

Newsletter

Biophysical Society

JANUARY

2016

DEADLINES

Meetings

60th Annual Meeting
February 27-March 2
Los Angeles, California

January 13

Early Registration
Late Abstract Submission
Blogger Applications

Engineering Approaches
to Biomolecular Motors:
From in vitro to in vivo

June 14-17

Vancouver, Canada

March 13

Abstract Submission

April 6

Early Registration

Liposomes, Exosomes,
and Virosomes

September 11-16

Ascona, Switzerland

March 7

Abstract Submission

March 11

Early Registration

Mechanobiology of
Disease

September 27-30

Singapore

June 6

Abstract Submission

July 5

Early Registration

New and Notable Changes at *Biophysical Journal*

Les Loew, Editor-in-Chief



My last Editorial in July (1) outlined steps *Biophysical Journal* (BJ) has taken to simplify submitted manuscript formatting, avoid bias in peer review, allow reviewers to consider each others' reviews before a decision is rendered by the editor, and assure proper attribution of reused data; it also introduced the new BJ Classics (the second BJ Classic, introduced by *Jane Dyson* and colleagues, appears in the January 2016 issue of BJ). Here, I would like to describe some new developments to highlight how we are continuing to enrich *Biophysical Journal*. These include a new Section entitled "Nucleic Acids and Genome Biophysics," streamlined handling of BJ Letters to assure rapid publication, an embedded viewer to display multidimensional image data, a BJ Twitter presence, and a welcome to new members of the Editorial Board.

Nucleic Acids and Genome Biophysics

An overarching question in biology and biomedicine is how the genome is organized to control normal development and how specific structural and functional disruptions to that organization might cause disease. Indeed, the National Institutes of Health (NIH) has recognized the importance of this field by

establishing a Common Fund Program, 4D Nucleome. Biophysics plays a central role in helping to understand gene regulation at a structural and mechanistic level and BJ has published an increasing number of papers in this area (see the collection entitled Nuclear Organization on the BJ website). At the Journal, we also recognized the importance of this field by sponsoring a 2015 webinar, "Biophysics of Nuclear Organization," which was viewed by well over 1,000 registrants (free access is still available). To recognize the thematic coherence of this field for our editors, reviewers, and readers, we have decided to launch a new Section of the Journal entitled "Nucleic Acids and Genome Biophysics" beginning in the January 2016 issue of BJ. Manuscripts submitted to this new Section should fit the description below (also in the BJ Guide to Authors):

This section highlights biophysical aspects of genome organization and their relation to cellular functions such as transcription, translation, development, and gene regulatory mechanisms. It includes investigations of the structure, dynamics, function, and regulation of DNA, RNA, and their complexes with other molecules using experimental and computational techniques. It also publishes research studies on chromatin structural states, folding and function, and the dynamic organization of the nucleus.

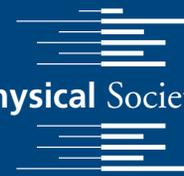
(Continued on page 4)

CONTENTS

Biophysicist in Profile	2
Public Affairs	6
Grants and Opportunities	7
Biophysical Journal	8
BJ Poster Award Winners	9
Annual Meeting	10

Student Center	13
Subgroups	14
Obituary	16
SACNAS/ABRCMS	18
MollyCule	19
Upcoming Events	20

Biophysical Society



BIOPHYSICAL SOCIETY

Officers

President

Edward Egelman

President-Elect

Suzanne Scarlata

Past-President

Dorothy Beckett

Secretary

Frances Separovic

Treasurer

Paul Axelsen

Council

Olga Boudker

Ruth Heidelberg

Kalina Hristova

Juliette Lecomte

Amy Lee

Robert Nakamoto

Gabriela Popescu

Joseph D. Puglisi

Michael Pusch

Erin Sheets

Antoine van Oijen

Bonnie Wallace

Biophysical Journal

Leslie Loew

Editor-in-Chief

Society Office

Ro Kampman

Executive Officer

Newsletter

Catie Curry

Beth Staehle

Ray Wolfe

Production

Laura Phelan

Profile

Ellen Weiss

Public Affairs

Beth Staehle

Publisher's Forum

The *Biophysical Society Newsletter* (ISSN 0006-3495) is published twelve times per year, January-December, by the Biophysical Society, 11400 Rockville Pike, Suite 800, Rockville, Maryland 20852. Distributed to USA members and other countries at no cost. Canadian GST No. 898477062. Postmaster: Send address changes to Biophysical Society, 11400 Rockville Pike, Suite 800, Rockville, MD 20852. Copyright © 2016 by the Biophysical Society. Printed in the United States of America. All rights reserved.

Biophysicist in Profile

DAVID E. SHAW



David E. Shaw, Chief Scientist, D.E. Shaw Research, always believed that he would work as a scientific researcher; he never imagined the unexpected detour he would take into the world of finance, as a pioneer in quantitative trading. Shaw's father was a theoretical plasma physicist, his mother a researcher in education, and his stepfather was an economist and professor at the University of California, Los Angeles (UCLA). "I was raised in Los Angeles, near UCLA, and my parents used to take me there so frequently that it was some time before I learned the difference between a university and a public park," he recalls. "They looked pretty much the same to me, though the university had a wider range of interesting things going on, and was generally more entertaining."

Shaw attended the University of California, San Diego, where he double-majored in mathematics and in applied physics and information science. He then earned his PhD from Stanford University in 1980. Shaw wrote a doctoral dissertation that provided a theoretical framework for a new class of computer architectures and algorithms that could be shown to offer asymptotically superior performance for certain mathematical operations related to artificial intelligence and database management.

He joined the faculty of the Computer Science Department at Columbia University, conducting research on the design of massively parallel special-purpose supercomputers for various applications. "Although my thesis at Stanford hadn't involved the construction of any actual hardware," Shaw explains, "after arriving at Columbia, I received government funding to actually start building one of the weird supercomputers I'd designed on paper." The machine could not be constructed using standard components, so Shaw and his students designed their own integrated circuits, and then connected them to assemble a small-scale working prototype. They wrote code for the machine that implemented some of Shaw's algorithms. "We were thrilled when the whole thing actually started working," Shaw recalls.

Hooked on the idea of designing and building these special-purpose supercomputers, Shaw saw that building full-scale machines would require a much larger budget than government grants could likely provide. He wrote a business plan for a proposed startup venture that would manufacture massively parallel supercomputers for commercial use, and began meeting with venture capitalists.

It quickly became clear to Shaw that this venture would not take off, but in the course of seeking funding, he had a chance meeting with executives from Morgan Stanley that led him on a career detour. "The executives I met with at Morgan Stanley told me that someone there had discovered a mathematical technique for identifying underpriced stocks," Shaw says. "A group of financial and technical people there had written some software that was using this technique to make investment decisions on a fully automated basis, and they were consistently earning an unusually high rate of return." Shaw was intrigued that they were using quantitative and computational methods in the stock market, "and I couldn't help wondering whether state of the art methods that were being explored in academia could be used to discover

other investment opportunities that weren't visible to the human eye," Shaw, explains. Though he had no experience in finance, in June 1986, Shaw shaved his beard, put on a suit, and left academia for a stint on Wall Street.

