

# MCB NEWS

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PREDICTIVE BIOLOGY THROUGH INTERDISCIPLINARY RESEARCH

The Division of Molecular and Cellular Biosciences (MCB) supports fundamental research and related activities designed to promote the understanding of complex living systems at the molecular, subcellular, and cellular levels.

The Division supports research across a broad spectrum of experimental systems and approaches, ranging from in vivo studies of model organisms, such as plants and microbes, to the use of in vitro and in silico strategies.

Credit: Grace Brannigan, Temple University, and Jerome Henin



Credit: Mikhail Akita, Joerg Wiedenmann



Credit: NSF



Credit: W. Henin



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## A WORD FROM THE DIVISION DIRECTOR, DR. PARAG CHITNIS



This is the second issue of the MCB newsletter. We appreciate the positive response that we received from many of you. We will continue to publish these newsletters every six months, improving them each time by incorporating your suggestions.

As I wrote last time, in the last few years the Division has undergone a transformation in its proposal review processes and its scientific emphasis areas. The Division solicitation and cluster descriptions reflect the emphasis on quantitative and predictive science at the intersections of biology and other disciplines. In FY2013, 30% of awards in the Division were funded jointly with directorates outside of Biological Sciences. Fostering research at the interface of biology with other disciplines is a major priority for all of us in the Division.

The Division has a long history of supporting interdisciplinary research. Dr. Kamal Shukla, a veteran program director in the Division, has been a pioneer in establishing strong interactions with physical sciences. Dr. Shukla, in collaboration

with Dr. Denise Caldwell, who is the Director of the Division of Physics, has nurtured the research at the physics-biology interface. Another area of long-term interactions is with the Directorate for Engineering, starting with the metabolic engineering program and then in quantitative systems biotechnology.

What are the reasons for the Division's success in fostering interdisciplinary research? People and processes! The Division has program directors that cherish interdisciplinary research. Our permanent program directors come from different backgrounds. Dr. Shukla is a physicist, whereas Dr. David Rockcliffe is a chemist. Two of our recent hires as permanent program directors are Dr. Theresa Good, who is a chemical engineer, and Dr. Arcady Mushegian, who is an expert in bioinformatics. In addition to the expertise and dedication of the program directors, the Division staff goes the extra mile to administer complex processes that are often required to navigate the review of interdisciplinary proposals. In the past several years, MCB has also employed different processes to review and fund research projects in the interdisciplinary space. When a proposal needs input from other disciplines, MCB program directors approach relevant program directors in other directorates and establish joint review at any time during the review and decision process. The joint review could include the suggestion of ad hoc reviewers from different disciplines

or discussion of proposals in two different panels. When there are many proposals in a specific area at the interface, MCB holds joint panels with other divisions. In the last fiscal year, MCB held joint panel meetings with Physics, Chemistry and Engineering. Besides joint review and funding of research projects, the Division also collaborates with other directorates in special programs such as Physics Frontier Centers and Engineering Frontiers Research and Innovation solicitations.

An additional mechanism for encouraging research at the intersections of different disciplines is to support workshops in research topics that bring experts from different areas together. If you have ideas for such workshops, I invite you to contact the relevant program directors to discuss your idea. As always, we welcome your feedback and we appreciate your thoughts about how we can help in the progress of science.



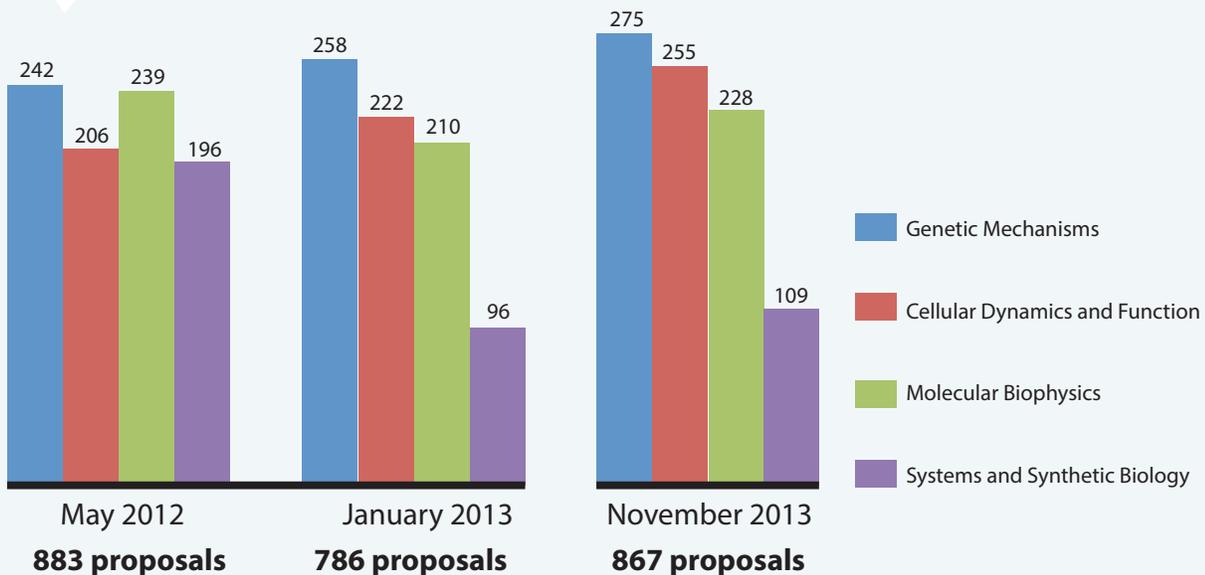
**DID YOU KNOW?**

As of November 2013, MCB accepts proposals for investigator-initiated research projects once a year. Prior to 2011, MCB accepted such proposals twice a year. However, community feedback and analysis of data showed that most researchers submitted proposals only once per year, mainly because there was not sufficient time to revise a proposal after declination and submit it for the next deadline. Moreover, when the researchers did submit a proposal immediately for the next deadline, its chances of funding were low.

