



Meeting of the BIO Advisory Committee Summary Minutes November 16-17, 2000

THURSDAY, NOVEMBER 16 - MORNING SESSION

Welcome & Introduction of Committee Members, Dr. Mary Clutter

Dr. Mary E. Clutter, Assistant Director for Biological Sciences (BIO) welcomed the committee members and thanked them for coming. Dr. Gwen Jacobs, Chair of the BIOAC, introduced herself and asked the committee members to do the same before the committee addressed the first order of business.

Remarks, Approval of Minutes (April 2000), Dr. Gwen Jacobs, Chair

The minutes of the April 6-7, 2000, meeting were unanimously approved.

Dr. Jacobs briefly outlined three issues that all NSF advisory committees were asked to address during their discussions: First, what are the best arguments for increasing the NSF budget over the next few years? Second, what are the best measures of successful performance for NSF's research and education activities? Third, what are the "best practices" of your advisory committee?

Report on AC Chairs Meeting, Dr. Ellen Goldberg

Dr. Ellen Goldberg summarized the Advisory Committee Chairs discussion on GPRA. The Chairs discussed the difficulty in quantifying success for the NSF. The concern over the increase in funding without the proportional increase in staffing was also addressed. Dr. Edwards responded that the increase in the complexity and size of many awards require an increase in staff and acknowledged the need for NSF to be competitive in attracting and retaining IT staff. These are two messages Dr. Colwell may present when requesting an increase in the administrative budget in future years.

Dr. Goldberg outlined the Reinvestment Initiative in Science and Engineering (RISE) document discussed at the Advisory Committee meeting for the Directorate for Mathematical and Physical Sciences in May 2000. She highlighted the several areas of special emphasis:

Information Technology, Biotechnology and Mathematics (Pure, Applied and Statistical). The need for the BIO Directorate to partner with MPS was discussed.

The MPS Advisory Committee recommended that each Directorate add a paragraph to the RISE document. This document would be presented to the Administration. The general consensus of the BIOAC was that the document favored MPS too heavily. Dr. Leonard Krishtalka recommended the creation of a separate document, authored by committee members and members of industry, addressing the ten great challenges of science and their economic, industrial and societal impacts.

Government Performance and Results Act (GPRA), Dr. James Edwards, Ms. Sonya Mallinoff & BIOAC GPRA WG

Ms. Sonya Mallinoff outlined the four NSF FY2000 Annual Performance Goals for Results. BIO's performance in the GPRA investment and management goals was summarized. Ms. Mallinoff also presented an overview of the GPRA process from the gathering of data to the report that is presented to the NSB in February and sent to Congress with NSF's next budget request.

Dr. Jacobs suggested that the committee discuss the following questions with Dr. Rita Colwell, NSF Director, during her session with the committee over lunch: Are the average award sizes increasing with the total NSF budget? Does NSF have the right balance of rotators and permanent program officers? And, is NSF allocating its resources to the most efficient ends?

BIO FY 2000 Committee of Visitors Reports

1. Division of Biological Infrastructure, Division Review, Dr. Ralph Quatrano

Dr. Ralph Quatrano briefly summarized the COV report to DBI and DBI's response to the recommendations. Overall the COV found that DBI satisfactorily transitioned new emphasis areas and the Committee favored increasing the number of these emphasis areas. In addition, DBI was ranked favorably in the funding of new discoveries. The Committee recommended reviewing the ratio of rotating to permanent program officers, and increasing the total staff size. The Committee also focused on the need to invest in infrastructure for instrumentation, databases, and informatics.

Dr. Leonard Krishtalka broached the issue of NSF's position on long-term support for organismal databases. Dr. Burt Ensley proposed the idea of an NSF scientific trust fund, which would withhold a certain percent of an award for the maintenance of scientific databases at large. The AC recommended that NSF review possible mechanisms to promote cooperation and the long-term security for scientific information.

2. Division of Environmental Biology, Systematic and Population Biology Cluster, Dr. John Wooley

Dr. John Wooley gave a synopsis of the COV report. The COV recommended that this division consider the creation of sequencing centers, similar to Electron Microscope facilities, that would ensure that DNA sequencing is accomplished efficiently. Other recommendations from the COV were to increase the average award size; to seize the opportunity for NSF to integrate microbial biology and systematics; and to rethink the NSF policy that prohibits providing reviewers' comments to investigators before a final decision has been made on a proposal.

