Meeting of the BIO Advisory Committee
Summary Minutes
November 13-14, 2003

THURSDAY, NOVEMBER 13TH

Welcome and Introduction of New Member – Dr. Mary E. Clutter, Assistant Director
Dr. Mary E. Clutter, Assistant Director for the Biological Sciences (BIO), introduced BIOAC members attending the meeting for the first time – Dr. Norma Allewell from the University of Maryland and the new CEOSE Liaison, Dr. David Burgess from Boston College.

Remarks, Approval of Minutes – Dr. James P. Collins, Chair
The minutes for the April 2003 meeting were unanimously approved by the BIOAC.

Directorate Update: Budget and Current Issues – Dr. Mary E. Clutter
Dr. Clutter briefed the BIOAC on the FY 2004 Budget Request, including the House and Senate Committee Actions, highlights from each, and the possibility of an omnibus bill if there is no resolution between the two. She discussed the BIO budget by Division, reviewed Federal R&D Obligations by agency, and concluded with the major challenges ahead for the Biological Sciences Directorate.

The BIOAC discussed:

- The proposed $30K/year graduate student stipend and the challenges it poses to academic institutions.
- The recent New York Times article, “Does Science Matter?” and the effect that the history of science funding has had on public perception.

21st Century Biology Subcommittee
Topic: Cyberinfrastructure
Discussants: Dr. James Collins, Dr. Claire Fraser, Dr. Larry Vanderhoef

BIOAC Workshop: “Building a Cyberinfrastructure for the Biological Sciences” – Dr. John Wooley

Dr. Wooley summarized the July 2003 workshop regarding the scientific opportunities that cyberinfrastructure holds for the Biological Sciences. He discussed how biology will drive information technology (IT) for the next century, including crosscutting themes underlying major IT challenges for genome-enabled science and research challenges that will require BIO cyberinfrastructure. Dr. Wooley gave examples of this data transformation, including the development of a cell-centered database; the possible extension of the BIRN idea to plants, microbes and genomes; and the implications of ecological cyberinfrastructure for NEON. He concluded by stressing the importance of bridging IT and biology to train "fearless biologists," focusing technology contributions to meet BIO's needs, creating test beds, and enabling international involvement.

The BIOAC discussed:

- The success and far-reaching significance of this workshop, including how cyberinfrastructure will truly integrate natural and social systems.
- The scientific and technological implications for undergraduate training, including the challenges of integrating biology into the curriculum of other disciplines (i.e. who will teach it?) and how enabling technology can be used to enhance the relationship between science, technology, universities, and society.
- The challenges created by the complexity and extent of the data.

The BIOAC recommended:

- NSF should take the leadership role in the creation of test beds using NSF microbial and genomic data.

Workshop: "Environmental Cyberinfrastructure Needs for Distributed Sensor Networks" – Dr. William Michener

Dr. Michener, from the LTER Network Office and the University of New Mexico, briefed the AC on the August 2003 workshop, including recommendations for more capable sensors, investment in and development of tools and test beds for sensor networks, Grid and Web services, community involvement in standardization efforts, research and development in security and error resiliency, new analytical and visualization tools, and education, outreach and collaboration. Dr. Michener reviewed details of Science Environment for Ecological Knowledge (SEEK) and Knowledge Network for Biocomplexity (KNB) as current examples of environmental cyberinfrastructure and discussed the LTER charge to "forge a bold new decade of synthesis science."

The BIOAC discussed:

- The importance of developing sensors to address all scales, from the genome to outer space.
- The usefulness of beginning a dialogue with colleagues at other agencies involved in sensor development (e.g. NASA).
- The role that Centers could play in the design, development, and integrated prototyping of sensor networks.
- Security issues, noting the necessity to delay open access until ecological metadata is complete.

- The tools, training, and collaboration required to facilitate this knowledge discovery.

Discussion with Dr. Rita Colwell, Director, NSF
Dr. Colwell briefed the BIOAC on the status of the budget and current NSF priorities, including the S&E budget, increasing diversity in the workforce, and integration of the scientific disciplines.

Dr. Colwell and the BIOAC discussed:

- The importance of increasing representation of underrepresented groups in the peer review process.
- How the S&E budget is comprised not only of people, but also cybersecurity and physical security.
- How NSF, universities, and individuals can do a better job of educating the public on the importance of science, including enhancing the NSF website to reach the public as well as scientists and translating NSF funded research into IMAX films, newspaper articles, radio shows (e.g. Earth and Sky), and possibly even TV shows.
- NSF involvement in the connecting K-12 school systems with centers, museums, aquariums, etc. so kids can get "turned on" to science.
- The effect that security restrictions on dual-use research will have on these disciplines.