In 2011, MCB began accepting unsolicited proposals every eight months to give an additional two months for revising the proposals. However, analysis of awards made in Fiscal Year 2012 showed that this change did not significantly improve the funding success of resubmitted proposals, likely because the declined proposals often required additional experiments or a complete rethinking of the research problem. There were other disadvantages to the eight-month cycle: It hampered review of proposals at the interface of biology and the physical sciences and engineering because other Divisions that interact with MCB in co-reviewing proposals have a single deadline (or submission window) in the fall. In addition, many principal investigators (PIs) communicated that they prefer having the same deadlines every year, which would not be achievable with an eight-month cycle. Therefore, MCB decided to institute a single annual deadline for accepting proposals for investigator-initiated projects.

An anticipated outcome of this change is that it will greatly facilitate the co-review and co-funding of interdisciplinary research at the intersections of biology and other disciplines. However, the change to annual deadlines is not expected to change the funding rate. As shown below, the number of proposals received for investigator-initiated research projects has not changed substantially between May 2012 and November 2013. Thus, provided the Division’s budget remains unchanged, the total number of awards made by MCB in a year will be approximately the same as in the past.

**Figure 1. Investigator-Initiated Research Projects (not including CAREER submissions)**





## OPPORTUNITY FOR THE COMMUNITY

NSF participated in the first joint call in August 2013 with the European Research Area Network (ERA-Net) for transnational research projects that enhance rapid advances in synthetic biology and aid the development of common practices and standards in this emerging technology. Synthetic biology is an interdisciplinary research area that has the potential to impact innovation and technological progress and to be a cornerstone of the bioeconomy. The ERA-Net in Synthetic Biology (ERASynBio) consortium consists of sixteen governmental funding bodies from twelve European Commission Member States (Austria, Denmark, Finland, France, Germany, Greece, Latvia, Netherlands, Portugal, Spain, Slovenia and the United Kingdom) and two Associated Countries (Norway and Switzerland). A total of 55 proposals were submitted to the call and 30 of the submissions included U.S. scientists. NSF committed two million euros to support the projects. The total commitment from all countries was fifteen million euros. ERASynBio will help promote the robust development of synthetic biology by structuring and coordinating national efforts and investments.

### Objectives for ERASynBio are to:

Initiate, facilitate and support the development of national research programs, strategies and infrastructures in synthetic biology avoiding fragmentation of programs, regulatory framework and policies beforehand	Initiate and implement transnational research funding actions	Overcome extant fragmentation in the research landscape and strengthen the scientific community in synthetic biology	Ensure concomitant development of research and infrastructure and ethical, legal and social implication agendas	Increase innovation and competitiveness in biotechnology	Stimulate continuous societal dialogue to develop a common understanding among stakeholders
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The first joint call addressed broad research areas within synthetic biology based on the following definition: Synthetic biology is the engineering of biology. It is the deliberate (re)design and construction of novel biological and biologically based parts, devices and systems to perform new functions for useful purposes, that draws on principles elucidated from biology and engineering. By promoting high risk-high reward areas that cross the boundaries of disciplines, the first joint call allowed researchers to identify new opportunities and directions in the field of synthetic biology. Using information gleaned from the outcome of the first joint call, ERASynBio will develop a white paper. The white paper will identify and prioritize research needs and infrastructure initiatives, as well as outline promising fields of application and routes for innovation.

The second joint call will be in 2014. It will be a topic-based call developed to address the strategic gaps and opportunities identified in the white paper. Stay tuned for more information on the second joint call. Bookmark this website to learn more about funding opportunities for the MCB Community: <http://www.nsf.gov/div/index.jsp?org=MCB>



## ASM-NSF LINK

### Building Bridges, Communities, and Career Competencies

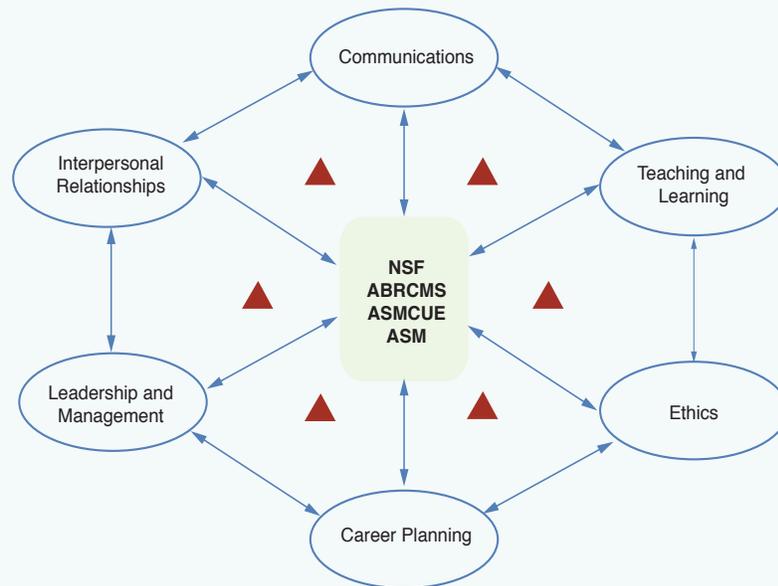


Figure 2. Above is an illustration of the bridges, communities, and competencies that will be generated through the LINK program. The center block depicts the melding of four unique stakeholders and audiences; triangles depict a suite of professional development activities, webinars, discussions, orientation and reflections, listservs, and other activities key to a successful structured-mentoring experience; circles indicate communities formed around six career competencies; and arrows illustrate numerous bridges and connections.

