National Science Foundation
Directorate for Biological Sciences

BIO ADVISORY COMMITTEE
Room 1235 Stafford I
April 17, 2008

Summary Minutes

Welcome and Approval of Minutes

Dr. Michael Mares, Chair of the Advisory Committee for Biological Sciences (BIO AC), convened the Spring 2008 meeting at 8:30 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 October 2007 meeting were unanimously approved by the Committee.

"Life in Transition" *Dr. James P. Collins, Assistant Director, BIO*

Dr. Collins began by reporting that NSF currently supports 67% of federal non-medical research. This is accomplished through the NSF's continuing mission to support the core sciences, including biology, and keeps the U.S. in-line with the strategic goals of the American Competitiveness Initiative (ACI). Noting the breakdown of BIO's budget by division, Dr. Collins highlighted the budget request for 2009. He then spoke about the continuing efforts to promote BIO's vision by strengthening core research in the areas of "origin, energy, and adaptation." Funding priorities will aim to support these areas through studies of the dynamics of water processes in the environment and adaptive systems technology. Additionally, new avenues of research may include synthetic biology, which explores the indispensable requirements for life and the symbiotic nature of cellular, organismal and ecological systems in the wake of climate transition and responsive adaptation. Dr. Collins highlighted research plans for the National Ecological Observatory Network (NEON) which aims to explore and analyze biological phenomena on a continental scale. With NEON and linked research, scientists will be able to close the loop of theory, observation, experimentation, and technology through observations of systems biology. Via this forward-thinking vision BIO will continue to be at the intersection of the physical and life sciences, on the cutting edge of transdisciplinary research.

The BIO AC discussed:

- Specifics regarding the Implications of Proposal and Award Management Mechanisms (IPAMM) Final Report (August, 2007)
    - Success rates, resubmissions, proposal/PI ratio
- The unintended consequences of environmentalism
    - Biofuels and, consequently, the clear cutting of forests for cropland
    - Increased costs for foodstuffs that use corn products
    - How NSF facilities and research will evaluate these issues

"Biological Sciences in the Federal R&D Portfolio" *Kei Koizumi, AAAS Program Director*

Dr. Koizumi presented a quick breakdown of the 2009 federal budget and the appropriations for science research. Though the President's $3.1 trillion budget proposal for FY09 calls for flat-funding or possibly cutting some domestic programs, supporting the physical sciences remains a top priority. The ACI and the America Competes Act, signed in August of 2007, both call for maintaining the forefront of scientific research and bolstering educational efforts in math and science to keep the U.S. on the forefront of emerging technologies. The current plan, to double the NSF budget over the next 7-10 years, remains a priority despite recent budgetary setbacks. If approved, the NSF's 10.9% request increase for FY09 will keep it on track with this budgetary goal.

American Institute of Biological Sciences (AIBS) Presentation
Dr. Richard O-Grady, Executive Director, & Dr. Robert Gropp, Director of Public Policy

This overview of AIBS gave a brief history and breakdown of the organization and their efforts to promote and inform in areas of research, education, and public policy. Areas of focus included:

- Federal Science Policy, specifically in regards to NSF, USGS, USDA, EPA, and NOAA
- Communication between researchers, Congress, and the public
- Advocacy for new initiatives addressing worldwide science issues such as climate change

Federation of American Societies for Experimental Biology Presentation (FASEB)
Howard Garrison, Deputy Executive Director for Public Policy

This summary presentation of FASEB gave an overview of the organization and highlighted three key points:

- How FASEB describes and represents biology with respect to science policy
- Metrics for determining FASEB's effectiveness
- Providing public policy advocacy for the new administration and the next Congress

The BIO AC discussed:

- The need for agency cooperation and collaboration not despite, but in light of the budget
- Candidates' stance of science policy, especially in terms of non-health life sciences
    - AAAS has some info on their website, however there is no lobbying effort to solicit this information
- Difficulty in making a compelling case for research that doesn't directly impact humans and the importance of linking basic research to possible advances that may have an effect on human well-being.
- Promoting science in political debates and expanding science topics and literacy to politicians
    - There exist several standing monthly meetings, sponsored through various organizations that seek to promote science topics on the Hill
        - The problem is that the audience is self-selecting and these meetings may not be publicized enough to target the desired audience
- The administrative turnover, focusing on the means rather than the ends

