

BIO ADVISORY COMMITTEE
April 20-21, 2006
Hilton Hotel – Gallery I

Summary Minutes

THURSDAY, APRIL 20, 2006

Welcome and Approval of Minutes

Dr. Susan Stafford, Chair of the Advisory Committee for Biological Sciences (BIO AC), convened the Spring 2006 meeting at 8:30 am. Dr. Stafford welcomed Dr. James Collins, the BIO AC members, and guests. The AC enthusiastically endorsed the meeting's agenda which allocated ample time for discussion. The Committee unanimously approved the minutes of the November 2005 meeting.

FY 2007 Budget, Dr. James P. Collins, Assistant Director, BIO

Dr. Collins presented the FY 2007 NSF and BIO budget request and the status of related Congressional hearings. He described how the NRC report *Rising above the Gathering Storm*, the National Science Board's *Science and Engineering Indicators 2006*, and the Administration's *American Competitiveness Initiative (ACI)* were currently driving science policy and would be influencing budget growth at NSF, DOE and NIST over the next ten years.

The BIO AC discussed:

- The statistics used in the *S & E Indicators* report and the importance of establishing meaningful metrics in order to drive science policy.
- The need for NSF and BIO to establish a stable and competitive position for funding through the ACI.
- The source of funds for the National Ecological Observatory Network (NEON).
- BIO's allocation of funds for the Emerging Frontier (EF) and Broadening Participation activities.

FY 2008 Budget Planning, The Process – new science areas for investment, Dr. Joann Roskoski, BIO

Dr. Roskoski reviewed the process that BIO uses for identifying the Leading Edge Science themes that could be used in the development of BIO's FY 2008 budget request. Input for this process comes through a variety of internal (panel discussions, Program Officer One-Pagers, Directorate-wide Leading Edge Symposium and Discussion, BIO Senior Management Science Retreats, the BIO AC) and external (scientific publications, scientific conferences, workshops) sources. The AC appreciated the overview of this process.

The BIO AC discussed:

- The importance of incorporating ideas from other parts of NSF into the Leading Edge Science identification process.
- The role of Venture Funds in addressing high risk research.
- How activities, like the proposed Plant Science Cyberinfrastructure Collaborative, may aid in integrating BIO and other sciences and mathematics.

Setting the Stage, Dr. James P. Collins

The AC enthusiastically endorsed BIO's plan, presented by Dr. Collins, to ask the National Academy of Sciences (NAS) to prepare a report that would (1) enunciate Biology's conceptual and theoretical foundations, (2) articulate the grand questions in Biology for the coming decade, and (3) provide an implementation plan for addressing those questions. Dr. Collins informed the

AC that BIO will continue to fund leading edge, integrative research in its core programs and through a Venture Fund mechanism. He proposed changes in the Emerging Frontiers (EF) activity including: developing new criteria for the Frontiers in Integrative Biology (FIBR) program, organizationally moving EF into the Office of the BIO Assistant Director and transferring some EF activities to the Divisions.

The BIO AC discussed:

- The potential for the NAS report to postulate biological questions in an exciting, forward-looking way
- Adding a fifth theoretical foci, Structural/Molecular Biology, to the list of Dr. Collins' overarching theories of Biology (Cell Biology, Genetics, Evolution, and Ecology).

NSF Strategic Plan – Update, Dr. Joann Roskoski

Dr. Roskoski briefed the Committee on the development of a new NSF Strategic Plan and compared its elements to the current strategic plan. The goals of the Draft FY 2006 – 2011 Strategic Plan, which incorporates aspects of the National Science Board's (NSB) Vision Document, are discovery, learning, research infrastructure and stewardship, and the objectives are to inspire and transform and to grow and develop. The AC was struck by how few public comments NSF received in response to its request for input on the current strategic plan and suggested sending it to panelists, proposal writers, or scientific meetings to increase awareness.

Joint Session with SBE AC, Drs. James Collins and David Lightfoot, Assistant Director, Social, Behavioral and Economic Sciences (SBE)

Following a seminar by Thomas Friedman, author of *The World is Flat*, the BIO AC and the SBE AC discussed current and future activities of mutual interest.

Ecology of Infectious Disease (EID), Dr. Sam Scheiner, BIO

Dr. Scheiner explained that EID funds projects with support from BIO, GEO and NIH that use a multidisciplinary approach to develop a predictive understanding of the ecological context for the emergence and transmission of infectious diseases. Dr. Scheiner stressed the ability of EID to elucidate socio-ecological solutions to disease spread while funding research that addresses the complexity of ecological interactions. The SBE AC commented that involving anthropologists in EID projects may lead to a better understanding of human responses to disease and more effective planning for halting human-to-human disease transfer.