Meeting rigorous funder guidelines is an inherent part of the U.S. research enterprise, and one that increasingly prompts investigators to demonstrate the positive impacts of their research on society. Along with strong research components, funded projects today must emphasize discovery, innovation, broadened participation, interdisciplinary collaboration or other societal benefits. One initiative that is reaching out to help investigators find ways to meet these expectations and improve their proposal competitiveness is the American Society for Microbiology (ASM)-NSF Leaders Inspiring Networks and Knowledge (LINK) Program.

Sponsored by the American Society for Microbiology with support and collaboration from the NSF, the program is a structured-mentoring effort to build “links” among established research investigators, early-career scientists, undergraduate faculty, and trainees (students and postdoctoral fellows). To foster a robust science community engaged in mentoring, networking, and collaboration, the LINK Program highlights NSF-sponsored research and promotes interactions at three ASM venues: the ASM Conference for Undergraduate Educators (ASMCUE), the ASM General Meeting, and the Annual Biomedical Research Conference for Minority Students (ABRCMS). Through these venues and through its award programs, LINK will offer several opportunities in 2014.



## ASM-NSF LINK

### 2014 Researcher Opportunities with ASM-NSF LINK

#### LINK Travel Awards

LINK travel awards support scientists actively engaged in research to attend ASMCUE in May or ABRCMS in November. Prospective awardees are researchers that wish to identify and build connections with undergraduate faculty for advancing interdisciplinary scientific research and student learning.

#### LINK Mentoring Awards

LINK mentoring awards support pairs or groups of investigators to explore innovative projects that broaden participation by underrepresented minorities in science, technology, engineering, and math. This support is meant to plan, initiate, and/or catalyze collaborative efforts. Preference is given to projects that have a high potential to transition into a successful proposal to NSF.

#### LINK Meeting Activities

At its three venues, LINK creates and facilitates opportunities for increased exposure to and success in emerging and interdisciplinary areas of the molecular, cellular, and microbial biosciences. Confirmed for asm2014 (the 114th ASM General Meeting) are sessions on facilitating mentoring and on innovative research and education in systems and synthetic biology. Additional sessions are planned for ASMCUE and ABRCMS in 2014.

#### Learn More Today!

LINK is supported by NSF grant (MCB-1241970). Visit <http://www.asmlink.org> to learn more about the program, including eligibility requirements and application deadlines.

### Congratulations to the 2013 LINK Travel Awardees!

#### ABRCMS-LINK Travel Award

- **Paula Faulkner**, North Carolina Agricultural and Technical State University, Greensboro, North Carolina
- **Christopher Bassey**, Azusa Pacific University, Azusa, California

#### ASMCUE-LINK Travel Award

- **Heike Bücking**, South Dakota State University, Brookings, South Dakota
- **Michael Ibba**, The Ohio State University, Columbus, Ohio
- **Michael Polymenis**, Texas A&M University, College Station, Texas
- **Joanne M. Willey**, Hofstra University, Hempstead, New York



## AVOID THE DREADED “RETURNED WITHOUT REVIEW”

Proposals can be returned without review for a variety of reasons. The most common mistakes PIs make with their proposal submissions are:

Proposal does not meet NSF proposal preparation requirements, such as page limitations, formatting instructions, and electronic submission, as specified in the Grant Proposal Guide or program solicitation.

Broader impacts are not addressed in separate section in (a) Project Summary, (b) Project Description – proposed work, AND (c) Project Description – Results from Prior NSF Support.

Proposal is a duplicate of, or substantially similar to, a proposal already under consideration by NSF from the same submitter; or, a previously reviewed and declined proposal has not been substantially revised.

Section on Results of Prior Support is missing from Project Description. This is required for each PI and co-PI who has had NSF support within the past 5 years. The section **MUST** include NSF award number, amount, time period, and title for the award most closely related to the current proposal and should report accomplishments for both intellectual merit and broader impacts.

Information in the Biographical Sketch is missing, e.g., no information on previous mentors, or incomplete COI (Conflict of Interest) information.

References Cited section is improperly formatted, e.g., titles are missing; or list of authors for each reference is incomplete.



## OTHER TIPS FOR PROPOSAL SUBMISSION FROM PROGRAM DIRECTORS AND ADMINISTRATIVE STAFF

Be sure to include the proper program solicitation number on the cover sheet. For RUI proposals, it is preferable to submit under MCB's annual solicitation rather than the NSF-wide solicitation, as this allows you to direct your proposal to a specific cluster.

Reference section: Do not use et al., list all authors.

Single Copy Documents are only visible to the NSF and are not viewable by reviewers. Your list of suggested reviewers goes here, as does your demographic information.

What goes in Supplemental Documents?

- Postdoctoral mentoring plan (if required) and data management plan
- Solicitation-specific documents such as the Faculty Early Career Development (CAREER) Program -required letters from department chairs and RUI statements, and letters of collaboration (note the latter should not be written as reference letters nor should they contain preliminary data, but rather should focus on describing the specific roles of the collaborators)
- Do not include journal articles or manuscripts
- When budgeting for undergraduate and high school students doing research, use the Participant Support section. The maximum is \$6,000 per person annually. No indirect costs are allowed, and be sure to use salary guidelines for Research Experiences for Undergraduates (REU) supplements.