In 1988, Shaw started his own investment firm, D.E. Shaw & Co., which initially focused exclusively on the application of quantitative and computational methods to investment management. For the first few years, Shaw was directly involved in much of the firm's research, but as time went on and the company expanded, Shaw found himself spending less time on research and more on management. "I could feel my scientific and mathematical skills beginning to atrophy," he says, "and I found myself missing the days when I solved technical puzzles for a living."

Shaw wanted to return to full-time research, and hoped to contribute to the search for new, potentially life-saving drugs. He also wanted to design algorithms and machine architectures, which he had always enjoyed. His sister, *Suzanne Pfeiffer*, professor of biochemistry at Stanford University, brought Shaw by the office of *Michael Levitt*, who was sitting at his computer running a molecular dynamics (MD) simulation. Shaw had never seen one before. "I thought it was incredibly cool," he says. He later connected with *Rich Friesner*, who tutored him on quantum chemistry, statistical mechanics, protein structure, and other relevant subjects. "Rich believed that MD simulations had the potential to provide important insights into the behavior of biologically significant molecules, but were so computationally demanding that many biological processes couldn't be simulated long enough to yield such insights," Shaw says. "I convinced myself that it might be possible to design special-purpose hardware and algorithms that could simulate the dynamics of biological macromolecules over periods a couple orders of magnitude longer than had been feasible on conventional supercomputers."

With a research direction in mind, he founded D.E. Shaw Research in 2001, and put together an interdisciplinary team of researchers. "Since then, we've been working together on the design of novel algorithms and machine architectures for high-speed molecular dynamics simulation, and on the application of such simulations to

biological research and computer-aided drug design," Shaw explains. "Our research focuses on the structural changes associated with protein folding, protein-ligand binding, molecular signaling, ion transport, and other biologically significant processes. We don't have our own wet lab, but we often collaborate with experimentalists, both to validate the phenomena we observe in our simulations and to exchange hypotheses and ideas for further studies."

One such experimentalist is *Arthur Horwich*, professor of genetics at Yale University School of Medicine, who met Shaw after the latter visited Yale for a seminar. The two discussed the possibility of working together on simulating the binding of a non-native polypeptide chain to the hydrophobic lining of a ring of GroEL. "That [first] conversation was just electrical," Horwich says. "He immediately saw what we wished to do and suggested I come down to D.E. Shaw Research in New York for a day, to chat with his team and consider all of the aspects of such a simulation. [...] We realized that this experiment was a little beyond reach, but we had a lot of fun together considering this. David is one of the most thoughtful and generous people I have ever met."

Walter Englander, professor of biochemistry, biophysics, and medical science at the University of Pennsylvania and one of Shaw's colleagues in the protein folding field, agrees with this assessment, "He is very smart, focused—but self-effacing—generous, hard-working, eager to give credit rather than take it. [Shaw and his group] freely share their results and make their detailed calculations available to whoever asks," he says.

Shaw has found great success by applying the skills and knowledge acquired in one field to others, approaching problems from a fresh vantage point. He recommends that young scientists consider an interdisciplinary path. "Milking an existing research paradigm to extend the frontiers of an existing research area can be important and gratifying," Shaw says, "but the juiciest, lowest-hanging fruit is often found in interstitial research areas that haven't yet been explored, and in the use of techniques and technologies borrowed from other fields. I also recommend flossing your teeth. You'll thank me when you're older."

Profilee-at-a-Glance

Institution

D.E. Shaw Research

Area of Research

Molecular simulations of biologically significant structural changes in proteins

New and Notable Changes at *Biophysical Journal*

(Continued from page 1)

I am pleased to announce that *Tamar Schlick* has enthusiastically agreed to lead this new Section as Associate Editor.

Her internationally recognized research encompasses DNA, RNA, and chromatin biophysics at multiple scales (learn more about Schlick on page 8). She is joined by the following outstanding group of Editorial Board members: *Christine Heitsch, Jason Kahn, Anatoly Kolomeisky, Tim Lohman, Tom Misteli, Karin Musier-Forsyth, Keir Neuman, Wilma Olson, Lois Pollack, Jody Puglisi, Michael Sattler, Ned Seeman, Andy Spakowitz, and Antoine van Oijen*. Look for a call for papers soon for a Special Issue of BJ to further highlight the importance of genomic biophysics.

Previously, many (but not all) of the papers for this new Section had appeared under the Section entitled “Proteins and Nucleic Acids,” causing it to swell beyond the reasonable capacities of its editors. Therefore, the title and focus of that Section will be on the structures, functions, and interactions of proteins. The “Proteins” Section remains under the able leadership of Associate Editor Nathan Baker.

BJ Letters

The purpose of the BJ Letters article type is to rapidly disseminate research of the greatest significance and urgency. Accordingly, Letters have and will continue to be limited to three pages to ensure that editors and reviewers can rapidly evaluate them. However, multiple rounds of review can delay publication and thereby undermine the purpose of Letters. Accordingly, we are instituting a new policy that will allow only one round of review in a shorter period of time. If an editor feels that the Letter will require substantive revisions, the Letter will be rejected and authors may be encouraged to resubmit as a regular article. In addition, Letters will be published online as soon as they have been edited and proofed by the authors,

speeding up the time to publication. They will, of course, also be included in the next published issue of the Journal.

Multidimensional Image Data

The advent of web-based publishing has made it possible to include movies as well as figures or still images as the displayed data in a research paper. But there is a need for embedded applications that permit the visualization of more complex dynamic data within a published paper. We are pleased to announce that BJ will soon support a multi-dimensional image player that will allow readers to interactively manipulate 3D image data as it changes over space and time. It will also simultaneously permit the display of several variables. So, for example, 3D images of a cell labeled with two fluorescent proteins marking histones and the nuclear envelope can be followed as the cell undergoes mitosis. Similarly, multiple variables can be displayed as they evolve in time in 3D geometries for spatial reaction-diffusion simulations. If you are planning a submission that might benefit from this kind of visualization, please contact the BJ office; we might use your datasets to test and ultimately inaugurate this feature.

Social Media

The importance of social media has not gone unnoticed by the Journal, and beginning January 1, the Journal has its own Twitter account. I had been skeptical about the value of Twitter to disseminate science until I opened my own account. I find it to be a valuable and fun way to communicate science and to quickly learn about what is happening in the labs of colleagues (as long as you keep that as your focus). We hope you will follow BJ and help us spread the word about important work in the Journal. In addition, corresponding authors for BJ papers will soon be able to add their twitter handles in a footnote to their published article. (Follow me @lesloew and follow BJ @BiophysJ).