Coupled Natural Human Systems (CNH), Dr. Tom Baerwald, SBE

Dr. Baerwald described the CNH working group's proposal to make CNH a multi-directorate activity, involving BIO, GEO, and SBE. It will fund projects focusing on the complex interactions among human and natural systems at diverse spatial, temporal, and organizational scales. Dr. Baerwald also discussed involving other NSF units in the program beginning in FY2008. The BIO AC suggested Cyberinfrastructure (CI) as an area of natural collaboration with CNH.

Biology and Society, Dr. Ron Rainger, SBE

Dr. Rainger discussed a new activity "Biology and Society" that would support research on (1) the impact of science and technology on the environment, (2) biology and science policy, (3) intellectual property and patent issues, (4) societal and ethical implications of genomics and biotechnology, and (5) history, philosophy, and social studies of biology. As the program is in its formative stages, Dr. Rainger welcomed input from both ACs. The SBE AC suggested using this program to address the usefulness of animals as research models for human diseases and conditions.

National Ecological Observatory Network (NEON), Dr. Liz Blood, BIO

Dr. Blood reviewed NEON planning efforts and emphasized its goal to be a continental research platform to test and advance ecological theory and forecasting. Dr. Blood also highlighted connections between NEON and other integrative programs, like EID, and citizen science endeavors, like the National Phenology Network or the Cornell Lab of Ornithology. As some sensors will be placed in human-dominated land use types, NEON will facilitate social science research and benefit ecological research through the involvement of the social science community. The SBE AC thought NEON would provide a great opportunity for social scientists to look at spatial questions and suggested integrating NEON data with more qualitative human indexes for relevant social studies. The BIO AC expressed concern about future operating costs.

Biological Basis of Behavior, *Drs. David Lightfoot and James Collins*

Drs. Lightfoot and Collins described the current state of funding for fundamental neuroscience research, which was historically supported by NSF and NIH, but is now largely being eliminated from NIH's portfolio as it focuses on translational research. A NSF-wide working group of Program Directors is identifying fundamental leading-edge neuroscience that could become the nucleus of a new NSF neuroscience activity. The BIO AC was encouraged that projects using non-human models for neuroscience research may once again be funded, yet both ACs raised concerns over whether there would be sufficient funds for a new activity to have a noticeable impact.

At the conclusion of the joint session, both Advisory Committees congratulated ADs Collins and Lightfoot for organizing the joint AC session and commended both Directorates' staff for creating the opportunity to jointly meet and collaborate with each other. All were optimistic about current and potential joint endeavors between the Directorates.

Cyberinfrastructure, *Drs. Dan Atkins, Office of Cyberinfrastructure (OCI) and Manfred Zorn, BIO*

Dr. Atkins reviewed the history of the formation of OCI, the need for alignment of different stakeholders in advancing CI, and the capability of programs like NEON to transform science through CI. The draft NSF Strategic Plan for CI addresses (1) High Performance Computing, (2) Data, Data Analysis & Visualization, (3) Collaboratories, Observatories and Virtual Organizations, and (4) Learning and Workforce Development. Dr. Atkins agreed with BIO AC concerns that to advance science, the OCI must not only provide high-end hardware but also improve basic CI capacity. Dr. Zorn presented the main CI challenges for Biology and possible solutions suggested by the Cyberinfrastructure for the Biological Sciences (CIBS) working group.

The BIO AC discussed:

- The imperative for the OCI to address the basic CI needs in the community, especially account management, authorization, and authentication.
- Problems and benefits of allowing unregulated editorial access to internet databases, referring to current models like NYTimes (<http://www.nytimes.com/>), Wikipedia (<http://wikipedia.org/>), or GenBank (<http://www.ncbi.nlm.nih.gov/Genbank/>). The AC suggested funding research in this area.
- The ability of CI to broaden participation in the scientific enterprise by allowing data access to any with computing capabilities.