Environment Subcommittee
Discussants: Dr. Burt Ensley, Dr. Leonard Krishtalka, Dr. Susan Stafford

BIOAC Workshop: "A Regional Network to Improve Understanding of the Carbon Cycle" – Dr. Jerry Melillo
Dr. Melillo discussed the workshop designed to road test a pilot NEON concept, focused on the scientific question of terrestrial carbon storage. The pilot would use a combination of approaches and would look at two questions – current carbon balance and future carbon balance of the US – to conduct several regional studies and several large-scale experimental manipulations over a long period of time. Foundation activities were recommended, including capacity building, cyberinfrastructure to facilitate data acquisition, analysis and sharing, a dedicated special-project analytical facility, a Center for sensor development bringing ecologists and engineers together, and an expanded NCEAS to promote synthesis.

The BIOAC discussed:

- The value of getting early buy-in and long-term support from policy makers.

NEON Update – Dr. Elizabeth Blood, Program Director, DBI
Dr. Blood updated the AC on the current status of NEON, including recommendations of the NRC Study; two AIBS-led workshops addressing leadership and governance; the establishment of the internal NEON Project Advisory Team (PAT); outreach activities to other NSF directorates, society meetings, universities, federal agencies; and NEON's Congressional status.

The BIOAC discussed:

- Concerns regarding the implementation process (incremental versus all-at-once) based

on differing recommendations given in the previous BON and NEON workshops and the two reports, the IBRCS White Paper and the NRC Study.
- Lessons learned from other MREFC projects.
- Community leaders as the driving force behind NEON.
- The critical importance of establishing the leadership and governance of NEON.
- NEON as “big science” versus “networked science.”

Committee of Visitors
The following Committee of Visitors Reports were discussed by the BIOAC:

- Training Cluster, Division of Biological Infrastructure, May 5-7, 2003 (reported by Dr. Thomas Brady)
- Division of Environmental Biology COV, June 11-13, 2003 (reported by Dr. Burt Ensley)
- Genes and Genome Systems Cluster, Division of Molecular and Cellular Biosciences, July 9-11, 2003 (reported by Dr. Claire Fraser)
- Neuroscience Cluster, Division of Integrative Biology and Neuroscience, April 7-8, 2003 (reported by Dr. James Collins for Dr. George Liggins)

The BIOAC approved the COV reports, and discussed the following:

- The AC’s responsibility to encourage colleagues to “give back” to NSF by serving as rotators.
- The small number of SGERs.
- How to better educate the academic community regarding NSF’s budget process.
- How today’s new initiatives are often tomorrow’s core.

Changes to the BIO COV Process – Dr. Joann Roskoski
Dr. Roskoski discussed the impetus for redesigning BIO’s COV process, noting the use of comments in the COV reports, the change in NSF accountability reporting, and BIO’s desire for COVs to address higher order issues. The goals of the BIO COV redesign include standardizing and streamlining the pre-and post meeting process across BIO, providing compiled information referenced to the COV template, maximizing time for discussion, and obtaining the final COV Report at the end of the meeting. She reviewed the process BIO is using for this redesign and the next steps needed, including identifying data needs and gaps, and designing a self-study report. BIO proposes going to Division-level COVs (four divisions, EF, and PGR – two a year, every three years), which would require higher-level thinking while still capturing in depth review of programs.

The BIOAC discussed:

- The need for a mechanism to address specific cluster or program issues if BIO conducts only division-level COVs.
- The lack of data as one of the main sources of frustration during COVs.
- Support of a self-study approach.
- The need for COVs to focus on recommendations that are under NSF’s control (i.e. not regarding an increase in funding).

FRIDAY, NOVEMBER 14TH

Education Subcommittee
Discussants: Dr. Mary Lou Guerinot, Dr. Thomas Brady, Dr. Manuelito-Kerkvliet, Dr. George Liggins

Update on BIO Education Plan – Drs. Penny Firth and Judy Skog
Dr. Firth updated the Committee on the status of the BIO Education Plan, Nurturing Discovery: Biology Education for the 21st Century. Revisions based on feedback include fine-tuning of the goal and recommendations, alignment of context with recommendations, explanation of the role of EHR, inclusion of more data, priorities addressed more effectively, and recommendations based on "big questions." The plan now recommends that BIO:

- make modest adjustments in the vertical balance of investments to emphasize K-12 and community college needs;
- embed mentor training in a wide variety of activities;
- begin regular program tracking, assessment and evaluation;
- pursue partnerships with other directorates;
- pursue new activities, including:
    - Discovery Communities,
    - Research Experiences for Community College Educators,
    - Year of Undergraduate Research in Biology, and
    - Integrative Leadership Fellows;
- hold a workshop to examine the reasons why RAMHSS is undersubscribed;
- look at how to best advance C-RUI and UMEB;
- hold workshops complementary to "BIO 2010" for non-biomedical fields; and
- hold a town meeting to explore how DDIG might be considered beyond its current boundaries (i.e. in DEB and parts of IBN).

Dr. Firth also reviewed implementation issues and next steps for the BIO Education Plan.

The BIOAC discussed:

- The difficulties of evaluating Education programs.
- Having the patience to wait for downstream effects of these programs.
- The excitement in the community about the new programs BIO is planning.