- Drivers of science education, including cross-disciplinary problems for expanding BIO in the 21st century
    - Distinguishing between sciences that deal with doctrine and those that deal with complexity.
    - Changing teaching/learning strategies on an institutional scale to provide skill sets for success when facing unknown challenges

Leading Edge Presentations

Synthetic Biology - *Dr. Pat Dennis, Program Director, presenting on behalf of MCB*
Systems Biology - *Dr. Steve de Belle, Program Director, presenting on behalf of IOS*
Climate Change - *Dr. Dan Childers, Program Director, presenting on behalf of DEB*
Ballistospores - *Dr. Mary Chamberlin, Program Director, presenting on behalf of EF*
Dark Data - *Dr. Bryan Heidorn, Program Director, presenting on behalf of DBI*

The BIO AC discussed:

- Ethical implications of creating synthetic organisms
    - Need to be mindful of public concern
- Amount of proposals that utilize synthetic biology in some form or another
    - At least 10-15%, possibly more
    - Synthetic biology is being used as a tool to evaluate functional components
- Cross-directorate funding opportunities
- Climate change research in BIO involving arctic regions, collaborating with OPP
- Data acquisition and universal distribution
    - Maintenance of collections and electronic transcription of archives
- How leading edge research can impact agenda items for the administration transition
- Creating productive models of sustainability, continuing transdisciplinary pathways

"The Promise and Problems of the NRC Theory Report: Complexity in Engineered and Biological Systems" *Dr. John Doyle, California Institute of Technology*

Dr. Doyle's elaborate presentation highlighted the need for the scientific community to recognize the fragility of robust architecture. That is, the architecture provides constraints to a system, but it's important to distinguish the "constraints that deconstrain." Though the NRC Theory report used some excellent examples of how theory works, Dr. Doyle asserted that it didn't build bridges or connect theory to all of the applicable areas of science and technology as well as it could have. He highlighted the need to facilitate communication through transdisciplinary science and by creating networks.

Undergraduate Biology Education Presentation *Dr. Penny Firth, Program Director BIO/DEB*

Dr. Firth noted the ongoing effort between the Education and Human Resources (EHR) Directorate and the Directorate for Biological Sciences to address the necessity for undergrad science education reform. On that note, she requested names of individuals to invite to an upcoming symposium to discuss strategies for change. Suggested attendees included Chairs from community college departments as well as Provosts from undergraduate institutions. The

importance of addressing biology through varying subject angles in addition to implementing large-scale, multi-institutional changes were mentioned. Additionally, it was recommended that statistics on post-graduation professions be recorded on a large-scale basis to evaluate the effectiveness of these proposed changes once implemented.

Discussion with Dr. Arden Bement, Director of NSF

Dr. Bement opened the discussion with comments on the FY2009 budget. He noted that though the NSF is optimistic with regards to the proposed increase in funds, we must be prepared to reevaluate priorities in light of the impending administration change. Dr. Bement expressed confidence in regards to growing research interests in core areas and maintaining the transdisciplinary nature of biology throughout many areas of science.

The BIO AC and Drs. Bement and Olsen discussed:

- Cyberinfrastructure initiatives
    - Investing in new terascale regime
    - Datanet solicitation
- Climate change research
    - NSF funded $200.25 million worth of directly-related research in FY08, not including investments in facilities and sustainability
    - NEON takes a large role in looking at large scale impacts
    - NSF is on the global change subcommittee
- Continuing broadening participation
    - Tennessee to be taken of EPSCoR list soon
- NSF's continuing autonomy and flexibility in terms of programs as well as funding unsolicited proposals
- Date for the Fall Advisory Committee Meeting set for October 30-31, 2008

The Spring Advisory Committee meeting was adjourned at 1:00 pm.

APPROVED:

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Michael Mares, Chair Date