

**National Science Foundation
Directorate for Biological Sciences**

**BIO ADVISORY COMMITTEE
Room 1235 Stafford I
April 19, 2007**

Summary Minutes

Welcome and Approval of Minutes

Dr. Michael Mares, Chair of the Advisory Committee for Biological Sciences (BIO AC), convened the Spring 2006 meeting at 8:00 am with a welcome to the members and guests. Dr. Mares noted that all of the members were in attendance. Dr. James P. Collins, Assistant Director for the Biological Sciences (BIO) greeted the BIO AC and asked the AC members to introduce themselves. The minutes for the November 2006 meeting were unanimously approved by the Committee.

Update on Budget and its Implications: *Dr. James P. Collins, Assistant Director, BIO*

Dr. Collins presented an overview of the BIO directorate's mission and its relation to programmatic themes within the context of the National Science Foundation (NSF), the American Competitiveness Initiative (ACI), and the National Science Board's (NSB) 2020 Vision. NSF is on track to meet the goal of doubling its budget within the decade. The congressionally approved FY2007 NSF budget allocation reflects the ACI's emphasis on core research in the areas of education and physical sciences. Dr. Collins stressed this point while discussing the disparity between the foundation-wide 7.5% increase as compared to the 6.0% increase in the BIO directorate. The recently submitted budget request for FY2008, requesting a 4.1% increase for BIO, was based on NSF's continuing commitment to stimulating innovation through both core and transformational research, broadening participation, and investing in the future of science.

The BIO AC discussed:

- Concerns that inflation rates negate the low budgetary increase for BIO
- How success rates are impacted by budgetary distribution throughout NSF – specifically, how can BIO expect to increase the success rate to ~25% if funding remains relatively flat?
- Increasing success rates for BIO in light of ACI recommendations
- Resubmission frustrations; burdening the reviewing community by requesting reviews for the same proposal multiple times.
- Collaborating with other directorates to support integrated programs and transformative research

Presentations on Systems Biology

Dr. Kevin White, Professor of Genetics and Human Ecology & Evolution, University of Chicago

Dr. White discussed the varying definitions of systems biology, emphasizing that its understanding stems from multiple interactions among groups of researchers with integrated specialties. Those working in this field have the ability to reduce the dimensionality and predict the behavior of complex systems. However, because it is such a broad-based discipline that can be applied to a varying array of problems, the need for experimental and informatics infrastructure, coupled with necessary computational and statistical analysis tools is critical.

Dr. Don DeAngelis, Professor of Mathematical and Theoretical Biology, University of Miami

Dr. DeAngelis spoke about the differing definitions and the intrinsic differences of systems ecology in the context of biology as a whole. He underscored the idea that ecological systems cannot be experimented upon. Scientists can, however, use modeling to find generalized patterns within ecological networks to make predictions about systems.

Dr. Ian Couzin, Professor of Ecology & Evolution, Princeton University

Dr. Couzin discussed the integration of systems biology in both laboratory and field experiments, specifically focusing on animal interactions. He stressed that animal groups present a novel way to explore systems biology because of parallels in interactions between each other and their environment. By examining individual interactions, inferences can be drawn about collective properties of a group.

Dr. Gloria Coruzzi, Department Chair of Biology, New York University

Dr. Coruzzi talked about systems biology within the context of plant systems. She linked gene networks with the function of plant metabolism and development. Her example of *Arabidopsis* experiments highlighted the effectiveness of applying broad-based integrative approaches to systems biology.

Dr. Penny Firth, Division Director of Evolutionary Biology, NSF

Dr. Firth spoke about the need for sustainability science and how systems biology fits within this framework. She framed the following questions for further consideration by the AC:

- How do biological systems create, test, and maintain adaptive capacity?
- How do we identify and assess critical thresholds, state changes, cross-scale feedbacks, and inertia of a system?
- How do adaptive organisms influence resilience and robustness of a system?
- How is novelty admitted to a system?