The BIOAC recommended:

- BIO should take advantage of EHR evaluation resources.

Action Item:

- Dr. Firth requested that the Committee submit feedback (to the Education Subcommittee/Tom Brady) on this new draft by January.

Report on Joint Meeting on Undergraduate Education, MPS/EHR/BIO – Dr. Thomas

Brady
Based on the BIO Education Plan recommendation for BIO to pursue partnerships with other directorates, Dr. Tom Brady, Chair of the BIOAC Education Subcommittee, attended this Joint MPS/EHR Meeting on Undergraduate Education. Dr. Brady reported to the BIOAC on the outcomes of the meeting, which focused on attracting more students to traditional mathematical disciplines, possibly by learning from the recent success of the biological sciences. Goals include looking at the content of undergraduate curriculum, examining lessons learned from previous reforms, and surveying the consumers of math and physical sciences bachelor's degrees to see if students are graduating with necessary knowledge and skills.

The BIOAC recommended:

- Surveying the students themselves (K-12 students as well as undergraduates).
- Looking at culture differences, faculty/department mindset, and job markets as well as curriculum reform.
- Examining the critical status of minorities in these disciplines.
- Talking to schools that have been successful in attracting students to math and physical sciences.

Report on NSF Minority Postdoctoral Research Fellowships Evaluation – Ms. Carter Kimsey, Program Manager, DBI
Ms. Kimsey presented the initial findings of the Minority Postdoctoral Research Fellowship Evaluation. The evaluation has shown that the Fellowships were highly valued by the former fellows, the experiences did increase their knowledge and skills, this truly was a research and training activity, and employing institutions see this program as a success. She also noted common themes found in the written comments, including the impressive number of former Fellows who are successful at obtaining research grants, the high percentage of underrepresented minorities supported by this program, and the doubling of the pool of potential Fellows from 1989 to 2000.

The BIOAC discussed:

- The excellence of this program and its evaluation.
- The very small investment for such a high payoff.
- Concern regarding the small number of applicants to the program.
- The need for a control group for the study.

The BIOAC recommended:

- BIO should continue, and even increase advertising of this program.

Division Issues and Plans

BIO Directorate – Dr. Mary Clutter
Dr. Mary Clutter updated the Committee on the current structure of the BIO Directorate, noting the status of the Emerging Frontiers division and reviewing the Frontiers in Integrative Biological Research (FIBR) program in more detail. Division Directors discussed current (MCB and DBI) and proposed (DEB and IBN) reorganizations and how each division will be better positioned to foster 21st Century Biology.

The BIOAC discussed:

- The continued tension between new initiatives and the core
- The challenges of applying cyberinfrastructure and information technology to existing biological collections and databases
- The distinct differences between the Neuroscience programs at NSF and NIH, including:
    - NSF funds research regarding evolution;
    - NSF uses interdisciplinary panels to review neuroscience proposals;
    - NIH funds more applied research and NSF more basic research;
    - NSF funds research on learning and memory; and
    - NSF is interested in broader impacts.
- The enormous issues of access to, integration of, and tools to use the rapidly accumulating information in all scientific disciplines.

The BIOAC recommended:

- Communicating BIO's organizational changes to the community.
- Increased communication across the Foundation, including among Advisory Committee Chairs.

BIOAC Follow-on Activities

Subcommittees:
21st Century Biology Subcommittee – Collins (Chair), Fraser, Vanderhoef, Wooley
The 21st Century Biology Subcommittee agreed with the proposed idea to meet with the equivalent subcommittee at DOE, the Biological and Environmental Research Advisory Committee (BERAC). The focus should be on microbes and environmental genomics.

Education Subcommittee – Brady (Chair), Chandler, Guerinot, Liggins, Manuelito-Kervliet
AC members were reminded to get feedback on the BIO Education Plan to Tom Brady by January.

Environment Subcommittee – Ensley, Krishtalka (Co-Chair), Melillo, Stafford (Co-Chair)
The Environment Subcommittee was tasked to work with John Wooley on cyberinfrastructure plans and legacy issues of archival databases and to work with Liz Blood in support of NEON. Leonard Krishtalka agreed to attend and represent BIO at the NSB workshop on Long-Lived Databases.

Plans for Spring Meeting:
Possible topics for discussion include updates on the following:

- BIO Division reorganizations;
- the status of Emerging Frontiers; and
- follow-up activities with EHR.

The AC members were in general agreement regarding a possible new format for future AC meetings. They would like the meeting to be set up like a panel, with networked laptops containing all relevant files for the meeting. Discussion also included the idea of putting the

material on USB portable drives, CD-ROMs and the Web.

Meeting Dates:
Spring – April 22-23, 2004 (confirmed)*
Fall – November 4-5 or 18-19, 2004 (tentative)

*Since the fall meeting it was necessary to change the dates for the spring 2004 meeting. The new confirmed dates are April 20-21, 2004.

The meeting was adjourned at 2:30 p.m.

APPROVED

/S/ James Collins *04/21/04*

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James Collins, Chair Date

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