3. Division of Integrative Biology and Neuroscience, Developmental Mechanisms, Dr. James Collins

Dr. James Collins reviewed the findings and recommendations of the COV. The main focus of the discussion was on the overlap of the evolutionary and developmental biology communities. The committee supports the funding of integrative research between these two disciplines.

4. Division of Molecular and Cellular Biosciences, Molecular Structure & Function and Biomolecular Processes Clusters, Dr. Gwen Jacobs

Dr. Gwen Jacobs related the COV's recommendations. The ensuing discussion focused on three areas:

- The effect of initiatives on the core programs - New initiatives should be evaluated for their relevance to the core programs and their impact on future Foundation activities.
- The cofunding process - The cofunding process between divisions and agencies is very similar. Both use the reviews from the other's panels to evaluate the proposal separately and then provide funding if the proposal is meritorious under the program's guidelines. The Committee recommended formalizing the selection process for proposal cofunding.
- Funding of established investigators - The previous COV found that that clusters being reviewed often funded small-scale awards that later become NIH awards. Dr. Wooley attributed this to NIH's demand for preliminary data and an established research record before funding a project. The current COV did not find this same trend.

The committee approved all COV reports as submitted.

BIO GPRA Performance Evaluation

Dr. Ellen Goldberg reviewed the draft BIOAC Directorate GPRA report. She highlighted the four GPRA "outcome goals" as well as the "quality of programs" goals and new merit review criteria. The discussion then turned to BIO's performance on GPRA goal # 3 - A diverse, globally oriented workforce of scientists and engineers. The recommendation of the committee: BIO should pair with the social sciences division to attempt to determine why minorities are not more prevalent in the sciences.

Discussion with Dr. Rita Colwell, Director, NSF

Dr. Rita Colwell thanked the Advisory Committee and gave an overview of the Fiscal Year 2001 budget. This fiscal year the NSF received its largest increase ever. Dr. Colwell attributed the success to several causes: first, cooperation between the scientific and industrial communities and second, a truly bipartisan effort in Congress.

Potential Areas of Interest for FY 2002 and Beyond

- **Initiatives** - Dr. Colwell was pleased to see that the new initiatives were well received in Congress. Biocomplexity in the Environment and 21st Century Workforce both received funding increases. The Nanotechnology initiative was funded. On the horizon are the Math Initiative in FY 2002, and the Economics and Social Sciences Initiative in FY 2003.
- **The Future of Grants** - Fortunately, Congress has provided their endorsement and the funding for NSF to increase the size of new grants. However, the size of research stipends is still a serious problem. The minimal funding received by graduate and postgraduate researchers may pose a barrier to entry into or continuation in the field of

science for some students. The NSF should address the amount of funding provided as well as the need for health insurance and other benefits.

Furthermore, the way in which science is conducted is changing. In the 21st century, virtual labs, like NEON was designed to be, will help to integrate the science of research and learning. Internet connectivity is a primary means of providing access to technology and information previously not available to many researchers. Projects such as BugScope (<http://bugscope.beckman.uiuc.edu/>) demonstrate the ability to bring scientific information to the community for the purpose of research and education.

- **EPSCoR** - EPSCoR funding increased to \$75,000,000 in FY 2001. Congress directed the NSF to continue to emphasize research infrastructure development in the EPSCoR states. As seen by the success of the EPSCoR awards in Mississippi and Puerto Rico, EPSCoR funding provides strength to communities.
- **Coping with the growing quantity of biological data** - The need for efficient, scalable, easily accessible databases is a pressing problem for biological researchers. The new challenge for NSF and the community is to create a system that maintains the integrity of research data while allowing access to it for the community at large. Dr. Burt Ensley suggested that NSF create a "trust fund" for grants that create large datasets. The Foundation would withhold a portion of each grant to be used to fund long-term data storage and maintenance. The suggestion was well received by Dr. Colwell. She also reminded the AC of the Information Technology Research initiative which funds research in information storage and retrieval, connectivity, and scalable networks.

Following Dr. Colwell's comments, the committee addressed the following three issues in their discussion with her:

1. What are the best arguments for increasing the NSF budget over the next few years?

Congress must be convinced of the economic, social and scientific value of the research funded by the NSF. The committee revisited the suggestion that the BIO Directorate create a document covering the 10 great challenging research questions that can not be answered without the support of the NSF. Several committee members suggested that a working group, which included members of industry, be formed to draft this type of document for Congress within the next few months.

