma Fellowship was awarded to **Nicole Fazio**, a graduate student in the Computational & Molecular Biophysics program. She is doing her PhD thesis work in the lab of Timothy Lohman, PhD.



Nicole Fazio

### Silbert Summer Fellowship Award

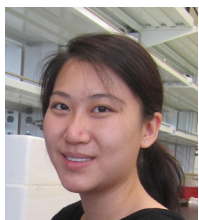


Silbert Lunch

2014

The 2014 Silbert Summer Fellowship awards were given to **Diane Aum** and **James Zou**. Diane worked with Albert Kim, PhD, an Assistant Professor in the Department of Neurological Surgery whose research interest focuses on signal transduction in malignant brain tumors and brain development. During the summer, Diane worked on Glioblastoma multiforme.

James worked with Marco Colonna, MD, the Robert Rock Belliveau, MD, Professor of Pathology and Immunology and of Internal Medicine. Dr. Colonna's research focuses on the innate immune responses in infections, autoimmunity and tumors. James's research project involved making antibodies against a molecule called IL-26, a poorly understood molecule involved in the mucosal immune system.



Brooke Liang



Angus Toland

## Silbert Summer Fellowship Award (continued)

2015

The 2015 Silbert Summer Fellowship awards were given to **Brooke Liang** and **Angus Toland**. Brooke worked with Russell Pachynski, MD, in the Department of Internal Medicine's medical oncology division. Dr. Pachynski's research focuses on various aspects of leukocyte trafficking in the setting of tumor immunology. Clinically, Dr. Pachynski's lab is developing novel combinatorial trials with existing immunotherapeutics in GU malignancies, and working closely with others in the CHiiPs program to do intensive immune monitoring on the patients in these trials. Brooke's summer research project evaluated the leukocyte chemoattractant receptor CMKLR1 on T cells.

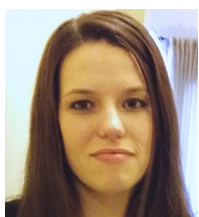
Angus worked with Douglas Chalker, PhD, in the Department of Biology. Dr. Chalker's research interest focuses on genetic and epigenetic regulation of developmentally programmed DNA rearrangements of Tetrahymena. Angus's summer research project was to produce mutations in amino acid sequences within a region of ~100 amino acids conserved amongst Lia3 and functional homologs (Lia3-like or LTL proteins) also expressed in *T. thermophila* and observe effects on G quadruplex binding.



Robin Shield-Cutler

## Ceil M. DeGutis Prize

**Robin Shield-Cutler** was awarded the 2015 Ceil M. DeGutis Prize in Chemical Biology/Medicinal Chemistry. Robin presented his research at the DeGutis Presentation on June 9 in a presentation entitled "How the human urinary metabolome supercharges antimicrobial defenses." Robin graduated this spring from the Molecular Microbiology and Microbial Pathogenesis graduate program. He has accepted a one-year position as Assistant Professor of biology at Grinnell College, in Grinnell, Iowa, that began in the fall of 2015.



Brittany Smith



Robert Wang

## Gary K. Ackers Fellowship

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

## Carl F. and Gerty T. Cori Prize in Biochemistry

**Robert Wang** received the Carl F. and Gerty T. Cori Prize in Biochemistry in recognition of his performance as a student in the Molecular Foundations of Medicine course for first-year medical students.

# Department Activities

## BCM/CMBP Retreat

2014

On October 17 and 18, the Biochemistry (BCM) and Computational & Molecular Biophysics (CMBP) graduate programs retreat was held at Cedar Creek Conference Center in New Haven, Missouri. In addition to various student speakers, the retreat featured two keynote speakers from our Washington University community: Jan Bieschke, PhD, assistant professor in the Department of Biomedical Engineering and Timothy Wenczewicz, PhD, assistant professor in the Department of Chemistry. Bieschke spoke on “Protein Misfolding Mechanisms and Intervention;” Dr. Wenczewicz spoke on “New Antibiotics from Nature’s Chemical Inventory.” Jayan Rammohan, CMBP graduate student, won Best Talk. Josh Brettmann, BCM graduate student, won Best Student Poster, and John Robinson, BCM graduate student, won Runner-Up. Joshua Sokoloski, a postdoc in Tim Lohman’s lab, won Best Postdoc Poster, and Saurabh Pratap Singh, a postdoc in Roberto Galletto’s lab, won Runner-Up.