## SCIENTIST-AWARDEE SPOTLIGHTS



Dr. Sean Decatur is an emerging national leader in higher education. Dr. Decatur became the 19th president of Kenyon College on July 1, 2013. Prior to that, he served as the dean of the College of Arts and Sciences and as a professor of chemistry and biochemistry at Oberlin College. Dr. Decatur has been funded by Molecular Biophysics and was a recipient of a National Science Foundation Faculty Early Career Development (CAREER) award.

Learn more about Dr. Decatur...

### 1 Tell us about your current career position.

I am the President of Kenyon College, a private, selective, residential liberal arts college in Ohio. We have an enrollment of 1650 students and about 170 faculty.

### 2 What are the key experiences and decisions you made that have helped you reach your current position?

I was an undergraduate student at Swarthmore College, another selective liberal arts college. At Swarthmore, I was encouraged to pursue a career in science by my faculty mentors; beginning in my sophomore year, I was working closely with faculty as a teaching and research assistant. I graduated from Swarthmore convinced that this combination of a teaching and research career was ideal for me, and I went to graduate school at Stanford with this in mind. When I graduated from Stanford, I started my faculty career at Mount Holyoke College, where I found that I greatly enjoyed teaching and mentoring undergraduates as well as establishing and leading a research program. After the standard rise through the faculty ranks, i.e., tenure, I began to take on additional administrative responsibilities, and that began my path towards college president.

### 3 Did support from the Division of Molecular and Cellular Biosciences impact your research and/or career? If so, then how?

I benefitted from NSF support (joint between Chemistry and MCB) early in my career – I was a CAREER grant recipient as a junior faculty member at Mount Holyoke, and I had continuous NSF funding for my research lab until a little over a year ago. This funding supported my work with undergraduate students who worked on original research projects, presented their work at national meetings, and co-authored publications; many of these students have gone on to advanced study in the sciences. It also helped to support post-doctoral scholars who worked in my lab, and I am proud that some of these folks have also gone on to teach and research at primarily undergraduate institutions. We also did some pretty cool science!

The CAREER grant pushed me to innovate in the integration of teaching and research, and this has been a theme throughout my academic career. Many of the skills that I find valuable as a college president were honed by my work as a PI on NSF MCB grants.



## SCIENTIST-AWARDEE SPOTLIGHTS

Learn more about Dr. Decatur (cont.)

**4 How did you first become interested in science?**

I've been interested in science since I was very young (I used to make my own chemistry sets from household materials – not something I recommend). I loved my science classes in school, and in college I was introduced to research very early on – I was hooked from that point.

**5 What is it that keeps you working hard and engaged in science/administration every day?**

I am strongly committed to improving the learning experience for students, and being a college president means I get to think creatively about this every day. I also love problem solving, and having a broad range of problems to think about. This was true in the lab, and it is very true in the president's office.

**6 Were there times when you failed at something you felt was critical to your path? If so, then how did you regroup and get back on track?**

Many times – experiments that didn't work; grant proposals that were not funded; papers with brutally honest critiques from reviewers; and many more. The key is not to take these personally, to keep the long-term goals clearly in mind, and to take every disappointment as a learning opportunity.

**7 What advice would you give to others who want to pursue a career in science/science administration similar to yours?**

I think that careers for scientists in liberal arts colleges are amazing opportunities – you can do original, interesting research (with funding from NSF and others), creative teaching, and inspirational mentoring of students. The type of integration of research with education that NSF has encouraged for years now is fundamentally what the liberal arts teaching experience is about – and I'd encourage PhD students to give it serious consideration.

**8 Do you have any role models or mentors? If so, describe how they have influenced you?**

The many professors I had at Swarthmore became good mentors and good friends – we are still very much in touch. I also have kept in close contact with my PhD mentor (Steve Boxer). I've learned different things/had different influences from different people – my general sense has been that it is valuable to collect multiple mentors over one's career.



## SCIENTIST-AWARDEE SPOTLIGHTS

Supporting interdisciplinary research is a priority for the Division. We would like to highlight MCB awardees that exemplify interdisciplinary research.

Principal investigator **Dr. Joseph Ecker** at the Salk Institute in La Jolla, California and co-PI **Dr. Yu-Hwa Lo** of the University of California-San Diego, are Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE) awardees. Dr. Ecker, who is an expert in plant hormone signaling and profiling epigenetic changes in human and plant cells, and Dr. Yu-Hwa Lo, who is an expert in development and implementation of microfluidic and nanofluidic lab-on-a-chip technologies, received funding ([MCB-1344299](#)) to develop and implement innovative technology to enable isolation and analysis of epigenomic profiles on single cells. The project proposed by Drs. Ecker and Lo will use a customized microfluidics system to sort and trap single plant cells and then subject them to various treatments followed by lysis and nano-sorting of chromatin fragments, which will be sequenced using single-molecule methods. The interdisciplinary nature of the project is evident from its integration of knowledge and technologies from biology, DNA sequencing technology, and engineering. If successful, the research will enable for the first time epigenomic analysis of the genomes of single cells to provide a detailed picture of stochastic and cell-specific responses of plant cells to hormonal and stress stimuli. The interdisciplinary nature of the research will carry over to the broader impacts activities, which include training high school, undergraduate and graduate students at the interface of biology and technology, as well as outreach to middle school students aimed at highlighting nanotechnology.