2. What are the best measures of successful performance for NSF's research and education activities?

Dr. Ensley commented that it is inherently difficult to quantify breakthroughs in science. Dr. Laura Hoopes suggested that NSF use the effectiveness of the proposal process as a measure of the Foundation's success. Quantifying the review process by recording the turn around time for providing feedback to the investigators is one possibility. Demonstrating the ability to provide access to awards information and program announcements through web based applications may be another measure of efficiency. A third suggestion was to count the number of publications or patents that arose from NSF supported investigators.

3. What are the "best practices" of your advisory committee? Dr. Gwen Jacobs stated that the BIO Advisory Committee's commitment to partnering with other Advisory Committees is a "best practice." The Committee is forging ties with Math and Physical Sciences to create cross

director activities. Dr. Colwell pointed out that education is always a cross training activity and that the Committee must incorporate the social sciences and educational divisions in these talks.

GPRA discussion

Staffing and infrastructural requirements created by GPRA - The AC voiced its concern about the staffing and infrastructure needed to accommodate the extra workload of GPRA and initiatives. Dr. Colwell responded that NSF is addressing this concern on several fronts. First, in fiscal year 2001, the Foundation received a 13% increase in the administrative allowance of the budget. Second, a working group within NSF has been established to assess the number of staff needed to handle a doubling or tripling in the budget. This includes training current staff as well as new hires. Another possibility is to have an internal NSF academy to provide training for support staff. As for the infrastructural needs, NSF has upgraded the phone system and installed video teleconferencing and is in the process of upgrading the computer systems. The NSF has made great strides towards a completely electronic review process and is the only agency that is fully electronic. NSF will also continue to strive to create more efficient and effective means of communication.

A benefit of GPRA is that it provides the agency with an opportunity to improve its performance. This year's review helped to identify the need for more IT staff to maintain the Foundation's web site and to ensure that documents are available in a timely manner. Dr. Colwell agreed that the reporting standards set by Congress place a heavy workload on the staff and suggested that to help streamline the GPRA process, the records keeping mechanism and reporting time need to be reviewed.

THURSDAY, NOVEMBER 16 - AFTERNOON SESSION

BIO UPDATE/CURRENT ISSUES

1. BIO/NSF FY 2001 Budget, Dr. Mary Clutter.

Dr. Mary Clutter presented the budget history of the NSF over the past fifty years and the fiscal year 2001 appropriations approved by Congress. She addressed the addition of specific language in the appropriations bill and outlined the five major challenges facing the NSF in fiscal years 2001 to 2005. The rest of the session included discussions on various topics from the expansion of the MRE program to include cyber infrastructure to the size and duration of awards. The group had a good discussion on the topic of "boxology" and how to foster cross discipline thinking. NEON was seen as a potential means for cross-pollination of researchers. The importance of integrating the social sciences in these types of discussions was stressed.

2. Biocomplexity, Dr. Joann Roskoski and Dr. Grace Wyngaard.

Fiscal year 1999 was the first year of the Biocomplexity program. Dr. Roskoski outline the type of proposals received and the number and size of the proposals funded. She also presented several incubation activity awards and research projects that exemplified the multidisciplinary nature of the Biocomplexity program. The committee talked about the selection process for the awarded proposals and the number of environmental proposals submitted. Dr. Wyngaard

stressed that all Biocomplexity proposals contain a management and informatics plan.

Dr. Wyngaard began her presentation with an outline of the draft for the FY 2001 Biocomplexity in the Environment special competition: Integrated Research and Education in Environmental Systems. The new competition contains four thematic areas. The draft strategic plan for FY 2002 to 2006 includes five broad themes and four more focused themes. Dr. Wyngaard provided more in depth coverage of the Genome-enabled Environmental Science theme. This approach to studying biocomplexity utilizes genetic information to understand the functioning of ecological systems.

3. Information Technology Research (ITR), Dr. Eugene Bruce and Dr. Gerald Selzer.

Dr. Bruce provided an overview of the FY 2000 ITR competition and relayed some of the biology-related topics from the 2000 ITR proposals. Lastly he addressed the five ITR Research Areas for the FY 2001 competition. The group discussed the educational component of the ITR grants and the individual management of awards by separate divisions. ITR awards appear to be creating a change in the scientific community as more institutions allow researchers to form non-traditional working teams.