Graduate Retreat, 2014

2015

The annual BCM and CMBP graduate program retreat was held on October 23 and 24 at Cedar Creek Conference Center. The keynote speakers were Alexander Barnes, PhD, assistant professor with the Department of Chemistry; and Peng Yu, PhD, assistant professor with the Department of Cell Biology and Physiology. Dr. Barnes’ talk was entitled “Using Microwaves to Boost NMR Signals and Determine Biomolecular Structure and Dynamics.” Dr. Yu’s talk was entitled “Structure and Mechanism of Ligan-Activated Potassium Channels.” Thomas Kraft, BCM graduate student, won Best Talk. Kathrin Andrich, a postdoc in Jan Bieschke’s lab, won Best Poster. Chao Wu, a BCM graduate student, won Best Student Poster, with Zeynep Yurtsever and Shannon Ohlemacher, both BCM graduate students, winning Runner-Up.



Graduate Retreat, 2015

## Science Fridays (TGIF)

Science Fridays are weekly informal presentations given by current students, fellows and faculty, followed by refreshments and fellowship.

On May 29 the department holds its “Welcome to Summer” happy hour. Featured food included hamburgers, hot dogs, veggie burgers and more. The winners of the Hawaiian shirt contest were Josh Brettmann and Tom Ellenberger. They each received their own box of Flavor-Ice.



“Welcome to Summer” Happy Hour



BMB Chili Cook-Off

## Science Fridays (TGIF) (continued)

On October 31 the department held an ice cream social after our BMB Science Friday. Robb Welty from the lab of Kathleen Hall, PhD, gave a seminar entitled “Local and Global Folding of a 58mer RNA Revealed by Fluorescent Base Substitutions.” After the seminar, BMB families, faculty, postdocs, students and staff enjoyed ice cream sundaes.

The 1st Annual BMB Chili Cook-off was held on February 27. There were seven entries (First-Year Students, Admin Office, Bowman lab, Burgers lab, Ellenberger lab, Havranek lab and Henzler-Wildman lab). The Best Chili trophy was awarded to the Ellenberger lab.



Tower Grove Park, 2014

## Annual Welcome BBQs

Every August the joint BCM/CMBP graduate program and BMB department barbecue takes place in Tower Grove Park, near the School of Medicine campus. Faculty, post-docs, students and staff attended to help welcome the new BCM/CMBP graduate program students. Everyone enjoys yard games and the kids play in a bounce house.

## Holiday Parties

2014

The department holiday party was held on December 19 in the King Center located in the Bernard Becker Medical Library. This year we had a family party which included a Duplos/Legos table and a special visit from Santa. Holiday trivia was back by popular demand. Nick Caito created a very challenging competition. The winning group was Dr. Carl Frieden, Dr. Tim Lohman and Dr. Alex Kozlov.

2015

On December 7, the annual holiday party was held in the King Center. Everyone enjoyed delicious food from avazza's and Kohn's catering. Santa stopped by for a visit to pass out gifts to all the young children in attendance. Finally, everyone tested their knowledge in a trivia contest featuring holiday movies. The competition was pretty steep with three teams in the final tie-breaker round. In the end, this year's winners were: Eric Galburt, Ana Ruiz-Manzano, Jay Rammohan and Eric and Kimberly Tomko.