Principal investigator **Dr. Houra Merrikh** and co-PI **Dr. Paul Wiggins** from the University of Washington combine biology and physics to explore a key problem in bacterial DNA syntheses/replication. In the cell, many molecular processes can conflict with the process of DNA replication, leading to stalling or ejection of the replisome. The mechanisms by which DNA replication complexes respond to these conflicts and resume, or restart, replication is poorly understood. Drs. Merrikh and Wiggins were awarded a grant ([MCB-1243492](#)) to analyze replication origin dynamics in cells of the bacterium, *Bacillus subtilis* by testing models for DNA replication restart using a combination of quantitative/physical measurements, single molecule measurements

and ensemble cellular fluorescence in a living organism. Their research aims to provide important insights into the fate of replisome proteins upon replication stalling, the precise order of events in protein loading to restart replication, and the competition between different pathways. All of these processes are important for a better understanding of the regulation of replication, an essential process in all living cells. The quantitative imaging methods used in the research will be the subject of education and training of biologists at many levels, including middle and high schools, two- and four-year colleges, and graduate school.

Principal investigator **Dr. Jef Boeke**, who recently moved from Johns Hopkins University to New York University, and co-PIs **Drs. Joel Bader** and **Srinivasan Chandrasegaran** from Johns Hopkins University are Science Across Virtual Institutes (SAVI) awardees. SAVI is a mechanism to facilitate collaboration among teams of NSF-supported U.S. scientists and engineers and their international partners who have complementary strengths and common interests. SAVI supports the formation of virtual institutes to foster enhanced research collaboration; data sharing; networking; and technical exchanges of students, post docs, and junior faculty across borders. Drs. Boeke, Bader and Chandrasegaran's SAVI grant ([MCB-1158201](#)) involves a collaboration with partners in China and supports the coordination of innovative and transformative approaches to synthesize the complete yeast genome by instituting a well-coordinated global yeast chromosome synthesis network. SAVI helps facilitate the multi-disciplinary international research and STEM educational efforts, in addition to providing a means to leverage, coordinate and expand their efforts to ensure the full synthesis of the *Saccharomyces cerevisiae* genome within a 5-year timeframe. The ability to build customized yeast genomes would be of immense utility for basic research in processes such as genome organization and evolution, as well as industrial applications. Moreover, the research is well integrated with education through an innovative "Build a Genome" course, developed at Johns Hopkins and now offered at other institutions in the U.S. and China.



## 2013 NOBEL PRIZE LAUREATES



The 2013 Nobel Prize laureates have been announced, and among the winners are individuals that have been supported by the Division of Molecular and Cellular Biosciences. The Nobel Prize honors men and women across the globe for outstanding achievements in physics, chemistry, medicine, literature, and for work in peace.

MCB funded awardee **Dr. Randy W. Schekman** was awarded the 2013 Nobel Prize in Physiology or Medicine for his discovery of machinery regulating vesicle traffic, a major transport system in our cells. The Nobel Prize was jointly awarded to Drs. James E. Rothman and Thomas C. Südhof. It was a mystery as to how the cell organizes its transport system, and Dr. Schekman used a genetic screen in yeast to identify three classes of genes that control different facets of the cell's transport system. Dr. Schekman's work provided new insights into how cellular molecules such as hormones, neurotransmitters, and enzymes are correctly delivered to the right place at the right time in the cell. Dr. Schekman is currently affiliated with the University of California, Berkeley, and Howard Hughes Medical Institute.

MCB funded awardees **Dr. Martin Karplus** and **Dr. Arieh Warshel** were awarded the 2013 Nobel Prize in Chemistry for the development of multiscale models for complex chemical systems. The Nobel Prize was jointly awarded to Dr. Michael Levitt. Drs. Karplus and Warshel devised methods that used both classical and quantum physics with computer modeling to understand and predict chemical processes. Previously the use of both classical and quantum physics was difficult, but with the quantum-mechanics/molecular-mechanics approach used by Drs. Karplus, Warshel and Levitt, it has become a commonplace tool that helps scientists understand important problems related to life. Their methods have aided scientists in unveiling chemical processes, such as a catalyst's purification of exhaust fumes or the photosynthesis in green leaves. Dr. Karplus is currently affiliated with Université de Strasbourg, France and Harvard University, Cambridge, Massachusetts. Dr. Warshel is currently affiliated with University of Southern California, Los Angeles, California.

The Division of Molecular and Cellular Biosciences would like to congratulate these individuals on their wonderful achievements. MCB proudly recognizes the investments made into these individuals and their research as their work has made profound impacts on the progress of science.



## PROGRAM DIRECTOR SPOTLIGHT

### Meet Dr. LaJoyce Debro!



Dr. LaJoyce Debro is a program director in the Cellular Dynamics and Function cluster of MCB. She served previously as a Visiting Scientist, Engineer, and Educator (VSEE) and has returned to the NSF as an Intergovernmental Personnel Act (IPA) assignee that works remotely. VSEEs and IPAs are a part of NSF's rotator program, which allows NSF to bring in top scientists, engineers, and educators from academia and industry as temporary staff. VSEEs become temporary NSF employees for up to 2 years,

while IPAs remain employees of their home institution, while at NSF. Through the rotator program, NSF's ties to the research community are strengthened while providing the talent and resources that are critical to maintaining NSF's world-class scientific workforce and meeting NSF's mission. NSF benefits from IPAs as they bring in new ideas and expertise from the research community while IPAs learn about NSF programs and the merit review process.

### Learn more about Dr. Debro...

#### 1 What were you doing before you came to the NSF? Did you return to the same position?

I was a faculty member at Jacksonville State University (JSU) in Alabama. After leaving NSF, I returned to the same position. At JSU, I teach in the course rotations for General Biology, Microbiology, Genetics, and Molecular Biology and run a small research lab with undergraduate students.