Welcome New Editorial Board Members

As mentioned above, BJ prides itself on the dedication of its editors to assure the fair and rapid handling of submitted papers. Editors are all working scientists who volunteer their time to maintain the quality of BJ for the biophysics community. They are charged with seeking qualified reviewers and making editorial decisions based on their own judgments, as informed by the reviews. Editorial Board members serve three-year terms and the terms are staggered. We have already welcomed the new members of Section I, above. Here, I am pleased to welcome the other newly appointed members of Editorial Board class of 2018 and thank them very much for agreeing to serve.

A full roster of the current Editorial Board, new and continuing, is available through the BJ website.

Section II. Proteins: *Nancy Forde, James Shorter, Jill Trewhella*

Section III. Channels and Transporters: *Henry Colecraft, Peter Hegemann, Vasanthi Jayaraman, Eric Sobie*

Section IV. Membranes: *Stephen Evans, Georg Pabst, Ana-Sunčana Smith*

Section V. Molecular Machines, Motors and Nanoscale Biophysics: *Thomas Perkins, David Thomas*

Section VI. Cell Biophysics: *Julie Biteen, Alex Dunn, Catherine Galbraith, Philip LeDuc, Valentin Nägerl, Elsa Yan*

Section VII. Systems Biophysics: *Natalie Balaban*

Reference

1. Loew, L. M. 2015. Author Appreciation. *Biophysical Journal* 109:E1-2.

Paper of the Year Award



Jochen Hub

Congratulations to *Jochen Hub* of the Institute for Microbiology and Genetics, Georg-August-University, Göttingen, Germany, and winner of the 2015 *Biophysical Journal* Paper of the Year Award. His paper, *Interpretation of Solution X-Ray Scattering by Explicit Solvent Molecular Dynamics* was coauthored with *Po-chia Chen* and was published in Volume 108 (10) (May 19, 2015) of *Biophysical Journal*.

The Paper of the Year Award was established to recognize one outstanding paper by a corresponding author who is also a young investigator. Papers are nominated for the award by the Associate Editors of the Journal. Upon learning of the award, Hub responded, "This is a surprise; I am very very honored." Hub will receive his award and give a short talk at the Awards Symposium during the Biophysical Society Annual Meeting.

Public Affairs

Online Petition to Encourage Presidential Debate on Science

It's officially 2016—a presidential election year in the United States.

The news is filled with information on the candidates and what they say on a variety of issues. Rarely, though, does this include a candidate's views on scientific issues. An online petition, ScienceDebate.org, has been created to encourage the presidential nominees from each party to participate in a debate solely dedicated to science. Issues could include topics such as research funding, science education, health and medicine, energy, and environmental policies.



ScienceDebate was originally started in late 2007 to garner support for science issues to be included in presidential debates prior to the 2008 election. The group has gained steam ahead of the upcoming election and is seeking additional signers to the petition. The petition has the backing of the Society's Public Affairs Committee.

The organization is now asking for two things: 1) signatures in support of having a science debate, and 2) questions you would like the candidates to answer related to science. Visitors to the site can either submit an original question, or can rate questions submitted by others. To sign the petition or submit a question, go to <http://sciencedebate.org/>.

NIH Ends all Support for Research Using Chimpanzees

In November, National Institutes of Health (NIH) Director Francis Collins announced that the NIH will retire the fifty chimpanzees it planned to keep in reserve for research. The announcement comes two years after Collins announced new standards for the use of chim-

panzees in research funded by the NIH, and the retirement of most of the 260 chimpanzees supported directly by the NIH. Collins notes that no researchers have applied for a permit to use the chimpanzees for research during the past three years, with the exception of an intramural NIH researcher who later withdrew the application. In addition, in June 2015, the US Fish and Wildlife Service listed captive chimpanzees as an endangered species. As a result, to conduct research on chimpanzees an applicant would need to show how that work would benefit wild chimpanzee research.

NIH is now working on a plan to find sanctuaries that have the capacity to house the chimpanzees.

New Resource on NIH Funding by State

United for Medical Research (UMR), an organization that advocates for steady growth in the NIH budget over the long term,



has a new resource available for advocates. By clicking on a specific state, visitors to the UMR website can learn how much NIH funding that state receives, how many jobs those funds support, and the level of economic activity of those funds. The page also provides health information, biopharmaceutical activity in the state, and the top funded institutions. The statistics are based on 2014 data.

This resource is useful since Senators and Representatives are always very interested in how federal policies play out at home, and many are not aware that NIH funding (and National Science Foundation funding for that matter!) is distributed to researchers around the country. The website can be found at <http://www.unitedformedicalresearch.com/state-by-state/#>.

Report Provides Overview of Federal Investment in Microbiome Research

Part of the mission of the Office of Science and Technology Policy (OSTP) at the White House is to ensure that the scientific and technical work carried out by the Executive Branch of the government is coordinated and operating to provide the most benefit to society, and that that work is based on sound scientific knowledge. In undertaking a look at the federal investment in microbiome research across the government, OSTP was doing just that. The National Science and Technology Council, which is a part of OSTP, created the Fast Track Action Committee on Mapping the Microbiome (FTAC-MM) to "survey federal investments in microbiome research." The resulting report was released in November 2015 and details the investments made between 2012 and 2014 by 14 separate federal organizations as well as what is needed in the future to advance the field.

Over the three-year period covered by the study, the federal government invested \$922 million in microbiome research; 59% of that was funded by NIH and 37% of the total was focused on understanding the human microbiome.

As for needs, scientists and program managers across the government cited the need for software to analyze large quantities of data and for bioinformaticians with the skills to interpret the data. They also uniformly felt that a lack of standards, baseline data, and sample repositories were problem areas for the field.

Not surprisingly, since investment is often the key to future progress and science is becoming increasingly interdisciplinary, the FTAC-MM reported that sustained investments in all areas of microbiome research and interdisciplinary research are necessary to fully understand microbiomes.

To address the challenges and needs identified, the FTAC-MM recommends that the federal government provide incentives for the development of tools and platform technologies and to find a way

to build a data-savvy workforce to move the field forward.

The full report can be found at https://www.whitehouse.gov/sites/default/files/microsites/ostp/NSTC/ftac-mm_report_final_112015_0.pdf.

Grants and Opportunities

Seed Awards in Science

Objective: To enable researchers to develop a novel idea to a position where they would be able to be competitive for a larger award from the Wellcome Trust, or another source.

Who Can Apply: Applicant must hold an appointment at an eligible institution in the UK, Republic of Ireland, or a low- or middle-income country, not be based at a core-funded research institute, and receive personal salary support from the host institution for the duration of the award.

Deadline: February 8, 2016

Website: www.wellcome.ac.uk/Funding/Biomedical-science/Funding-schemes/Seed-Awards/index.htm

L'Oréal USA for Women in Science Program

Objective: To recognize five women postdoctoral scientists annually for their contributions in Science, Technology, Engineering and Math fields and commitment to serving as role models for younger generations.

