

National Science Foundation  
Directorate for Biological Sciences

**Advisory Committee Meeting**  
**April 25-26, 2016**  
**Room 1235**

**Summary Minutes**

**BIO AC Members in Attendance:**

Dr. Katherine L. Gross, Chair	Dr. Hannah V. Carey	Dr. Wilfredo Colón
Dr. Greg Florant	Dr. Steve A. N. Goldstein	Dr. Stephanie Hampton
Dr. Elizabeth A. Kellogg	Dr. Susan Marqusee	Dr. Margaret McFall-Ngai
Dr. Randy J. Nelson	Dr. Stacia A. Sower	Dr. Joan E. Strassmann
Dr. Paul E. Turner	Dr. Brett Tyler	

**BIO AC Members attending via telephone:**

Drs. May Berenbaum and Richard McCombie

**BIO AC Members not in attendance:**

Drs. Dominic Poccia and Michael Purugganan

**Monday, April 25, 2016**

8:32AM: Dr. Katherine L. Gross, Advisory Committee chair, convened the meeting by welcoming BIO AC members, NSF staff, and guests and requesting introductions.

The summary minutes from the September 2015 BIO AC meeting were approved.

Dr. Gross reviewed the meeting agenda.

**Budget Request (FY17) – James L. Olds, Assistant Director, Directorate for Biological Sciences**

Dr. Olds summarized the BIO FY 2017 Congressional Budget Request and discussed the breakdown of the request across the Directorate and the Foundation. Major investments remained focused around the *Five Grand Challenges for 21<sup>st</sup> Century Biology*. These include Understanding the Brain (UtB), Synthetic Biology, the National Ecological Observatory Network (NEON), Research at the Intersection of Biology, Math & Physical Sciences (BIOMaPS) and Innovations at the Nexus of Food and Water (INFEWS). Dr. Olds stated that increasing investments in Emerging Frontiers will support some of these activities, and he described a new initiative supporting research training grants, and detailed some of the BIOData activities.

The Advisory Committee discussed the goals and design of the research training grant initiative and the future of biological collections.

**Collections in Support of Biological Research – James L. Olds**

Dr. Olds conveyed that the interruption to the Collections program was done to allow time to assess the program, evaluate its future, and look for entrepreneurial opportunities and/or partnerships for

the activity. BIO will consider proposals for emergency collection support this year on an *ad hoc* basis while it evaluates the current biennial program.

The Advisory Committee discussed how the break could impact the community and the potential effects on research. Members provided some recommendations for the program moving forward.

### **BIO 2016 Leading Edge Presentations – Rules of Life**

#### ***Division of Molecular and Cellular Biosciences – Dr. Richard Cyr, Program Officer***

Dr. Cyr's presentation focused on how molecular and cellular bioscience approach can be used to understand the rules of life and the emerging field of synthetic biology. He briefly described two research projects that employed engineering derived traits. One project used theoretical physics principles to understand biological self-organization, and the other used cytokinetics and the Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) technology.

#### ***Division of Integrative Organismal Systems – Dr. Michael Mishkind, Program Officer***

Dr. Mishkind focused on two leading edge areas: 1) genomics & epigenomics, and 2) the microbiome. A review of the microbiome was presented, and a discussion followed regarding the potential of combining epigenetics and microbiome research.

#### ***Division of Environmental Biology – Dr. Leslie J. Rissler, Program Officer***

Dr. Rissler's presentation covered approaches to understanding the rules of life supported by DEB: 1) genetic variation as the ultimate source of biological diversity; 2) environmental variation as a selective force on genetic variation; and 3) feedbacks that occur between genetic and environmental variation. Dr. Rissler posited that the Division of Environmental Biology (DEB) is a link between the micro and macro scales in ecology and evolution because DEB supports predictive genome to phenome research in the context of environmental feedbacks and evolutionary diversification.

#### ***Division of Biological Infrastructure – Dr. Jennifer W. Weller, Program Officer***

Dr. Weller presented multiple activities within the Division of Biological Infrastructure (DBI). DBI supports research tools, centers and collections, infrastructure, and education research fellowships. DBI's connections to the rules of life were demonstrated by their support of living stocks, instrumentation, and shared data platforms and modeling. Dr. Weller also discussed how various infrastructure projects have implemented sustainability plans.

The Advisory Committee and DBI program officers discussed steps moving forward in terms of sustainability in cyberinfrastructure, both in biological sciences and across other disciplines at NSF.

The Advisory Committee engaged in a discussion following the presentations, topics included:

- The role of the genomes to phenomes concept in the rules of life
- The role of genomes to phenomes concept in messaging the general public
- How well the divisions represent the different sciences, especially at the interfaces
- The emerging potential of synthetic biology
- The effectiveness of programs in expanding graduate education

### **BIO Portfolio Analysis – Dr. Brent Miller, Science Advisor, Directorate for Biological Sciences**

Dr. Miller described the application of a new experimental text clustering engine to the NSF proposal portfolio. The tool organizes awards into themes and topics. The tool can also produce concept networks and will allow tracking of the prevalence of themes and topics over time. The new tool is flexible and it shows promise in helping understand funding patterns. One drawback is that data prior to 2007 cannot be analyzed because of a lack of digitization.