#### 2 What attracted you to work for NSF?

I had served on a number of review panels at NSF, and during each panel service the invitation was extended for panelists to consider serving NSF as a rotating program director. I enjoyed reviewing the proposals, and one year when I was feeling especially overworked and underappreciated in my regular faculty position, I decided to apply for the program director position. I guess you can say I was losing my passion for teaching and needed a change, and perhaps my students and my coworkers needed me to make a change.

#### 3 What was your first impression of NSF? Has this impression changed since serving as a rotator? If so, then how?

Prior to being a rotator I was uncomfortable talking to program directors and avoided holding conversations

with "those people." I always accepted the reviews that were provided and never considered contacting a program director for additional feedback or to discuss my project prior to submission.

My first impression was – "What have I gotten myself into?" Overnight I had gone from being a leader in my department to a position where I felt that I had no control. The systems were new, the jargon was new, and every day I broke a new unwritten rule. At NSF everybody has a job to perform, and the system works when you delegate work according to the job descriptions. Sometimes that meant waiting what seemed like an unreasonable amount of time to get a simple job done that I could have completed in a matter of minutes. It was really hard for me to learn to delegate and wait.

I now realize and tell PIs that program directors are "you." For the most part program directors are your peers who understand the academic and financial constraints within which you work. Program directors want to fund all the exciting, risky projects, especially those that open up new areas of research. Program directors agonize when budgetary limitations force them to differentiate among potentially good projects as opposed to funding them all.



## PROGRAM DIRECTOR SPOTLIGHT

Learn more about Dr. Debro (cont.)

### 4 What were the personal goals you most wanted to accomplish while at the NSF? Did you achieve these goals? If not, then why?

I wanted to continue to develop professionally and energize my career. I believe that being at NSF moved me from my comfort zone and guided me in working harder to bring research opportunities into the undergraduate teaching laboratories and in developing alternative teaching strategies that engage students more in the classroom.

### 5 What surprised you most about working at NSF?

I was surprised to discover how much I missed working directly with students – especially their personalities, their curiosities, and their energy levels. It is quiet at NSF and essentially, you work with professionals, electronic files, and documents. It took a while to become accustomed to working all day with no interruptions from students.

### 6 What were the challenges to serving as a rotator?

The challenges for me were more personal than professional. As much as I enjoyed being in the nation's capital, I missed my family. The pictures on the wall were not a good substitute for the laughter, conversation, eating, joking, hugs, and kisses that we share when all 19 of my children, children-in-law, and grandchildren gather under one roof. While everybody in the family visited, they never visited at the same time.

### 7 What was most rewarding about serving as a rotator?

I met, worked with, and established professional relationships with a fantastic group of scientists who are experts in diverse areas.

As a representative from the Directorate for Biological Sciences on the NSF-wide Undergraduate Biology Education Working Group, I had the opportunity to participate in planning and organizing for the first “Vision and Change in Undergraduate Biology Education Conference.” It was amazing to watch the conference come together from a collection of conversations and meetings that were held across the nation and at NSF to a dynamic conference that is modeling the framework for undergraduate biology for students of today.

### 8 What would you tell someone who is thinking about serving as a program director at NSF?

Working at NSF is a wonderful experience. While working with a cooperative team of wonderful, supportive people, I established professional relationships with some of the top scientists in the nation and the relationships have continued.

### 9 When your friends/colleagues find out that you worked at NSF, what do they say or ask?

Of course, the main questions of concern are “What kinds of research projects are getting funded?” and “What can I do to get my project funded?” When I returned to my home institution, I, in conjunction with another former program director in the region, gave a series of presentations on “An Insider’s Perspective of the National Science Foundation.” My colleagues continue to seek my help with review of their projects..

### 10 Is there anything else you would like to share with the readers?

I continue to check the progress of the PIs whom I funded and whenever it is appropriate I include their research results in my classes. Peeping into the future of biology through the lens of NSF is an exciting experience!

## PROGRAM DIRECTOR FLASHBACK

### Meet Dr. Wendy Boss!



Dr. Boss was a program director in the Networks and Regulation cluster, which has since changed in name and description to reflect the new cluster's scope and priorities for funding. The cluster name is now Systems and Synthetic Biology. Dr. Boss served as an Intergovernmental Personnel Act (IPA) assignee at the NSF from July 2011 through December 2012.

### Learn more about Dr. Boss...

#### 1 What were you doing before you came to the NSF? Did you return to the same position?

I was a professor at North Carolina State University before coming to NSF. I taught undergraduate and graduate lectures and labs, established a research program, and did my best to share with students and colleagues my enthusiasm for science in general and more specifically for understanding how organisms sense and respond to their environmental cues. I returned to that position with the intention of retiring in six months and I did. I am now an emerita professor.

#### 2 What attracted you to work for NSF?

NSF supported the research and training for my group for over 25 years. I was nearing retirement, and I felt it was time to pay back. It is extremely difficult to obtain funding for research these days and I wanted the opportunity to help younger investigators "break into the system." Finally, my personal situation was such that the timing was perfect. My spouse had retired and could go with me to D.C.

#### 3 What was your first impression of NSF? Has this impression changed since serving as a rotator? If so, then how?

My impression was that the Division was seeking exciting research to fund and was working to secure funds within NSF to do this. This did not change, but

I had anticipated that there would be more time to discuss research and cutting edge concepts. As a new rotator you are quickly caught up in the everyday functions and have less time to interact with individual researchers or research groups.

#### 4 What were the personal goals you most wanted to accomplish while at the NSF? Did you achieve these goals? If not, then why?