Who Can Apply: Women who are American citizens or permanent US residents and are currently postdoctoral fellows involved in the life, physical/material sciences, engineering, technology, computer science and/or mathematics fields. Individuals must be affiliated with a US Institution.

Deadline: February 5, 2016

Website: www.lorealusa.com/Foundation/Article.aspx?topcode=Foundation_AccessibleScience_Fellowships

Biophysical Journal

Know the Editors



Tamar Schlick

Tamar Schlick

New York University, New York
Editor for the Nucleic Acids and
Genome Biophysics Section

Q: What is your area of research?

Although my formal background is in applied mathematics, since my graduate studies I have been interested in using computational and mathematical tools to investigate how large biological molecules work, by simulating their structure and dynamics in the context of important regulatory cellular processes. My group focuses on protein–nucleic acid interactions involved in DNA synthesis and repair, chromatin folding, and RNA structure analysis and design. Such interactions control gene expression, genome packaging, replication, repair, transcription regulation, and more.

Computer modeling and simulations help link the structural information on macromolecular complexes obtained by biophysical and biochemical techniques, with the wide range of dynamic behavior in the cell. Currently, macromolecular modeling serves as an important link between sequence and function and also as a vehicle for directing structural and functional initiatives, predicting biological phenomena, and pursuing medical and technological applications of the underlying biological systems.

Because of inherent practical limitations that biomolecular modelers face in dealing with complex, chaotic, hierarchical, and multiscale systems, new modeling and algorithmic approaches that borrow from diverse fields of mathematics (e.g., topology and geometry), as well as computing and numerical analysis (e.g., for coarse-graining and enhanced sampling), are continuously needed to enhance the reliability of macromolecular simulations to address targeted biological problems.

On the atomic level, we develop enhanced sampling methods to study the synthesis and repair mechanisms of DNA polymerases — to delineate conformational and chemical pathways in polymerase catalytic cycles, and interpret the varying efficiency and fidelity behavior across various polymerases. On the macroscopic and mesoscopic scales, we develop coarse-grained models to investigate chromatin structure and function, such as the folding of oligonucleosomes and chromosomes at various cell stages as a function of internal and external factors, and epigenetic regulation by altered chromatin architecture.

We also study RNA structure using a graph-theory approach for representing RNA secondary structures, with a focus on describing the structural repertoire of RNAs in the goal of using this information for RNA prediction and design. Ultimately, such coarse-grained models of chromatin and RNA could be combined to study biological networks of transcription, DNA repair, and gene regulation.

Submit to the New BJ Section

The *Biophysical Journal* is pleased to announce the addition of a new Section to the Journal: "Nucleic Acids and Genome Biophysics." The Journal seeks submissions to this section that address biophysical aspects of genome organization and their relation to cellular functions such as transcription, translation, development, and gene regulatory mechanisms. Appropriate papers include investigations of the structure, dynamics, function, and regulation of DNA, RNA, and their complexes with other molecules using experimental and computational techniques. Research studies on chromatin structural states, folding and function, and the dynamic organization of the nucleus will also be published in this Section.

To submit to Biophysical Journal visit <http://biophysj.msubmit.net>

2015 *Biophysical Journal* Poster Award Winners



Throughout this past year, the *Biophysical Journal* sponsored awards for outstanding posters presented by students and postdocs at the Society's Thematic Meetings. Awardees receive a certificate and \$250. Congratulations to these 2015 Poster Award winners.

New Biological Frontiers Illuminated by Molecular Sensors and Actuators Taipei, Taiwan: June 28–July 1, 2015

Student Winners

Hsin-Ya Lou, Stanford University
Vertical Nanopillar for in Situ Probe of Nuclear Mechanotransduction

Maohan Su, National University of Singapore
Curvature-generating Proteins and Subcellular Pattern Formation

Hung-Yi Wu, National Taiwan University
RecA E38K Mutant Displaces SSB without Apparent ssDNA Length Dependence

Biophysics of Proteins at Surfaces: Assembly, Activation, Signaling Madrid, Spain: October 13–15, 2015

Student Winners

Elizabeth Haglin, University of Massachusetts, Amherst
Signaling-related Structural Changes of Chemoreceptor Nano-Arrays

Quentin Lubart, Laboratoire des Matériaux et du Génie Physique
Phosphatidylinositol-4,5-bis(phosphate)-induced Moesin Adsorption on Supported Lipid Bilayers: Role of Moesin Phosphorylation

Polymers and Self-Assembly: From Biology to Nanomaterials Rio de Janeiro, Brazil: October 25–30, 2015

Student Winner

Zuzanna Bednarikova, Slovakia Academy of Sciences
Amyloid Self-Assembly of Insulin in Presence of Glyco-Acridines: In Vitro and in Silico Study

Biophysics in the Understanding, Diagnosis and Treatment of Infectious Diseases Stellenbosch, South Africa: November 16–20, 2015

Postdoc Winners

Serah Kimani, University of Cape Town
Substrate Specificity in the Amidases of Biomedical Importance – Insights from the Crystal Structures of a Model Bacterial Amidase

Dirk Lamprecht, K-RITH
*Bedaquiline, Q203, and Clofazimine: Novel Insights into Effects on *M. Tuberculosis* Respiration*

Student Winners

Lizelle Lubbe, University of Cape Town
The Influence of Angiotensin Converting Enzyme Mutations on the Kinetics and Dynamics of N-Domain Selective Inhibition

James Hove Mazorodze, K-RITH
Directing Warburg: Mycobacterium Tuberculosis Redirects Host Energy Metabolism in the TB Lung

Biophysical Society **60**TH ANNUAL MEETING

LOS ANGELES, CALIFORNIA • FEBRUARY 27 – MARCH 2, 2016

SPONSORS

*Asylum Research,
an Oxford Instruments Company*

Bruker Nano Surfaces

Burroughs Wellcome Fund

Carl Zeiss Microscopy LLC

Chroma Technology

FEI

*HEKA Elektronik + Multi
Channel Systems*

KinTek Corp

Molecular Devices

*Nanon Technologies
GmbH*

Renishaw Inc

*Sophion together with
Biolin Scientific*

Sutter Instrument

*The Journal of Physical
Chemistry*

*Wyatt Technology
Corporation*

Public Affairs Sessions

As you plan your schedule for the upcoming Annual Meeting, make sure to take advantage of the opportunities to broaden your perspective by attending a session or two organized by the Public Affairs Committee. Science is at the heart of many issues the world is currently facing, and it is important to understand those issues as well as how to communicate those issues to the public. The sessions being offered at the 2016 meeting provide ample opportunity to learn about both!

NSF Grant Writing Workshop

Monday, February 29, 1:00 PM–3:00 PM

Putting your best foot forward in your grant proposal is key to securing funding for research. Program officers from the National Science Foundation will walk attendees through the process and provide tips on how to prepare the best possible proposal.