Holiday Party, 2015



# Facilities

## High-Throughput Screening Core

The High-Throughput Screening Core (HTSC) has successfully completed its first year in operation in its remodeled space on the second floor of the Cancer Research Building. The HTSC is the combination of two former screening cores: the CGSC and the HTC, and represents a collaboration between the Alvin J. Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine and the Department of Biochemistry and Molecular Biophysics.

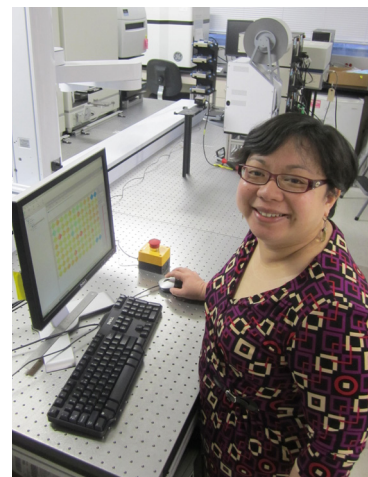
The number of HTSC users, who come from multiple departments across Washington University as well as Saint Louis University, has continued to grow in the past year. Users have taken advantage of the various resources and services available at the HTSC, including small molecule and siRNA collections, automated high-speed fluorescent and brightfield microscopes, and specialized instrumentation (multimode plate readers, liquid handling equipment) for plate-based assay implementation and high-throughput screening.

The HTSC facilitates efforts towards identifying molecules or genes that modulate investigators' biology of interest. Assay systems range from *in vitro* enzymatic or protein interaction assays to cell-, organoid-, and whole-organism-based readouts. Some of the projects that the HTSC was involved with in the past year include:

- Effects of microbial metabolites on intestinal stem/progenitor cell proliferation
- Targeting the RelMtb enzyme to combat *Mycobacterium tuberculosis* infection
- Drug modulation of protein secretion in kidney cells
- Targeting malarial and human glucose transport with small molecule inhibitors
- Development of high throughput screening assays to identify inhibitors of viral nucleoprotein interactions
- Regulators of snail transcription factor stability
- Mechanisms of gastrointestinal adenocarcinoma tumorigenesis
- Determinants of aging and lifespan in worms

The HTSC also provides assay development expertise and grant writing support to investigators interested in applying high throughput screening and high content imaging approaches to their studies. To help support some of these research activities, eligible investigators can apply to the ICTS Just-in-time Core Usage funding program.

For a detailed description of the HTSC's resources and services, please visit the website ([htsc.wustl.edu](http://htsc.wustl.edu)) or contact the scientific director, Maxene Ilagan ([ilaganmg@wustl.edu](mailto:ilaganmg@wustl.edu)).



High-Throughput Screening Core

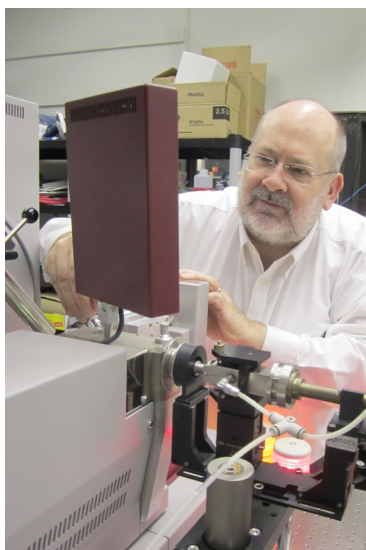


NMR Facility

### **NMR Facility**

The Biochemistry and Molecular Biophysics NMR Facility consists of three NMR Spectrometers (500, 600, 700 MHz). The 600 MHz instrument is fitted with a triple-resonance cryoprobe. The facility serves the needs of investigators studying biomolecular structure, macromolecular interactions and dynamics.