I wanted to fund some exciting research and to try to help younger faculty be competitive for funding.

Yes and no. There is a limited amount of money for research. The Division of Molecular and Cellular Biology was in a transition towards more theory driven research. It takes time for PIs to retool and retrain. Some PIs listened and bought into the changes and others didn't seem to grasp the vision or make it their own. I think the secret to continued success in science is to keep moving forward, embracing new ideas and reshaping them into your own creative initiatives.



## PROGRAM DIRECTOR FLASHBACK

Learn more about Dr. Boss (cont.)

### 5 What surprised you most about working at NSF?

It did not surprise me but rather impressed me that the program directors make a sincere effort and spend a significant amount of time trying to find the best panel to review the proposals that are submitted. As a PI you are often so wrapped up in the specifics of your research that it is difficult to see the bigger picture. I learned the importance of listening to your program director. If you find the panel did not completely “appreciate” your ideas, then it is time to rethink what you are doing or write the proposal for a different audience.

### 6 What were the challenges to serving as a rotator?

At first you are overwhelmed by the jargon and rapid pace of arranging and running panels. You are the “student” again but the staff is great and many of the permanent program directors will take the time to train you. Finding panelists to serve on panels was also a challenge. NSF would not exist without the research community and I think more PIs need to realize that it is “their” NSF and they should volunteer to be a more active partner.

### 7 What was most rewarding about serving as a rotator?

The most rewarding part was funding exciting research. Also, I appreciated getting to know people on the panels, other program directors and gaining insights into the NSF culture. As a faculty member you lead a team. At NSF you are part of the team and it gives you a different perspective. It is a learning experience, and with regard to management, people skills etc., being a program director goes beyond what most faculty are exposed to. You learn how to run a team effectively and equitably, and your efforts are appreciated. This type of job training and the acknowledgement for a job well done are not found in most academic positions.

### 8 What would you tell someone who is thinking about serving as a program director at NSF?

Before you apply to be a program director, serve on panels, and most importantly, get to know the permanent program directors you will be working with. It is important to understand how the program works and what is valued. You will have to justify any funding decisions you make and understanding how others on your team think and evaluate science is important.

NSF needs the fresh ideas and perspectives that rotators bring to the system. You are NSF.

Finally, if you are in a position where you are considering retirement and know you aren’t going to be applying for more grants, it is rewarding and stimulating to participate at this level. Because I was anticipating retiring, I had a sense of independence that I might not have felt as an active PI. In addition, my research was slowing down so that I could meet my commitments and still enjoy D.C. My impression from observing other rotators was that it is challenging to maintain an active program while serving at NSF, but they were younger and seemed to do just fine multitasking.

### 9 When your friends/colleagues find out that you worked at NSF, what do they say or ask?

When I was a program director at NSF, many colleagues reacted as I would have. I was perceived as someone who could potentially fund their research. They would tell me about their research, ask about funding options, and ask me what types of research we were funding.



## PROGRAM DIRECTOR FLASHBACK

Learn more about Dr. Boss (cont.)

### 10 Would you like to share anything else with our readers?

There are several insights I would like to share:

When you are beginning to write a proposal, spend 90% of your time thinking about the fundamental question you are going to address. Step back from the bench and think about questions that will provide major insights and advance the field or create new fields of research. Discuss your ideas with critical colleagues who will challenge and motivate you; only then should you begin writing.

You should get to know your program director. Do your homework and find the best program for the research question you want to ask. Read correspondence from NSF as well as the program descriptions on the web, serve on panels, and read the abstracts of what is being funded. Go to meetings, network, and collaborate to find complementary skills that

you need to take your research to the next level and make it competitive. Listen carefully to what your program director tells you. If you have a sense that your research does not fit into any existing programs, it probably doesn't, and you should rethink the question you are asking, look for another funding source, or refocus your research.

NSF will fund high risk research. This means a creative idea that has the potential to open up a new area of research. You need to provide enough of a logical argument (based on literature and/or data) to justify the risk.

To help prepare your students, spend more time having them think up their own research projects and training them to use logic and reasoning to justify their ideas to faculty teams. If they can't get faculty excited about what questions they want to ask, they will have trouble obtaining funding and being successful in either academics or industry.



## JOIN THE NSF TEAM

Become an NSF rotator and you'll be in a prime position to influence new directions in the fields of science, technology, and education! Oversee NSF's "gold standard" merit review process and make recommendations about which proposals to fund. Interact with potential collaborators, develop leadership skills and gain a more multi-disciplinary scope, all while continuing your own research at your home institution.

To learn more about the responsibilities and benefits of an NSF rotator, please visit:

[http://www.nsf.gov/about/career\\_opps/rotators/index.jsp](http://www.nsf.gov/about/career_opps/rotators/index.jsp)



## MCB SUPPORTS STUDENTS

### Pathways Program



The Pathways Program in the federal government is designed to provide current students and recent graduates with the opportunity to explore federal careers. The participants gain valuable work experience while learning how both the federal government and NSF operate. Students in the Program can choose to work part-time or full time while enrolled in school.

### Meet Program Assistant Claudia Garcia

#### 1 How long have you worked at NSF, and what do you do?

I came to NSF through the Pathways Program in February 2013. I work as a program assistant for the Molecular Biophysics cluster where I provide administrative support. I assist four program directors with the approval proposal cycle, which includes compliance checking, panel set up and award distribution.