Itinerary Planner Now Available

Browse the over 3600 abstracts submitted for the Annual Meeting and start planning your schedule.

To access the Itinerary Planner visit, www.biophysics.org/2016meeting

The Science of Hollywood

Monday, February 29, 2:30 PM–4:00 PM

The portrayal of scientists and science in popular media can play an important role in shaping the public's opinion about scientific issues. Whether a big box office feature like Jurassic World, an animated feature like Inside Out, or a sitcom like the Big Bang Theory, getting the science right requires experts in the pertinent field to weigh in. At this session, the panelists from the Science and Entertainment Exchange will discuss the role scientists play in the developing storylines involving scientists for movies and television, why sometimes even the best intentions do not result in an accurate representation, and what scientists can learn from Hollywood about communicating their work.

GMOs, Severe Weather, and Public Opinion

Tuesday, March 1, 2016, 1:30 PM–3:00 PM

Genetically modified organisms are big news in the popular press, with articles often focused on food safety, related regulations, and labelling. What gets less coverage is the role GMOs can play in protecting our food supply and specific plant economies. This session will take a look at the role GMOs have played in these areas and public policy, as well as the press's coverage of this scientific area.

By the Numbers

New for 2016! A fun number fact relating to the Biophysical Society or the field of biophysics.

Since 1958, BPS has held 578 different symposia at the Annual Meetings.

COMMUNITIES, SCIENTIFIC DISCOVERIES, AND LEARNING

Publications Sessions

Transparency, Reproducibility, and the Progress of Science

Sunday, February 28, 2:30 PM–4:00 PM

This panel discussion, sponsored by the Public Affairs Committee and the Publications Committee, will examine the complex issues relating to reproducibility in science, how it can be improved by greater transparency, and how it affects how we communicate science. Speakers will address reproducibility as it pertains to researchers, publishers, and government, and explore why this is a hot topic in the popular press. Panelists: *Emilie Marcus*, Cell/Cell Press, *Helen Berman*, Protein Data Bank, and an additional speaker to be announced.

How to Get Your Scientific Paper Published

Monday, February 29, 2:15 PM–3:45 PM

This panel discussion, sponsored by the Publications Committee, will focus on the practical issues involved in publishing a scientific paper. The panelists have extensive experience in writing, reviewing, and editing papers, and will provide information on the dos and don'ts of submitting research manuscripts. Discussions will focus on strategies to avoid common pitfalls, how to prevent and fix problems before submission, and how to respond to critiques and even rejection of a paper. Attendees are encouraged to ask questions during the session. Session Moderator: *Catherine Royer*; Panelists include *Leslie Loew*, Editor-in-Chief of *Biophysical Journal*, and members of the Editorial Board and Publications Committee, *William Hancock*, *William Kobertz* and *Elizabeth Komives*.

First Timers & New Members

First Time Attendee Event

Saturday, February 27, 5:00 PM–7:00 PM

Make the most of your conference experience. Stop by the First-Time Attendee event on Saturday evening during the Opening Mixer and get some tips on how to navigate the meeting. Society staff and Membership Committee members will be available to provide advice and answer your questions about the meeting.

Dinner Meet-up

Sunday, February 28–Tuesday, March 1, 5:30 PM

Interested in making new acquaintances and experiencing the cuisine of Downtown Los Angeles? Meet at the Society Booth each evening, Sunday through Tuesday, at 5:30 PM where a BPS member will coordinate dinner at a local restaurant.

New Member Welcome Coffee

Monday, February 29, 10:15 AM–11:15 AM

All new and prospective members are invited to participate and get acquainted with the Biophysical Society. Attendees will have the opportunity to meet members of the Society's council and committees to discuss BPS activities, highlight member benefits and opportunities, ask questions, and enjoy refreshments. Current members are encouraged to come meet the new members.

Stay Connected:

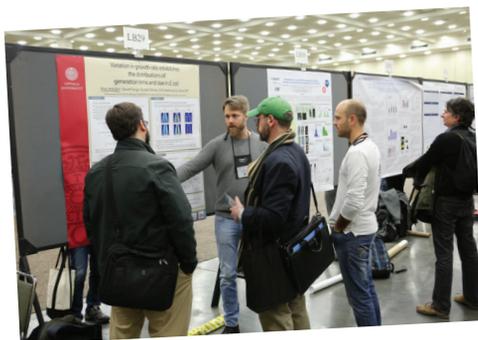
#BPS16





10 Reasons to Visit the Exhibit Hall

- Explore the latest technologies and see product demonstrations from over 130 exhibiting companies
- Stay abreast of the newest tools and publications that will keep you at the leading-edge of your profession
- Visit and view over 600 daily poster presentations
- Earn raffle entries by visiting exhibitors for a chance to win a Samsung Galaxy Tablet
- Cast your vote in the Art of Science Image Contest
- Network and meet new acquaintances
- Participate in the Graduate and Postdoc Institution Fair
- Learn about career opportunities at the Industry and Agency Opportunities Fair
- Use the exhibitor coupons to enter raffles and giveaways and receive discounts on equipment purchases
- Attend the Wednesday Poster Session for a chance to win a Fitbit



Poster Printing

Once again, the Society is working with Tray Printing to offer poster printing and delivery directly to the Los Angeles Convention Center for onsite pickup.



New This Year: In addition to the “Smooth Matte Vinyl” option, you will also have the option to have your poster printed on “Polyester Fabric.” The fabric option allows you to fold and transport your poster in your luggage without the hassle of bringing it home with you in a poster tube. Choose the best option for you.

Visit www.biophysics.org/2016meeting and click on 'Abstracts,' 'Poster Guidelines' for more information. Deadline for discounted rates for early printing submissions is 11:00 AM (PST) Wednesday, February 24.



Liposomes, Exosomes, and Virosomes: From Modeling Complex Membrane Processes to Medical Diagnostics and Drug Delivery

Ascona, Switzerland | September 11–16, 2016

This meeting will cover recent developments for investigating biochemical reactions and networks at, in, and across membranes of artificial and cell membrane-derived vesicles. Themes the meeting will address include: imaging membrane proteins and their biochemical reactions by light- and electron-optical and force microscopy at small ensemble and single molecule levels; vesicles in cellular trafficking and processes; lipid and protein micro-/nano-domains in membranes; transmembrane signalling in cell-derived vesicles; modeling in-plane and trans-membrane reactions; vesicles as ultrasmall containers for (bio-)chemical reactions; vesicles as artificial cells and for synthetic and systems biology; extracellular vesicles (exosomes) as diagnostic biomarkers; viral envelopes (virosomes) and vesicles for targeted drug delivery; and membrane networks and tissue engineering.

www.biophysics.org/2016Switzerland

Deadlines

Abstract Submission
March 7, 2016

Early Registration
March 11, 2016

Student Center

Student Center is a new feature in the Newsletter, where student members can share their experiences on how they decided to enter the field of biophysics.