4. Plant Genome and 2010 Project, Dr. Machi Dilworth.

The Plant Genome Research Program hosted an awardees meeting in September. Two PIs from each project attended. In 2000, the Plant Genome Research Program will move away from supporting infrastructure to focus more on functional genomics, tool development and broadening the participation in genome research. The 2010 Project encourages small groups to concentrate on sequencing a set of Arabidopsis thaliana genes and determining their function. The overall goal is to determine the function(s) of all 25,000 genes in Arabidopsis.

5. NEON, Dr. Terry Yates and Dr. Scott Collins.

This proposed project has generated support from researchers, other countries, and a host of other agencies. The committee expressed its support for the NSF lead role in the project.

6. Nanoscale Science, Dr. Mary Jane Saunders and Dr. Eve Barak.

Dr. Mary Jane Saunders reviewed the Nanoscale Science initiative. The committee discussed the scope of the biological proposals submitted to the initiative. One conclusion regarding the bio-related proposals was that the initiative may not be reaching environmental researchers

7. MPS/BIO Working Group, Dr. Mary Jane Saunders and Dr. Margaret Palmer.

Dr. Mary Jane Saunders explained the charge of the working group and its plan to promote cooperation in the internal and external scientific communities. The Working Group has already hosted one speaker who exemplifies the type of cultural cross over between mathematics and biology that the group would like to foster. Multidisciplinary researchers should be the rule not the exception. To this end, the committee recommended promoting changes in the graduate and undergraduate curricula. The conversation then turned to IGERT and its influence on the scientific community. IGERT helps to create non-traditional researchers.

Dr. Sam Scheiner presented a brief explanation of the Mathematical Sciences initiative. This is another area where cross-disciplinary work by undergraduates and graduates can create positive cultural changes.

BIOAC Activities

Education Working Group, Dr. Marvalee Wake and Dr. Laura Hoopes, Staff Liaison: Dr. Grace Wyngaard

Dr. Wyngaard discussed the findings of the study by the Education Working Group. One of the recommendations was for NSF to develop an education philosophy. To improve teaching will require a paradigm shift and a new set of tools. The draft report also recommends a stronger working partnership with EHR. In closing, Dr. Wyngaard outlined the five main themes of the Directorate's Education Philosophy. The group then discussed biology's unique contribution to the Foundation's education effort, citing as an example the work in neuroscience on the science of learning. In addition, revised programs such as the new REU sites announcement and Research Opportunities Awards provide undergraduate and K - 12 teachers with more opportunity to hone their pedagogical skills. Science should be taught by the same method that scientific research is conducted. The group recommended a dialogue with EHR to focus on the way in which science is taught and the way in which it should be taught.

Genomics Working Group Report on Microbe Workshop, Dr. Claire Fraser and Dr. John Wooley Staff Liaison: Dr. Maryanna Henkart

Dr. Maryanna Henkart described the purpose of the Microbe Project workshop and identified the seven topics covered at the session. The working group intended to have an action plan ready in a month (January 2001). The working group goals were to define NSF's role in the microbe project and to help recommend focus areas of microbial genomics. Dr. Henkart provided information on the group's breakout session topics: genome sequencing/ sequencing biodiversity; bioinformatics and infrastructure; and functional genomics. The working group also defined five specific recommendations for the BIO Directorate.

Important future foci:

1. Catalog the biosphere to increase the breadth of phylogenetic knowledge.
2. Implement centers of excellence in genome analysis.
3. Define and implement standards for genome annotation and data storage.
4. Training in genome enabled science for undergraduates and established investigators.
5. NSF should fund existing centers to bolster the study of functional genomics.

LTER 20-Year Review, Dr. Frank Harris

Dr. Frank Harris reviewed the history of the LTER program and discussed a proposed 20-year review. The focus of the AC discussion was on how to capitalize on the information technology boom using the LTERs. Data sharing requires standardized information protocols and leadership to provide guidance to the sites. These sites provide a wealth of information on student participation and education as well as long term scientific data. The key is to synthesize all the information generated from all the LTER sites.

Environment Report on AC-ERE Meeting, Dr. James Collins and Dr. Leonard Krishtalka

Staff Liaison: Dr. Joann Roskoski

Dr. Joann Roskoski presented a report on the Advisory Committee for Environmental Research and Education (AC-ERE) meeting. This is the first advisory committee created by the NSF for a virtual area. Because of the long-term nature of the committee's agenda, the committee appointments last one to two years and the committee will continue to meet for the foreseeable future. Dr. Clutter emphasized the need for new methods and tools to understand complex systems and to synthesize environmental research across disciplines. Dr. Edwards recommended joint advisory panels to foster the type of cross communication needed for such an ambitious agenda.

