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# Meeting of the BIO Advisory Committee Summary Minutes April 25-26, 2002

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**THURSDAY, APRIL 25TH**

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**Welcome and Introduction of New Member: Dr. Mary E. Clutter, Assistant Director**

Dr. Clutter welcomed the committee and introduced a new member, Dr. Jerry Melillo of the Ecosystems Center, Marine Biological Laboratory at Woods Hole.

**Remarks, Approval of Minutes: Dr. James Collins, Chair**

The November 8-9, 2001 minutes were approved by voice vote.

**FY2003 Budget: Dr. Mary E. Clutter**

Dr. Clutter reviewed the House VA-HUD Appropriations Subcommittee hearing of April 11, 2002, and briefed the committee on the BIO FY 2003 budget request. The BIO request proposes a virtual division, Emerging Frontiers, partly in response to BIO AC recommendations.

**EDUCATION IN 21st CENTURY BIOLOGY**

**Review of Education Subcommittee Report, April 2000: Dr. Marvalee Wake**

Recommendations of the subcommittee included the need for data-gathering on BIO educational activities; a teaching component for NSF predoctoral and postdoctoral fellowships, and increased support for Doctoral Dissertation Improvement Grants. The subcommittee expressed concern regarding the US dependence on international scientists and engineers in some areas of research and encouraged NSF and BIO to institute programs that would reduce this dependence. Recommendations that have been addressed include (1) development and implementation of a BIO educational philosophy and (2) establishment of an education subcommittee of the AC.

**Current Portfolio of Activities: Dr. Mary E. Clutter and Dr. Joann Roskoski, Executive Officer, BIO**

Dr. Roskoski presented information on NSF and BIO educational programs. A major discussion item was program evaluation. The evaluation activities planned as part of the Undergraduate Mentoring in Environmental Biology (UMEB) program may serve as useful prototypes. It was noted that the Education and Human Resources (EHR) and Social, Behavioral and Economic Sciences (SBE) directorates have tools available to help with evaluations.

**Vision of Educational Activities at NSF: Dr. Judith Ramaley, Assistant Director, Education and Human Resources**

Dr. Ramaley presented the EHR Directorate's vision of educational activities at NSF, including themes of the portfolio, and strategies for improving minority participation in Science, Technology, Engineering and Mathematics (STEM) programs. She noted the importance of incorporating lessons learned from NSF diversity programs into all education programs; women and minorities have been the indicators for overall problems in the system. Discussion included the need to consider the educational needs of the adult workforce - how adults learn and what knowledge is required to prepare for new technologies. A draft career path analysis of science, mathematics, and engineering students was distributed.

**Report on Advisory Committee on Environmental Research and Education (AC-ERE) Activities: Dr. James Collins (BIOAC Representative) and Dr. Joann Roskoski**

A draft Decadal Plan for NSF Environmental Research and Education describes the current environmental portfolio, identifies ways NSF-wide integration can enhance current investments, and identifies opportunities for future investment. The draft plan will be released for public comment in May, 2002. The AC-ERE is also soliciting input from other AC's, Federal agencies, and professional societies. A report (for NSF and the scientific community) and brochure (for the public and Congress) will be produced. Discussion included the need for milestones for success, such as the development of better warning of environmental and climate change, or better restoration techniques.

**Education Breakout Groups: AC members, and BIO and EHR Program Officers**

The education presentations and discussions above served as background for breakout group discussions of education issues by members of the AC, and BIO and EHR program officers, as summarized below.

**(1) K-12 and informal science education**

Increasing BIO spending on K-12 programs could have a significant impact without a major dollar investment since current spending is a small proportion of the total BIO education budget. Informal science education is needed before the 7th grade in order to prevent losing students who are interested in science. Ideas included television ads with science role models, and engaging parents through citizen science programs. Improving the science literacy of teachers by reaching teachers at education schools, teachers out of field, and teachers in field, was also discussed.

**(2) Undergraduate education (includes community colleges)**

Research experience for undergraduates and faculty is vital. NSF should reach out to community colleges, by helping to improve mentoring of their students, faculty and administrators, and helping to facilitate the transition of students to undergraduate institutions.