International Polar Year (IPY), *Drs. Matt Kane, BIO and Marie Bundy, Office of Polar Programs (OPP)*

Drs. Kane and Bundy discussed the history of BIO and OPP partnerships, beginning with projects in genome-enabled science and polar Long-Term Ecological Research (LTER) sites. Dr. Bundy discussed planning for IPY and interagency involvement in the activities. They also updated the BIO AC on NSF's IPY Special Solicitations for FY06 and FY07, which will fund IPY activities related to the Arctic Observing Network, Ice Sheet History and Dynamics, Studies of Life in the Cold and Dark, and Education/Outreach.

NEON – National Ecological Observatory Network, Dr. Elizabeth Blood, BIO

Dr. Blood presented NEON's timeline of activities, its theoretical framework, partnerships with grassroots institutions, ability to engage citizens in science, and potential to be the terrestrial component of the USGEO (US Group on Earth Observations) program. She also discussed recent reviews of the draft NEON Science Plan and the technical review process that NEON will undergo before funding for construction can occur.

The BIOAC discussed:

- The relationship between NEON and LTER and the process for choosing sites to place NEON sensors.
- Potential interest from the Department on Homeland Security in NEON.
- Issues with public versus proprietary data.
- Attempts at integrating Historically Black Colleges and Universities (HBCUs) into the NEON research plan.

Broadening Participation, Drs. Tom Brady, BIO, and Joanne Tornow, BIO/Education and Human Resources (EHR)

Dr. Brady presented the recommendations of BIO's Broadening Participation Working Group (BPWG) for increasing the participation of groups underrepresented in science in the BIO scientific workforce and in the undergraduate, graduate, postdoctoral, and independent investigators STEM pools. Dr. Tornow commented on activities in the EHR Division of Human Resource Development (HRD) addressing Broadening Participation (BP), including the Louis Stokes Alliances for Minority Participation (LSAMP) program.

The BIOAC discussed:

- Several issues that should be addressed prior to implementing the recommendations from the BPWG, including (1) evaluating the effectiveness of old programs to better shape new initiatives, (2) creating better metrics to evaluate initiatives, (3) analyzing availability of long-term support for new initiatives and (4) getting a deeper appreciation for social factors that might influence the success of proposed activities.
- Communication of Broadening Participation activities in BIO and EHR to other NSF Directorates.
- The need for more reports like the "Final Report on the Evaluation of the NSF LSAMP Program" to evaluate other initiatives. The AC asked for additional information on reports of this type.

FRIDAY, APRIL 21, 2006

Dr. Arden Bement, Director, NSF

The discussion between the Director and the BIO AC focused on: (1) BIO's role in ACI, (2) NSF's responsibility to fund neuroscience, (3) CI initiatives (4) NSF's role in curriculum development, (5) SBE's role in NEON, and (6) using new technologies to broaden participation in BIO and NSF activities.

The BIO AC and Dr. Bement discussed:

- NSF's ability to benefit from the American Competitiveness Initiative by contributing to the ACI innovation, workforce and science and math education goals. Dr. Bement also distinguished the ACI from NIST's Advanced Technology Program (ATP), which tends to focus more on technological innovation for the market place, while the ACI focuses on developing new concepts and R&D at the frontier.
- The importance of and need for NSF to become more active in funding neuroscience.

- Ways the OCI can tackle important CI issues, including optimization of the human-machine interface, incorporation of operations research and management science in the synthesis and flow of data, and development of CI education at the university level.
- NSF's role in education and the responsibility of Directorates to nurture curriculum change.
- The growing interaction of SBE and BIO, which Dr. Bement encouraged.
- The continued priority of BP for NSF and ways to communicate BP program evaluations and assessments within the Foundation and throughout the STEM community.

BIO AC Planning Discussion

The Committee gave their support to the proposed NAS report and proposed changes to EF. Dr. Collins requested the AC think about a new name for EF and the efficacy of a name change for the Minority Postdoctoral Research Fellowships.

The BIO AC discussed:

- Concerns with the use of the phrase "theoretical biology" in the NAS report and suggested using a term that has fewer connotations, such as "integrative" or "conceptual."
- Arranging for updates at future AC meetings on the OCI from Dr. Atkins and the status of the LTAR (Long-Term Agricultural Research) sites discussion with the USDA.
- Different ways to inform the wider public about new directions at NSF and BIO (e.g. NSF television channel, pod casts) and requested updates from BIO at the next AC meeting.
- Requests to BIO to provide information, analysis, and distillation of past, current, and proposed BP initiatives.
- The relationship between the proposed Venture Funds and EF.
- Meeting with ACs from other Directorates at future meetings.

The meeting ended at noon.

Susan G. Stafford, Chair

Date