For more information please visit the NMR Facility website: [biochem.wustl.edu/bmbnmr/facilities](http://biochem.wustl.edu/bmbnmr/facilities)



WUSM Structural Biology Core

### **WUSM Structural Biology Core**

The WUSM Structural Biology Core (X-ray facility) is a state-of-the-art macromolecular crystallography facility formed by eight faculty (Drs. Amarasinghe, Brett, Ellenberger, Fremont, Hultgren, Li, Tolia, and Yuan) representing five different primary departments (Pathology and Immunology, Biochemistry and Molecular Biophysics, Microbiology, Internal Medicine, and Cell Biology and Physiology). Resources include three X-ray-generators (two Rigaku, one Xenocs), with four image plate detectors supported with near liquid nitrogen cold heads, two Mosquito robots, a Gryphon LCP device, and a Rigaku HT Minstrel and CrystalMation Gallery. The core facility also supports broad access to SBGRID crystallography software as well as dedicated synchrotron beam line access through membership in the Molecular Biology Consortium at the Advanced Light Source in Berkeley, California (Beamline 4.2.2).

For training, or to schedule time to use the X-ray data collection systems, please contact Rick Stegeman at [stegemanr@biochem.wustl.edu](mailto:stegemanr@biochem.wustl.edu) or visit the core's website at [sbc.wustl.edu](http://sbc.wustl.edu).

## Research Grants & Awards

**Peter M. Burgers, PhD**, Marvin A. Brennecke Professor of Biological Chemistry, has received a four-year renewal grant award from the NIGMS for his research entitled “Enzymology of replication of yeast chromosomal DNA.” He has also received (along with Amir Aharoni, PhD, professor, Ben Gurion University), a new two-year grant award from the U.S.–Israel Binational Science Foundation for his research entitled “Switching of DNA polymerases on the PCNA ring during DNA damage response.”

**Carl Frieden, PhD**, Professor of biochemistry and molecular biophysics, received a new five-year grant award from the National Institute on Aging for his research entitled “Alzheimer’s Disease: Defining the apoE-amyloid-beta interaction.”

**Michael Greenberg, PhD**, Assistant Professor of biochemistry and molecular biophysics, received two grants from the CDI hPSC Pilot Grant Program to develop models of familial cardiomyopathies using stem cells.

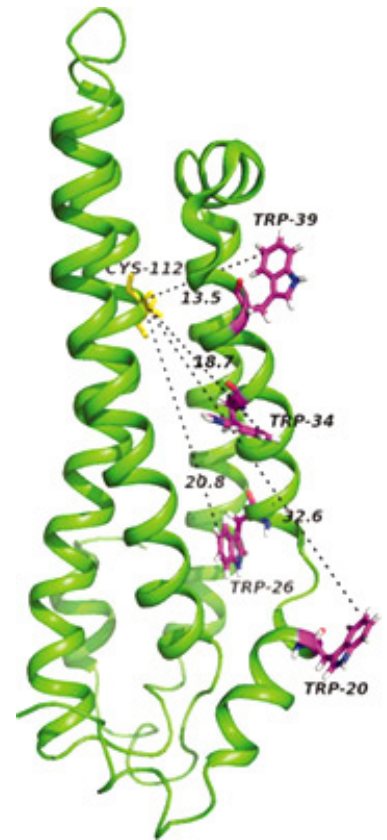
**Kathleen B. Hall, PhD**, Professor of biochemistry and molecular biophysics, received a gift from Agilent Technologies, Inc. for her research entitled “RNA conformational probing by selective labeling using low field NMR.”

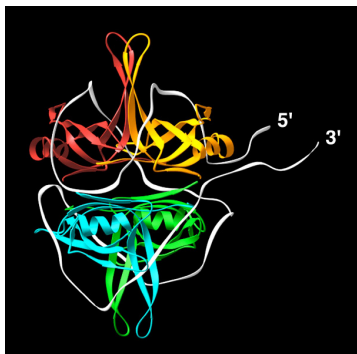
**James Janetka, PhD**, Associate Professor of biochemistry and molecular biophysics, along with Henry Han, PhD, assistant professor of neurological surgery, received a new one-year grant award from the University Research Strategic Alliance program for their research entitled “Selective diagnostic imaging agents for cerebral amyloid angiopathy (CAA) plaques in Alzheimer’s disease.”