GPRA report discussion

The Committee approved the BIOAC GPRA report with modifications. All numerical ratings were removed from the report. The group discussed the utility of attempting to quantify the GPRA objectives in this way. The general consensus being that quantitative data such as number of publications produced by NSF supported PIs and the efficiency of the review process are more desirable measures. Because the Foundation is shifting towards a completely electronic review process, the group favored increasing the number of IT staff. In addition, the gathering of publication data would require the creation of a new searchable database and therefore also requires more trained IT staff. Lastly, the committee addressed the amount of reporting time required to produce the GPRA report and recommended that the staff be increased to lessen the burden.

FRIDAY, NOVEMBER 17 - AFTERNOON SESSION

Protein Structure Initiative and Alliance for Cellular Signalling, Dr. Marvin Cassman, NIGMS/NIH

In September, the National Institute of General Medical Sciences (NIGMS) launched its new pilot project in structural genomics. Seven centers were designated as the lead organizations for the projects. Some of the target species of the projects are *Mycoplasma genitalium*, *Drosophila melanogaster* and *C. elegans*.

Dr. Cassman also discussed the agency's pharmacogenetics research and the new "Glue Grants," which are designed to promote collaborations to address complex topics such as cellular communication. The "Glue Grants" require high throughput analysis and large databases to store data. Therefore a high priority is the coordination between the groups studying the protein structures. One solution may be distributed computing. The question then is who would oversee the progress of the research groups and maintain the integrity of the site. Dr. Cassman also detailed the Alliance for Cellular Signalling project. For more information please visit: <http://afcs.swmed.edu/>

Status of Microbial Cell Project and Environment Budget Dr. Aristides (Ari) Patrinos, DOE

Dr. Patrinos discussed the DOE budget for 2001, highlighting some of the areas that received increases (infrastructure and initiatives in biomedical and microbial cell research, climate modeling, environmental remediation and some construction for Mouse House at ORNL). Dr.

Patrinos emphasized the need for NSF and DOE to work together to integrate programs and to share resources efficiently. He also mentioned an interagency report on the status of microbial science due to be out in December. The Microbial Cell project is an integral part of the "Bringing the Genome to life" initiative. The DOE hopes to receive funds in the 2002 budget to implement the findings from this report.

Future Business

Future Workshops

The AC recommended sponsoring three workshops.

1. Long term stewardship of BIO initiatives within NSF. To whom should this responsibility fall? Dr. Krishtalka and Dr. Wooley volunteered to co-lead a workshop, using the Microbial workshop as a model, on this topic.

2. Ten Most Important Questions in Biology. Create a joint committee with other AC members to write this document which would be presented to the new Presidential Science Advisor. It was suggested that the Committee invite Dr. Murray Gell-Mann (Santa Fe Institute) to participate in the working group.

3. Curatorial Responsibilities for Databases. The working group would focus on the creation of standards for NSF-supported databases. Industry and the scientific community must coordinate the cataloging and annotating of collected data. Dr. Krishtalka volunteered for the database workshop.

FY 2001 BIO Committee of Visitors

The list of upcoming meetings was sent to the members of the committee. The following AC members volunteered to attend these meeting:

- Division of Biological Infrastructure - Plant Genome, May 9-11, 2001 - Dr. Bert Ensley
- Division of Environmental Biology - Long Term Research, March 28-30, 2001 - Dr. Leonard Krishtalka
- Division of Integrative Biology and Neuroscience Division, March 20-22, 2001 - Dr. Gwen Jacobs
- Division of Molecular and Cellular Biosciences Cell Biology Cluster, March 21-23, 2001 - Dr. George Jones (tentative)

Future Meeting Dates:

Spring -- April 26-27, 2001

Fall -- November 8-9, 2001

Dr. Ellen Goldberg will be the next chair.

The meeting adjourned at 2:15 p.m.

APPROVED:

/S/ Ellen Goldberg April 26, 2001

Ellen Goldberg, Chair Date

[Back to Meeting Agendas and Minutes Page \(.../advisory.jsp\)](#)

National Science Foundation, 2415 Eisenhower Avenue, Alexandria, Virginia 22314, USA Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749