Short and long-term tracking of students would determine whether programs are working - by measuring retention in the biology major and future career success. The population of institutions that participate in NSF programs should be broadened. The proposed Integrated Undergraduate Education and Research Training program (IUERT) that would be open to all colleges and universities is a good idea in principle, but the unique challenges of primarily undergraduate institutions such as heavy teaching load for professors, need to be considered. Current programs might be leveraged or modified to accomplish similar goals to the IUERT. Mentoring of underrepresented groups is critical.

### **(3) Graduate and postdoctoral experience**

The integration of the research and education component of proposals could be strengthened by explicitly asking PIs to include information about the types of training that undergraduates, graduate students and postdoctoral fellows would receive beyond that obtained during the conduct of a research project, such as courses in ethics, writing proposals, management, seminar series, etc. Also noted was the need for teaching experience for graduate students and post docs. Role models and mentoring can help underrepresented groups. In response to the George Jones Science editorial of April 12, 2002, it was suggested that NSF lead an interagency working group on increasing participation of underrepresented groups at all levels of the STEM enterprise. It was noted that increasing the diversity of the workforce could improve the quality of science (for example due to new perspectives, sensitivity to environmental justice issues).

**FRIDAY, APRIL 26TH**

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## **PLANNING FOR 21st CENTURY BIOLOGY**

### **BIO Science Retreat: Dr. Mary Clutter and the BIO Senior Management Team**

Dr. Clutter reviewed the revisioning process in BIO, which is driven by the characteristics of the Biology of the 21st Century (multidimensional, multidisciplinary, data-driven, education-oriented and internationally engaged), and an effort to eliminate boundaries between disciplines. The first step in the revisioning process will be the establishment of the Emerging Frontiers virtual division proposed in the FY 2003 budget. It was recommended that measures should be developed to evaluate the effectiveness of the Emerging Frontiers virtual division.

Dr. Roskoski briefed the AC on its process for annual and long range program planning. The salient scientific ideas that emerged from the annual "Leading Edge" discussions between the BIO program officers and BIO senior management on the 2002 themes of Evolution, Multi-level integration, Data-"gazing/grazing", and Education were reviewed. At the BIO Science Retreat, these ideas were further distilled into two potential areas of emphasis: Living Networks and Microbial. The AC enthusiastically encouraged further development of these areas.

### **Important Notice Recommended**

After discussing George Jones' Science editorial of April 12, 2002, the AC recommended that the Director of NSF issue an Important Notice to Presidents of Universities and Colleges,

stating a concern about the status of diversity within the STEM enterprise in the US and challenging academic institutions to vigorously employ creative means, such as requiring a diverse pool of applicants to be considered before a new faculty hire could be approved, in order to broaden the participation of underrepresented groups at all levels. Security issues could be used to justify a national effort to improve science education, similar to that which occurred in the 1950's in response to the launch of Sputnik. A diverse science workforce was seen as necessary to ensure that the US continues to encourage and emphasize leading edge research.

**Long-term Ecological Research (LTER) 20-Year Review Committee Report: Dr. Leonard Krishtalka (and Dr. Frank Harris in absentia)**

Dr. Krishtalka discussed the review process, summarized the accomplishments of the LTER program, and presented the review committee's recommendations. Recommendations included the following: (1) the third decade of LTER should focus on synthesis science for ecological forecasting; (2) the LTER community and NSF should jointly draft a 10-year strategic plan based on 21st century biology, and (3) a goal of LTER should be to understand the nation's ecosystems in order to use and preserve them sustainably.

**BIOAC FOLLOW-ON ACTIVITIES**

**Future Business:**

It was agreed that education and coordination with EHR should be high priorities. The BIO-AC will continue its standing subcommittees on Education, the Environment, and 21st Century Biology. Members were invited to suggest topics for workshops on other activities for consideration by the AC.

**Future Meeting Dates:**

Fall - November 7-8, 2002

Spring 2003 - April 24-25, 2003

APPROVED

*/S James Collins*            *11/8/02*

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James Collins, Chair      Date

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