#### 2 What attracted you to work for NSF?

When I first started to look for a new job, I was looking for something in the government sector that would allow me to work and continue with my studies

in accounting and information systems. After doing a search for open positions in the government, I found the Pathways Program at NSF. I liked that this program would allow me the flexibility needed with my school schedule. I also liked that NSF promotes science across the nation, keeping the United States at the leading edge of discovery. That made me want to be part of this agency.

#### 3 What do you like about working at NSF?

What I like the most about working at NSF are the people I work with. In the short time that I have been working here, I have been able to make friends that always are able to turn a bad day into a good one.

For more information on the Pathways Program, please visit:

<http://www.opm.gov/policy-data-oversight/hiring-authorities/students-recent-graduates/> and  
<http://www.nsf.gov/careers/careertypes/pathways.jsp>



## SUMMER SCHOLAR INTERNS

NSF's Summer Scholars Internship Program (SSIP) is designed to develop undergraduate and graduate student potential through exposure to relevant science and engineering policy, research and education issues and programs. The students come to NSF for a ten-week summer experience to work in an office that aligns with the students' academic interests.

**It was a pleasure for MCB to host three wonderful summer interns through SSIP!**



### **Andrew Candelaria**

#### **Hispanic Association of Colleges and Universities (HACU) Summer Scholar Intern**

Andrew's internship focused on broadening participation initiatives with an emphasis on Hispanic serving institutes (HSI) and programs that contribute to the success of Hispanics in STEM



### **Justin Kaye**

#### **Washington Internships for Native Students (WINS) Summer Scholar Intern**

Justin's internship focused on partnership development and outreach to Tribal Colleges in an effort to increase the participation of faculty and students from Tribal Colleges in STEM programs.



### **Nicklas Sapp**

#### **Quality Education for Minorities Network (QEM) Summer Scholar Intern**

Nicklas' internship focused on developing a tool for tracking and categorization of different types of broader impact activities in proposals quickly and easily.

For more information on the Summer Scholars Internship Program, please contact Sherrie Green, Program Manager, at [sbgreen@nsf.gov](mailto:sbgreen@nsf.gov) or visit: <http://www.nsf.gov/od/iaa/activities/interns/index.jsp>



## MCB AT YOUR FINGERTIPS

MCB would be delighted to visit your institution for either virtual or in-person outreach. Outreach provides the community an opportunity to converse with NSF program directors. We recognize the importance of beneficial dialogue, so we encourage you to communicate with your program director about outreach, program opportunities, proposal preparation and the merit review process.



## FIND US AT A MEETING NEAR YOU!

### **American Society for Biochemistry and Molecular Biology Annual Meeting**

April 26–30, 2014  
San Diego, California

### **American Society for Microbiology, 114th General Meeting**

May 17–20, 2014  
Boston, Massachusetts

### **Plant Biology 2014**

July 12–16, 2014  
Portland, Oregon



## PROGRAM DIRECTOR HIGHLIGHTS

Program directors make numerous outreach presentations at meetings and to diverse institutions across the country. The outreach presentations aim to increase the community's participation and success in NSF programs by educating the science community on grant writing, funding opportunities and the mission of NSF.



### **Michele McGuirl**

participated in a virtual roundtable discussion of Broader Impacts and gave a virtual presentation on MCB and life science programs at the NSF for the University of Montana.



### **Karen Cone**

discussed funding opportunities in plant biology at the American Society of Plant Biologists meeting, July 20-24, 2013 and gave a presentation on Communicating Broader Impacts at a Career Symposium on Science Outreach and Communication sponsored by the American Society for Biochemistry and Molecular Biology at the University of Missouri, September 21, 2013.



### **Susanne von Bodman**

presented an overview of NSF and NSF programs and discussed interdisciplinary education and research at the American Society for Microbiology Conference for Undergraduate Educators, May 16-19, 2013.



### **David Rockcliffe and Susannah Gal**

discussed funding opportunities and the proposal-submission and review processes at the American Society for Biochemistry and Molecular Biology Minority Affairs Committee mentoring and grant-writing workshop, June 27, 2013.





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## QUESTIONS FOR YOU

- 1 One of the challenging aspects of handling proposal reviews for program directors is recruiting panelists and ad hoc reviewers. Do you think principal investigators (PIs) who have received MCB funding should have an obligation to review for MCB?
- 2 What do you want to know about interpreting your panel summary and reviews?
- 3 NSF requests information on the gender, race, ethnicity and disability status of individuals named as PIs/co-PIs on proposals and awards. Submission of this information is voluntary but it helps the NSF to provide equal opportunities for participation in its programs and promote the full use of the nation's research and engineering resources.

If you have chosen not to complete the Principal Investigator Information page of the proposal (i.e. information about principal investigators, project directors and co-principal investigators), why not?

- 4 Are you or someone you know involved in citizen science? MCB would like to know more about what the community is doing that engages the general public in scientific research activities.

We appreciate all feedback. Please send responses to [mcbnews@nsf.gov](mailto:mcbnews@nsf.gov) with "MCB Newsletter" in the subject line.



## MCB SPECIAL ANNOUNCEMENTS

NSF has issued a new CAREER program solicitation ([NSF 14-532](#)).



## WE WANT TO HEAR FROM YOU!

MCB News welcomes comments on topics covered in the newsletter and on topics of interest to the Division. Please contact your program director with questions and/or ideas. The best way to contact a program director is via email - many questions can be answered most quickly and effectively this way.

If you have a more complicated issue that requires a phone conversation, or would just like to speak by phone, please indicate this in your email and a program director will contact you. In any event, please include a phone number in your email.



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Please note that the information in this newsletter is current at the time of publication.  
See program website for any updates or revisions: <http://www.nsf.gov/bio/mcb/about.jsp>

