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# Meeting of the BIO Advisory Committee Summary Minutes April 20-21, 2004

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TUESDAY, APRIL 20TH

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## **Welcome and Approval of Minutes**

Dr. James P. Collins, Chair of the Advisory Committee for Biological Sciences (BIOAC), convened the Spring 2004 meeting at 1:30 pm with a welcome to members and guests. Dr. Mary E. Clutter, Assistant Director for the Biological Sciences (BIO), greeted the BIOAC, noting the members not in attendance (Fraser, Melillo, Vanderhoef, Burgess). The minutes for the November 2003 meeting were unanimously approved by the BIOAC.

## **Directorate Update: Budget and Current Issues – Dr. Mary E. Clutter**

Dr. Clutter updated the BIOAC on current issues at NSF, including the departure of Rita Colwell in February of this year. She briefed the Committee on the FY 2005 Budget Request, noting that the doubling of the NSF budget is not likely in this economic climate and priorities will have to be chosen carefully. Dr. Clutter discussed the percentage composition of federal government outlays including the decreasing amount for discretionary funding, and she compared the BIO Request to the Actual Budgets back to fiscal year 1998. Highlights of the fiscal year 2005 BIO Request include NEON, LTER, IGERT, and ITR transition to the Core, e.g. cyberinfrastructure.

*The BIOAC discussed:*

- The interesting trends seen in BIO's budget from 1998-2004.
- The tension in universities caused by an increase in graduate student stipends.

## **Division of Environmental Biology Reorganization: Dr. Michael Willig, Division Director**

Dr. Willig briefed the BIOAC on the DEB reorganization into four interacting clusters – Ecological Biology, Ecosystem Science, Population and Evolutionary Processes, and Systematic Biology and Biodiversity Inventories. He reviewed the goals of the division, characteristics of each new cluster, staffing and management issues, and described how DEB is poised to advance activities in the community.

*The BIOAC discussed:*

- How restructuring would allow more integration and flexibility in establishing review panels.
- Concerns that the division is currently understaffed.

**Division of Integrative Biology & Neuroscience: Dr. Judith Verbeke, Acting Division Director**

Dr. Verbeke updated the BIOAC on the IBN reorganization, noting the unifying, division-wide questions forming the basis for the new structure and the intentional “sticky ends” with MCB and DEB facilitating interactions among the divisions. The proposed “Division of Integrative Organismal Biology” will have four clusters – Developmental Systems, Environmental and Structural Systems, Behavioral Systems, and Functional and Regulatory Systems. Dr. Verbeke discussed staffing and management issues and implementation plans including web descriptions, program officer recruitment, and a planned Dear Colleague Letter to the community.

*The BIOAC discussed:*

- Their enthusiasm for the intentional “blurring of boundaries” within and across divisions.
- The integration of neuroscience across the division.
- The importance of program officer recruitment, clear communication to the community, and assessment of proposal submission to the new clusters.

**National Ecological Observatory Network (NEON) Status: Dr. Elizabeth Blood, Program Director**

Dr. Blood updated the Committee on the status of NEON, reporting on the release of a solicitation for a Coordinating Consortium and Project Office; a Coordination and Implementation report addressing NEON leadership and governance; a prospective PI meeting held in February; the status of NEON in the Budget Request; internal management activities; and NEON science workshops.

*The BIOAC discussed:*

- The importance of international and interagency collaborations.
- Lessons learned from current MREFC projects.
- The advantages of having the coordinating office in place early.
- How NEON has the potential to transform science.

**Discussion with Dr. Arden Bement, Acting Director, National Science Foundation**

Dr. Bement briefed the Committee on the budget status and the need to maintain strength, balance and flexibility in the Core in coming years. He discussed cyberinfrastructure – in particular, the importance of providing adequate resources to the Directorates for cyberinfrastructure investments and the need for crossdisciplinary collaborations in this area. Finally, Dr. Bement applauded the integrative approach in BIO’s Education Plan and encouraged BIO to continue communicating NEON clearly to Congressional appropriators, e.g. the idea of distributed sensors.