Committee members discussed how this tool could be used to find relationships among apparently unrelated sciences, identify natural emerging patterns among research themes and topics, and aid Program Directors in real time portfolio analysis across the Directorate and the Foundation. Dr. Miller emphasized that a human analysis component was crucial to properly interpreting the tool's output, as the tool provides a large range of options for processing data.

### **BIO AC Sub-committee for the Strategic Vision for the Biological Sciences – Dr. Steve A. N. Goldstein**

Dr. Goldstein reported on the progress of the sub-committee organized by Dr. Olds and the Advisory Committee Chair Dr. Gross to develop a strategic vision for BIO. The sub-committee, co-chaired by Drs. Gross and Goldstein, has met monthly by WebEx and met in-person on Sunday, April 24. Dr. Goldstein reported that the sub-committee's preliminary discussions map well to this meeting's Leading Edge presentations. BIO appears to be well positioned to lead many areas at the interdisciplinary edges. Dr. Goldstein reported on many reoccurring themes covered in the sub-committee's discussions, such as system responses in the context of evolution, our ability to use data that spans biological scales, and training future scientists.

Dr. Goldstein reported that due to the complexity and breadth of the subcommittee's discussions the subcommittee requested the help of a consultant. Dr. Goldstein summarized the discussions between the subcommittee and the consultant, and elaborated on the tentative plans for outreach to the community. Discussion ensued regarding several aspects of soliciting concept pieces from the community.

### **Graduate Research Training Grants in Biology**

Dr. Charles Liarakos, Senior Advisor of Directorate for Biological Sciences, reported on a new planned solicitation for research training grants. The training grants are designed to advance science and engineering research, and build an effective model of graduate education and workforce development. The solicitation will be linked to the National Science Foundation Research Traineeship Program (NRT).

### **Preparation for Visit with the NSF Director**

The Advisory Committee discussed several topics of discussion for their meeting with NSF Director Dr. France Córdova.

### **Open Discussion**

Dr. Gross asked for ideas and suggestions on regularizing future meeting dates.

The Chair adjourned the meeting at 4:20pm.

## **Tuesday, April 26, 2016**

The Chair reconvened the meeting at 9:00AM.

Dr. Gross summarized the list of topics to be brought up with Dr. Córdova that the AC had discussed the previous day and assigned various AC members to lead the discussion.

The BIO AC recognized the contributions of two former BIO staff members. Ms. Sonya Mallinoff, former Senior Advisor in BIO, who retired on April 1, 2016 after 45 years of service at NSF. There was also a slide presentation and tribute to former MCB Program Director Dr. Kamal Shukla, who passed away in February.

### **NEON Update – Dr. James. L. Olds, Assistant Director**

Dr. Olds reported on updates to the NEON project since the last BIO Advisory Committee (BIO AC) meeting. There has been a change in the management of National Ecological Observatory Network (NEON) to Battelle Memorial Institute, headquartered in Columbus, Ohio. Battelle has extensive experience and is known for the quality of their management practices and experience working on large projects. On April 8, 2016, the NEON board resigned and was replaced with three board members from Battelle who took full control. Battelle Ecology, a subsidiary of Battelle Memorial Institute, replaced NEON, Inc. and will manage NEON day-to-day operations. Dr. Olds stated that the report from the sub-committee formed by the BIO AC and led by Dr. Stephanie Hampton was pivotal in moving the NEON project forward.

Dr. Olds also provided updates on several internal management changes related to NEON. Responsibility for the NEON program has moved from the Office of the Assistant Director into the Centers and Other Mid to Large Scale Infrastructure Cluster in the Division of Biological Infrastructure, where there is expertise in project management. The NSF internal communications Science Engagement Working Group (SEWG), consisting of program officers from across BIO, is coordinating with the NEON program.

Dr. Olds reported that there were 53 proposals submissions in response to the MacroSystems Biology program's latest solicitation, and eight proposals were in the early NEON track. Additionally, a NEON Workshop was held at the Smithsonian Institute to reengage the research community stakeholders. Dr. Hampton reported that the workshop was extremely positive and all participants were enthusiastic and engaged.

Dr. Caitlin Schrein, Science Writer in BIO, reported that there is a new NSF NEON website that will provide updates on NEON, including management-related changes. Dr. Schrein will be coordinating with Battelle on press releases.

The Advisory Committee members discussed opportunities in terms of NEON and cyberinfrastructure, standardizing and automating data, linking collections with NEON, and long-term funding plans.

### **Visit with Dr. France Córdova, Director, NSF**

Dr. Córdova and the Advisory Committee discussed the following topics: the excitement within the BIO AC and their desire to help develop avenues for supporting the rules of life focus within BIO; the sub-committee's progress in developing a strategic vision document for BIO; the community's reaction to activities taking place in the Collections in Support of Biological Research program; cyberinfrastructure; NEON; career development for undergraduate and graduate students; and how to increase interdisciplinary and transdisciplinary efforts.

## **Wrap-Up**

Dr. Gross requested future meetings to be regularized in October and April, preferably to a set week in those months.

The sub-committee co-chairs Drs. Gross and Goldstein will inform the Advisory Committee on their next steps. The members were encouraged to write down names of colleagues who might have potential ideas and societies that may be good partners for informing the development of BIO AC vision for biology.

The Chair adjourned the meeting at 12:09pm.