How did you get interested in pursuing biophysics? Send a photo and your answer to [ccurry@biophysics.org](mailto:c Curry@biophysics.org).

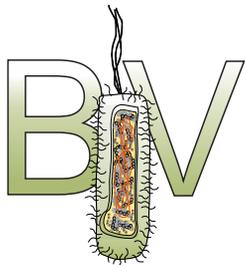
Q: What led you to study biophysics?

A: I developed a passion for biophysics before leaving high school where a deep enthusiasm for ecology, physics, and mathematics were interwoven by a number of advanced placement classes and extra-curricular clubs. In the following years, I pursued a bachelor's degree in biophysics where I voraciously sought out scientific opportunities, eventually joining the nuclear physics laboratory of *Charlie Freeman*, SUNY Geneseo, and carrying out cancer irradiation research. The experience was transformative, focusing my excitement for the crossroads of physics and biology toward productive scientific research. A fire had been lit that I was unable to quench!



Andrew T. Lombardo
Laboratory of *David Warshaw*
Molecular Physiology and
Biophysics
The University of Vermont

Subgroups



BIV

A few months ago I waxed lyrical about my stint as a rotating Program Director at the National Science Foundation. In anticipation of the Grant Writing Workshop at the BPS Annual Meeting, led by last year's Distinguished Service Award winner, *Kamal Shukla*, and yours truly, I offer five suggestions for writing a **terrible** grant application and one gem about writing **THE perfect**, transformative application.

For the record, I saw each of these examples more than once.

Don't read the Grant Proposal Guide. For instance, incorrect formatting can get your application tossed back before anyone with a PhD has a chance to cast his or her one eye on your masterpiece.

Start at the last second. Sure, anyone can write a great application in about five days. Not.

If you run out of space, make the figures smaller. The instructions state 15 pages, but your Project Description is 17 pages. Make the text fit

by reducing the figures to postage stamp size. See my important "research gem" in Figure 1.

Abbr. Evything. NSF reviewers are bright people, but don't depend on them knowing the difference between an EXSY, a ToF, and an RTFM. I once saw an application where "red" was abbreviated "rd". You can guess what the Panel discussion focused on.

Make the ability to perform Aim n depend on the success of Aim n-1. Agencies have strong feelings about funding projects that can't work.

— *Gary J. Pielak*, Subgroup Chair-Elect

PS: If you have not yet decided to attend the BIV symposium on Saturday before the BPS meeting gets into full swing, do so! We have a great slate of speakers, including *Zoya Ignatova* and *Helmut Grubmüller* from Germany, *Ken Dill* and *Shu-ou Shan* from the United States, and many more. It's going to be a fun session, and an exciting BIV dinner Saturday night. Make sure to sign up for dinner!



Figure 1

Engineering Approaches to Biomolecular Motors: From in vitro to in vivo

Vancouver, Canada | June 14–17, 2016

Over the past several decades, scientists and engineers in fields ranging from nanotechnology to cell biology have contributed to our understanding of the basic physical principles and biological functions of energy-consuming macromolecular machines. This meeting will bring together researchers from diverse disciplines who are developing novel ways of measuring and controlling biomolecular motors inside and outside of cells, synthesizing artificial molecular motors inspired by biology, harnessing motors for applications in devices, or developing theories that cut across biological and synthetic systems. Set in beautiful Vancouver, Canada, this meeting seeks to promote promising directions and techniques while catalyzing frontier research on exploiting biological building blocks for novel function in biology and beyond.

Deadlines

Abstract Submission
March 13, 2016

Early Registration
April 16, 2016

Powerful Instruments for Very Small Forces

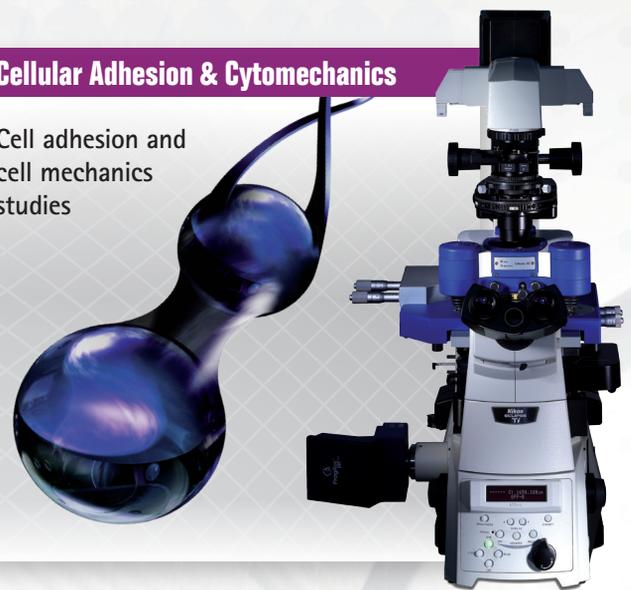
Atomic Force Microscopy

Correlative microscopy –
superresolution and
real time sample
dynamics



Cellular Adhesion & Cytomechanics

Cell adhesion and
cell mechanics
studies



Force-Sensing Optical Tweezers

Quantification of
molecular, cellular and
micro-rheological processes



Automated Force Spectroscopy

Automated single
molecule force
spectroscopy



Meet us at the 60th Annual Meeting of the
BIOPHYSICAL SOCIETY · BOOTH #908

JPK
Instruments

Nanotechnology for Life Science

Visit the JPK web site for more information
and sign up for our eNewsletter: usa.jpk.com



Follow us on Facebook,
Youtube and LinkedIn.

Obituary

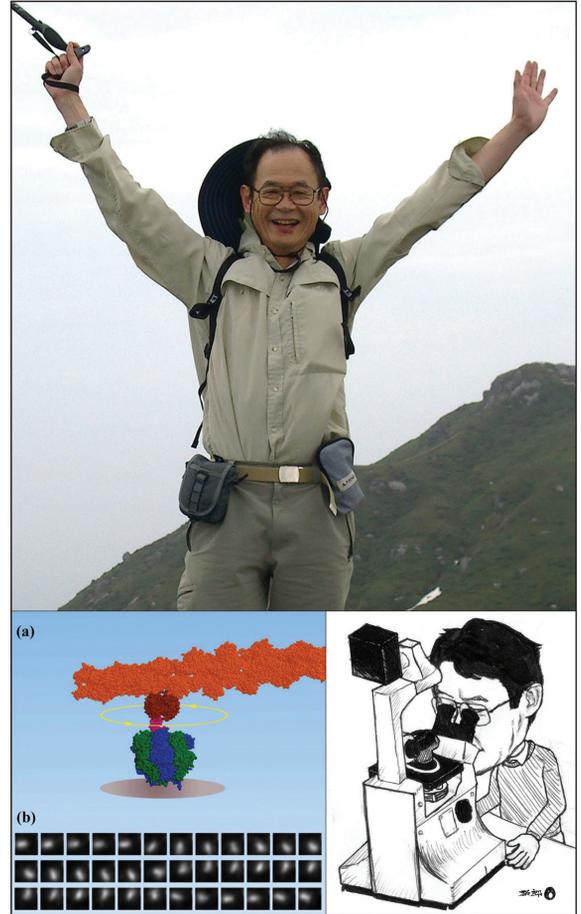
Kazuhiko Kinosita, Jr.