*Dr. Bement and the BIOAC discussed:*

- The tension between MREFC activities and the Core in the budget.
- The importance of empowering teachers with resources through the Math and Science Partnership (MSP) whether the program is managed at NSF or the Department of Education.
- The gradual transition of Priority Areas to the Core and the need for Advisory Committees to help and advise Assistant Directors with this process.
- How to communicate the importance of a “21 st Century Workforce” more effectively to Congress.
- The social implications of nanotechnology and the need to be proactive and forthright with the public.
- The interactions between NIST and NSF.
- Diversity issues as a top priority at NSF, second only to preservation of the Core.

**Report on Joint meeting of EHR/MPS/BIO Advisory Committees: Dr. Thomas Brady, BIOAC**

Dr. Tom Brady updated the BIOAC on the activities of the EHR/MPS Joint Subcommittee including focus groups held to assess changes in the disciplines, undergraduate reform in institutions, and changes in the demands of the STEM workforce. He reviewed major issues in the disciplines, preliminary recommendations, and plans for future activities including additional focus groups with representatives from the scientific workforce, two-year colleges and professional societies.

*The BIOAC discussed:*

- The importance of reaching out to institutions to increase participation.
- Integration of biology into the curricula of the physical sciences.

**Presentation of BIO Education Plan: Dr. Muriel Poston, Acting Deputy Director, DBI and Dr. Penny Firth, Acting Deputy Director, DEB**

Dr. Poston reviewed the history of the BIO Education Plan, highlights of feedback on the report, the vision and goals, the priorities to build capacity (integration, increased diversity, curriculum reform, mentor training), and the context for the development of this plan. Dr. Firth reviewed the six “big questions” used to organize the recommendations and examples of how recommendations may be bundled for implementation including tracking and planning, comprehensive undergraduate activities, vertical integration, and “big bang for buck” enhancements.

*The BIOAC discussed:*

- The importance of “biosphere literacy” at all levels.
- How to keep young students engaged in science as they progress.
- The impact of BIO’s investment in CAREER.
- The difference that Criterion Two is having on the research enterprise.

*BIOAC recommendations for the BIO Education Plan:*

- Use the term K-16 (including community colleges) rather than K-12 in this report.
- Include teacher education programs in the context of the report.
- Carefully consider where BIO investments can have the most impact.

WEDNESDAY, APRIL 21ST

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### **BIO Leading Edge Presentations**

Dr. Clutter discussed major challenges facing the biological sciences and BIO's criteria for developing priorities. Dr. Roskoski reviewed the process for identifying science themes for the budget. BIO Division Directors and Program Officers presented the major research themes identified during this year's Leading Edge Science workshop: biodiversity, comparative and integrative biology, opportunities in genomics, and predictive biology. Biodiversity presentations highlighted the growing importance of computation, networking and digitization of natural history collections. The comparative/integrative biology presentations noted the need to expand the number of model organisms studied and the interoperability of databases to advance comparative research. The opportunities in genomics presentation highlighted how genomic tools and techniques are facilitating the growth of new fields like metagenomics and environmental genomics but database issues and the need for more computational biologists must be addressed in order to insure continued progress. Finally, predictive studies using modeling and simulation are becoming a larger part of the BIO portfolio. The tremendous opportunity for biological discovery being facilitated by genomic and cyber tools was a theme that ran across all presentations.

*The BIOAC discussed:*

- The importance of cyber-linking networks such as NEON and the Legacy Infrastructure Network for Natural Environments (LINNE).
- The need for a roadmap for computational issues.
- The fact that digitization provides economies of scale but physical collections are still needed.
- The need to recognize the sociological and cultural dimensions of collections (e.g., cataloging from a cultural perspective).
- The balance needed between reductionist and integrative research.
- The cyber readiness of various biological sub disciplines.
- The importance of inculcating quantitative courses into the biological curriculum and BIO's investment in this area.
- The need for NSF, in partnership with universities and industry, to do more community action building at the undergraduate level.
- The importance of keeping the "boutique databases" connected through ontology.
- The complexity of modeling using huge datasets and multiple parameters.