**Weikai Li, PhD**, Assistant Professor of biochemistry and molecular biophysics, received a new two-year Grant in Aid Award from the American Heart Association for his research entitled “Mechanism of VKOR function and warfarin inhibition.”

**Weikai Li, PhD**, Assistant Professor of biochemistry and molecular biophysics received a new five year, \$1,900,000 grant award from the National Heart, Lung, and Blood Institute for his research entitled “Structural and functional basis of the Vitamin K cycle.”

**Garland Marshall, PhD**, Professor of biochemistry and molecular biophysics, has received an equipment supplement grant award from the National Institute of General Medical Sciences for his research entitled “Discovery of new therapeutics for drug-free remission of HIV.” Dr. Marshall also has received a grant award from Epigenetx, LLC for his research entitled “Characterization of lysine deacetylase inhibitors (KDACIs).”



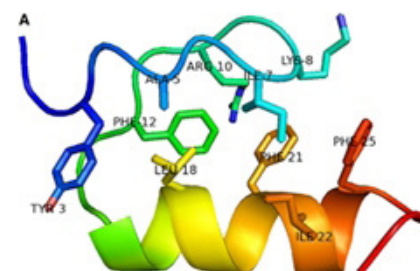


## Publications

The Department of Biochemistry and Molecular Biophysics published over 46 articles in various journals.

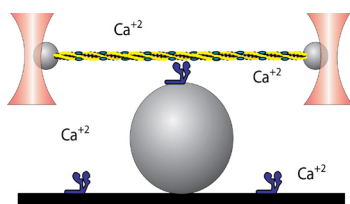
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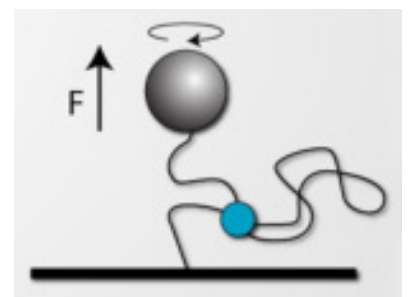
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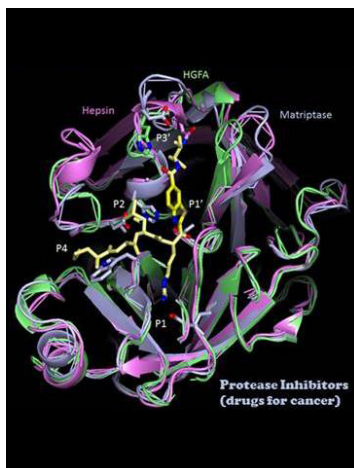
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# People

## Faculty

Wayne Barnes.....	Associate Professor
Greg Bowman .....	Assistant Professor
Peter Burgers.....	Professor
John A. Cooper.....	Department Head and Professor
Tom Ellenberger .....	Professor
Elliot Elson .....	Professor
William Frazier.....	Professor
Carl Frieden .....	Professor
Eric Galburt.....	Assistant Professor
Roberto Galletto .....	Assistant Professor
Kathleen Hall .....	Professor
James Havranek .....	Assistant Professor
Weikai Li.....	Assistant Professor
Timothy Lohman .....	Professor
Garland Marshall.....	Professor
Linda Pike.....	Professor

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Maxene Ilagan.....	Assistant Professor
Alex Kozlov .....	Assistant Professor
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## Adjunct Faculty

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John Majors  
F. Scott Mathews

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Darrell Baldwin .....	Facility Maintenance Service Coordinator
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Patti Hunt .....	Supervisor Lab Support Services
Marin Markov.....	Lab Assistant II/Glasswasher
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Virginia Ribaldo .....	Research Administrator
Melissa Torres .....	Assistant to the Head
Andy Zaruba.....	Operations and Systems Specialist I