Life should not be a journey to the grave with the intention of arriving safely in a pretty and well-preserved body, but rather to skid in broadside in a cloud of smoke, thoroughly used up, totally worn out, and loudly proclaiming “Wow! What a Ride!”
Hunter S. Thompson, 1998

And what a ride he had! Sadly, we lost a great biophysicist, with the death of *Kazuhiko Kinosita, Jr.*, Waseda University, Tokyo, Japan, whose body was discovered on November 6, 2015, at an altitude of 2,600 m, about 50 m below the trail up Mt. Senjogatake, a 3,033-m peak in the Southern Alps of Japan. His wife, Mariko, had reported him missing on November 3. He was 69 years old and leaves behind a wife and three adult children.

Kinosita had been climbing solo, as he so frequently did—despite the exhortations of friends—and apparently sustained a fall, suffering a head injury. Kinosita simply loved the mountains: he was an active outdoorsman, an avid hiker, and an accomplished downhill skier. He had already climbed 300 of the top peaks in Japan, and was on his way towards conquering the next tier.

Kinosita-*san*—he always resisted being called by the honorific for teacher, *sensei*—also had a lifelong passion for good food and cooking, and he frequently drew parallels between the work of a great chef and a great scientist. He savored life in all its dimensions, and believed in living it to the fullest. Perhaps for this reason, and the lessons that he took from history, he was a staunch, uncompromising pacifist. As recently as last month, he expressed his personal opposition to the bellicose path that he felt Japan had been taking in its territorial dispute with China. I remember keenly how hard it had been to convince him to travel to the United States to deliver the National Lecture at the Biophysical Society Annual Meeting in 2006. In the immediate post-9/11 era, the United States had implemented a mandatory fingerprinting program for all visa applicants. Kinosita



Top, Kazuhiko Kinosita, Jr., summits again (photo courtesy of Rod MacKinnon). Bottom left, (a) cartoon of the rotation assay, showing an actin filament (red) driven into counter-clockwise rotation (yellow arrow) by a surface attached molecule of F_1 ATPase (blue, green); (b) successive fluorescence images of the rotating filament. Bottom right, a caricature of Kinosita peering into a microscope, drawn by his son, Takuro Kinosita.

objected to what he saw as a humiliation, and a presumption of guilt, associated with this program, and he stopped traveling to the United States for nearly five years. It took all my persuasive powers, both as a colleague and as Biophysical Society President, to convince him to accept this disrespect, in return for the greater good we derived from his lecture.

His friends and colleagues will remember him most vividly for his trenchant sense of humor, which was evident not only in conversations, but

in so many of his writings. No doubt about it, he had a real predilection for high irony, and for (often self-effacing) sarcasm: this comes across vividly in a famous interview that *Nature* conducted, where his quirky personality shines through (*Nature* 422:266, 2003). There, he asserts that his last wish was “that my death is to remain undisclosed for two months.” Sorry, Kazu!

But it was in science where Kinoshita really shone. He was the quintessential biophysicist, bringing the very best of his perspective in physics to tackle deep biological problems, particularly in the new field of single-molecule biology, which he helped to establish. He is best known for a landmark experiment carried out in 1996, together with his younger colleagues *H. Noji*, *R. Yasuda*, and *M. Yoshida* (Noji et al., *Nature* 386:299-302, 1997). They attached a fluorescently tagged actin filament, about 1 micrometer in length, to the central Y-subunit of the F_1 -ATPase (ATP synthase). The ATPase itself was fixed to a coverglass surface of a flowcell using nickel linkages onto engineered cysteine residues. When ATP was introduced into the surrounding buffer, the actin filament spun continuously counter-clockwise (see Figure). This observation proved unequivocally that the F_1 -ATPase was, in fact, the smallest known rotary motor. The then-heretical possibility that the F_1 enzyme rotated had first been proposed by UCLA biochemist *Paul Boyer* in the 1970s (inspired by the rotation of the bacterial flagellar motor), and when its crystal structure was finally solved by John Walker and colleagues in Cambridge in 1994 (itself a heroic feat of crystallography), it became

a serious possibility, based on the symmetries of the structure. But it took Kinoshita's single-molecule assay to demonstrate that the F_1 -ATPase rotated, and it did so beautifully and convincingly. The late distinguished biochemist, *Mildred Cohn*, University of Pennsylvania, read the Noji et al. paper, shook her head, and pronounced “They have it all, here.” In the very year that Kinoshita published his findings, Boyer and Walker received the Nobel Prize in Chemistry. There are many of us who feel that the Nobel Committee should have recognized Kinoshita as well, who supplied the conclusive proof of Boyer's conjecture.

Kinoshita went on to do a number of seminal experiments with the F_1 -ATPase, as well as other molecular motors, including myosin and DNA gyrase. He showed that the F_1 motor had amazingly high efficiency, approaching 100%, and that it turned in discrete rotary substeps. He proved that the motor could function not only as an ATPase, but synthesized ATP when driven by an external torque, which was supplied using a rotating magnetic field. These experiments are all classics in the single-molecule field.

Translated from the Japanese kanji, “Kinoshita” (also, Kinoshita) means “under the tree.” Legend has it that Buddha found enlightenment under a Bodhi tree. Kinoshita found his share of enlightenment, and he shared it generously with us in his own inimitable, endearing, and wry style.

Steven M. Block, Stanford University
Past President, Biophysical Society

Kinoshita Memorial Fund

To honor his life and work, colleagues in the Biophysical Society have come together to create the Kinoshita Memorial Fund. This fund will be used to establish an endowment that will sponsor a permanent BPS award in Single Molecule Biophysics. With your generous help, we hope to meet a fund-raising goal of \$50,000. Those who wish to contribute are encouraged to click on the “donate” icon on the top line of the BPS homepage, www.biophysics.org, and select the Kinoshita Memorial Fund. Donations are considered deductible for the purpose of US taxes.

—SMB

SACNAS/ABRCMS

Increasing Knowledge about Biophysics at Conferences for Minority Students in Science

This fall, representatives from the Biophysical Society joined students from all over the country at two of the largest annual conferences for underrepresented minority students in science, the SACNAS National Conference (Society for Advancement of Hispanics/Chicanos and Native Americans in Science), as well as ABRCMS (the Annual Biomedical Research Conference for Minority Students). Attendees had the opportunity to learn about the Society's Summer Research Program in Biophysics at the University of North Carolina, Chapel Hill, as well as other Society activities and meetings. Many students who stopped by the booth at both meetings were unsure what the field of biophysics encompassed, but some students were already confident in their interest in pursuing biophysics research.