### **Report on NSB Workshops on Long-Lived Data Collections, November 18, 2003 and March 23, 2004: Dr. Christopher Greer, Program Director, DBI**

Dr. Greer briefed the BIOAC on the major issues and questions emerging from two workshops held by the NSB Task Force on Long-lived Data Collections. Issues include the role of long-lived data collections in science and education, long-term support of collections, curation of data, access, standards, and training.

*The BIOAC discussed:*

- The possible need for a foundation-wide policy for single investigator/smaller data collections.
- Perishability of media and migration of data across platforms.
- The importance of data access and IPR issues.
- The need for NSF to manage quality assurance and quality control.
- The difficulties of quantifying the impact of databases on the research enterprise.
- The question of new career paths for database managers.

### **Update on BIOAC Workshop on Building A Cyberinfrastructure for Biology (CIBIO):**

#### **Dr. John Wooley, BIOAC**

Dr. Wooley updated the BIOAC on the status of the CIBIO report (final draft in print production) and future planned activities (NSF-DOE Joint Subcommittee on CIBIO, opportunities for collaboration and/or intellectual support for activities like NEON or GTL, and planning for an Implementation Workshop).

*The BIOAC discussed:*

- The importance of articulating the need for cyberinfrastructure very clearly to Congress.
- The need for BIO to weigh priorities carefully when comparing the relative costs of maintaining extant data collections versus funding new research.
- Concerns regarding the current budget environment but encouraged BIO to consider adapting current programs to Homeland Security issues (e.g., agricultural bioterrorism) in order to increase funding.
- The “digital divide,” including the opportunity to transform tribal institutions with even a small investment in cyberinfrastructure.

### **BIO Cyberinfrastructure Working Group: Dr. Michael Willig, Division Director, DEB**

Dr. Willig reviewed the charge, timeline and members of the BIO Cyberinfrastructure Working Group (CIBS). CIBS is charged with analyzing the current status of BIO cyber activities and providing recommendations on future investments in this area. Working group activities thus far include interactions with other directorates, BIO-wide and community-wide workshops, and cyber-enabled research seminars.

*The BIOAC discussed:*

- Examples of cyber projects that are ready to begin immediately, e.g. an integrated microbial database.
- The need for BIO to continue to take risks with cyberinfrastructure investments.

### **BIOAC Recommended Directions for BIO**

- The Committee was very enthusiastic about the “all hands meeting” style of this year’s Leading Edge Workshop and recommended BIO continue in this tradition.
- The Committee was impressed with the level of integration and “blurring of boundaries” in the division reorganizations and Leading Edge discussions.
- The Committee encouraged BIO to continue reaching out to HBCU’s, tribal colleges, and community colleges, especially with regards to cyberinfrastructure.

- Continue to let science be the driver for cyberinfrastructure.
- Improving the quantitative skills of biologists is a top priority – now is the time for a new training program to dovetail with cyberinfrastructure initiatives.
- BIO should continue to collaborate with EHR and MPS to foster education of 21 st century biologists.

### **Future Business**

- The BIOAC Environment Subcommittee agreed to serve as a resource for the directorate. The Committee noted that Leonard Krishtalka, AC member of the Environment Subcommittee, has a conflict of interest and will not participate in this advisory role.
- COV Representatives:
  - Division of Biological Infrastructure, June 16-18, 2004 – Krishtalka (tentative)
  - Plant Genome Research Program, August 11-13, 2004 – Brady (confirmed)
- Fall Meeting Dates: November 18-19, 2004 (confirmed)

The Spring 2004 Advisory Committee meeting adjourned at 3:30 p.m.

APPROVED

*/S/ James Collins*      *11/19/04*

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James Collins, Chair      Date

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