The BIO AC discussed:

- How to encourage more aggressive interaction and integration among scientists of varying disciplines, including within and beyond biology
- How to foster communication to share experiences
- The importance of teaching students statistical methods for evaluating biological principles and creating enthusiasm for this discipline
- The relative values of a more integrated education versus a more specialized one – Does expertise get lost?
- The collaborative nature of a systems biology program and the merits of housing it in the office of Emerging Frontiers

Discussion with Dr. Arden Bement, Director of NSF, and Dr. Kathie Olsen, Deputy Director of NSF

Dr. Bement opened the discussion with comments on the FY2008 budget. He commented that the FY2007 budget request received full funding. Dr. Bement expressed optimism with regard to meeting the goal of doubling NSF's budget within 10 years as well as the new Compete America Bill, which prescribes more funding for science education. He had concerns about the need for NSF to maintain its autonomy in light of possible upcoming governmental shifts in administration.

The BIO AC and Drs. Bement and Olsen discussed:

- Success rates – with further discussion anticipated after Autumn IPAMM presentation to the BIO AC
- Concerns over stressing the reviewing community with resubmitted proposals, a direct result of low success rates
- Ways in which the NSF is trying to maintain the gold standard of the merit review process in light of budgetary matters
- How the budget takes into account interdisciplinary, cross-directorate programs
- Education initiatives for K-12

Progress Report for Joint BIO-EHR Advisory Committee Meeting

The summary report from the joint BIO-EHR session, which took place during the last AC meeting, highlighted the need for continued effort to emphasize science in K-12 classrooms as well as undergraduate education. Current joint initiatives include a set of informal conversations as well as a formal workshop highlighting “vision and change.” Additionally, the research and teaching coordination networks (RTCN) were discussed; they will provide new grant opportunities for research, education and practice.

The BIO AC discussed:

- Specifics regarding RTCN groups and their parallels to already-functioning RCNs.
- Undergraduate infrastructure and changing initiatives, specifically with an emphasis on assessing research at an undergraduate level
- Workshop involvement – who might be involved, including community college representatives, post-docs, those with CAREER awards, representatives from small LAS schools, and those with education awards
- Articulating an outcome for the “vision and change” workshop – How will undergrad education be different ten years from now? What can be, and needs to be, changed and how do we get there?
- The need to formulate further questions to address at the workshop

Reports

CEOSE Report, Dr. Muriel Poston, CEOSE liaison to the BIO AC

Dr. Poston discussed the outcomes of the June workshop, which had representatives from other government agencies including, but not limited to: NASA, NOAA, NIH, DOE, etc. Particular points discussed included:

- Assessment of impact and accountability with regards to broadening participation
- Call to assess the outcome of programs and investments in broadening participation and transformative research
- The need to ensure that annual reports from funded projects specifically address broadening participation activities and progress
- The next meeting is scheduled for June
- There will be a mini-symposium addressing concerns for the disabled community in October

Environmental Research and Education, *Dr. Joseph Travis*

Dr. Travis talked about the advancements in ERE, the cross-directorate AC which involves initiatives in environmental research and education. Specifics included:

- Efforts to identify areas of new knowledge and research
- The recently signed memorandum to continue the coupled natural and human systems program
- The workshop report, which specifically emphasized giving PIs better resources and ideas to aid in broadening participation efforts
- Integrating social sciences policy with natural sciences policy, focusing on interdisciplinary environmental education
- NSF's role in promoting sustainability

Around the Table Comments:

- Semantics of beginning a program in systems biology, including phrasing and definitions as well as possible program names
- BIO's unique public affairs strategy which includes philanthropy initiatives and funding for new multidisciplinary and collaborative research.
- Progress in the education agenda – fighting a battle “big enough to matter, but small enough to win”
- Need to bring in new topics for discussion with Arden Bement, specific to BIO
- Approval of the short presentations and single-day format
- Request to hear about projects in systems biology that couldn't be funded by NSF
- The next meeting, scheduled for October 18-19

The Spring Advisory Committee meeting was adjourned at 5:00 pm.

APPROVED:

Michael Mares, Chair

Date