This year, SACNAS took place in National Harbor, Maryland, in late October, at the Gaylord Convention center on the banks of the Potomac River. *Lisa Phillippie*, the on-site administrator at the University of North Carolina, for the Summer Research Program in Biophysics, helped staff the BPS booth to give students details about the summer program and the labs open to summer students. Committee on Diver-

sity and Inclusion (CID) members *Luis Marky*, University of Nebraska, and *Silvia Cavagnero*, University of Wisconsin, Madison, took a look at biophysics-related posters throughout the meeting to select two students to receive a travel award to attend the BPS Annual Meeting in Los Angeles this February. The SACNAS travel award winner is *Lauren Thurlow*, a McNair Scholar at Loyola Marymount University.

In November, BPS representatives headed to a reliably rainy Seattle, Washington, for ABRCMS. *Lisa Phillips* was once again on-site to provide students with firsthand knowledge of the summer research opportunity. Local BPS member *Karen Thickman*, University of Washington, along with BPS CID member *Candice Etson*, Wesleyan University, judged undergraduate posters on biophysical topics. Winners of travel awards to the BPS Annual Meeting from ABRCMS include *Josean Reyes*, University of Puerto Rico, *Kyle Lopez*, University of Arizona, and *Saffron R. Little*, Fisk University.

In addition to travel awards, BPS sponsored several poster awards at the two meetings. The poster award winners from SACNAS, all undergraduate students, were *Santiago Sanchez*, University of California, Santa Cruz, and *Izuel Tejada*, El Paso Community College. Poster award winners at ABRCMS were among those selected in the category of Engineering, Physics, and Mathematics from which 22 students were provided awards.



Biophysics Week
March 7–11, 2016

MollyCule

Is having a mentor important? How do I go about finding a professional mentor?

Scientific mentorship is a critical part of career development and professional success. In every stage of a career, from undergraduates trying to find a first research experience to established investigators and professionals working on the next big idea, everyone needs help and advice. A mentor helps you understand how to advance in your science and your career. A mentor provides advice on how to find out about a new field or how to navigate your own research area, and can help if you get stuck. The kind of mentor you need depends on your current educational or professional experience, your career goals, and the career pathway you expect to take to achieve these goals. As an example, students need to find supportive mentors with whom they can communicate and who can help them to be productive, publish their research findings, and provide a springboard towards their next step in the career ladder. Early in your career, local mentorship within your institution is critical, but as your career progresses do not underestimate the value of keeping contact with previous mentors or finding new mentors outside of your current place of

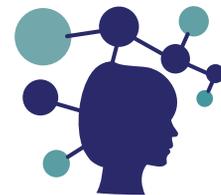
employment. When considering possible mentors, research their publication record and make certain that their laboratory is a productive environment with the resources you will need to accomplish your goals. There are many helpful resources for scientific mentors and mentees that cover every stage of a career that are freely available. Here are a few online resources to start with:

HHMI: http://www.hhmi.org/sites/default/files/Educational%20Materials/Lab%20Management/Making%20the%20Right%20Moves/moves2_ch5.pdf

Nature: http://www.nature.com/naturejobs/science/career_toolkit/mentoring

University of Michigan: <http://www.rackham.umich.edu/downloads/publications/mentoring.pdf>

The National Academies Press: <http://www.nap.edu/catalog/5789/adviser-teacher-role-model-friend-on-being-a-mentor-to>

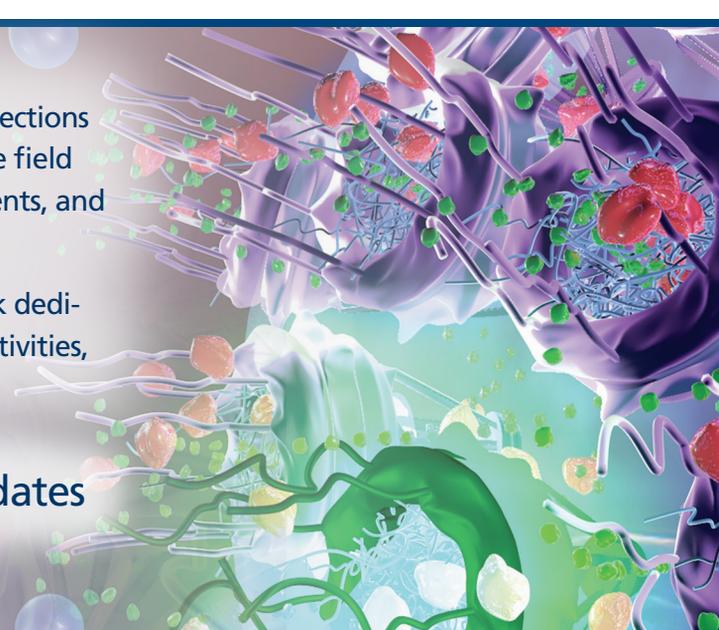


Molly Cule
Advice

Biophysics Week is a global effort aimed at encouraging connections within the biophysics community and raising awareness of the field and its impact among the general public, policy makers, students, and scientists in related fields.

Keep an eye out for upcoming events during this special week dedicated to you and the field of biophysics. There will be daily activities, news, publications, blogs, fun facts, and more.

Visit biophysics.org/BiophysicsWeek for updates and to learn how you can get involved!





11400 Rockville Pike, Suite 800
Rockville, Maryland 20852

Presorted
First Class Mail
U.S. Postage
PAID
Claysburg, PA
Permit #6

UPCOMING EVENTS

BIOPHYSICAL SOCIETY NEWSLETTER JANUARY 2016

March

March 14-16

International Conference on
Dermal Drug Delivery by Nano-
carriers

Berlin, Germany

www.sfb1112.de/en/Internationale-Tagung-des-SFB-1112/index.html

March 30-April 2

Cryo-EM 3D Image Analysis
Symposium 2016

Lake Tahoe, California

ncmi.bcm.edu/ncmi/events/workshops/workshops_148

April

April 10-14

Myeloid Cells
Killarney, Ireland

www.keystonesymposia.org/index.cfm?e=web.Meeting.Program&meetingid=1404

April 11-14

Joint Meeting of the Membrane
Group of the French Biophysical
Society, GEM, and the Membrane
Section of the German Biophysical
Society, DGfB

Bad Herrenalb, Germany

www.ccb.tu-dortmund.de/fb03/bpmi/en/home/

May

May 22-26

State of the Brain
Alpbach, Austria

www.keystonesymposia.org/index.cfm?e=web.Meeting.Program&meetingid=1425

May 23-27

Fourth International Conference on
Radiation and Applications in Vari-
ous Fields of Research

Nis, Serbia

www.rad-conference.org

June

June 12-17

Cell Polarity in Development, Divi-
sion, and Disease

West Dover, Vermont

www.grc.org/programs.aspx?id=16714

June 13-15

5th World Congress on Materials
Science & Engineering

Alicante, Spain

materialsscience.conferenceseries.com/europe/