## Postdoctoral Fellows & Visiting Scholars

Flavio Ballante.....	Postdoctoral Fellow
Rachel Bezalel-Buch.....	Postdoctoral Fellow
Nicholas Bodmer.....	Postdoctoral Fellow
Chris Brosey.....	Postdoctoral Fellow
Margaret E. Crampton.....	Summer Program Trainee
Vandna Fnu .....	Postdoctoral Fellow
Kamaldeep Gill.....	Postdoctoral Fellow
William F. Hood .....	Visiting Staff
Yunyi Kang .....	Visiting Researcher
Partha Karmakar .....	Postdoctoral Fellow
Joanna Kim.....	Postdoctoral Fellow
Brooke Ligon.....	Visiting Researcher
Fang Liu .....	Visiting Researcher
Shixuan Liu .....	Postdoctoral Fellow
Qian Liu.....	Visiting Researcher
Golrokh Malihi.....	Visiting Researcher
Laurel K. McGrane.....	Visiting Researcher
Tridib Monda.....	Postdoctoral Fellow
Damodara Reddy Nandarapu.....	Postdoctoral Fellow
Michael Prinsen.....	Visiting Researcher
Grace Theresa Nicholas Ramena .....	Postdoctoral Fellow
Guomin Shen .....	Postdoctoral Fellow
Michael James Simon.....	Postdoctoral Fellow
Saurabh Pratap Singh.....	Postdoctoral Fellow
Alan Soetikno .....	Summer Program Trainee
Joshua Edward Sokoloski .....	Postdoctoral Fellow
Benjamin Charles Stark.....	Postdoctoral Fellow
Elias Tannous .....	Postdoctoral Fellow
Stephen Forrest Trudeau .....	Summer Program Trainee

Jinjing Wang.....Visiting Staff  
 Lin Wang ..... Visiting Researcher  
 Chin-Chuan Wei ..... Visiting Researcher  
 Yihu Yang .....Postdoctoral Fellow  
 Tyler J. Yates .....Summer Program Trainee

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 Ryan Sunil Chugani ..... Research Technician II  
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 Thanh Loan Nguyen..... Senior Research Technician  
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Joshua Brettmann.....	Graduate Student
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Theodore Christensen.....	Graduate Student
Yong Hee Chung.....	Graduate Student
Elizabeth DeLassus.....	Graduate Student
Nicholas Dietrich.....	Graduate Student
Jabari Elliott.....	Graduate Student
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McKenna Feltes.....	Graduate Student
Ronald Fowle Grider.....	Graduate Student
Whitney Grither.....	Graduate Student
Sarem Hailemariam.....	Graduate Student
Linxuan Hao.....	Graduate Student
Ian Harvey.....	Graduate Student
Alex Holehouse.....	Graduate Student
Drake Jensen.....	Graduate Student
Britney Johnson.....	Graduate Student
Adam Joyce.....	Graduate Student
Patrick Judge.....	Graduate Student
Vasilios Kalas.....	Graduate Student
George Katumba.....	Graduate Student
Roger Klein.....	Graduate Student
Thomas Kraft.....	Graduate Student
Mariah Lawler.....	Graduate Student
Winnie Long.....	Undergraduate
Andrew Loza.....	Graduate Student
Andrew Meiburg.....	Graduate Student
Justin Miller.....	Graduate Student
Elisa Murray.....	Graduate Student
Shannon Ohlemacher.....	Graduate Student
Yerdos Ordabayev.....	Graduate Student
Shankar Parajuli.....	Graduate Student
JooYoung Park.....	Graduate Student
Edward Peneguy.....	Graduate Student
Joshua Rackers.....	Graduate Student
Jayan Rammohan.....	Graduate Student
Shweta Ravi.....	Undergraduate
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John Robinson.....	Graduate Student
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Joseph Stodola.....	Graduate Student
Tyson Todd.....	Graduate Student
Robb Welty.....	Graduate Student
Chao Wu.....	Graduate Student
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Lu Yu.....	Graduate Student
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