

**Division of Molecular and Cellular Biosciences
Directorate for Biological Sciences
National Science Foundation**

**Response to the report by
Committee of Visitors (2011-13)**

The Directorate for the Biological Sciences (BIO) and the Division of Molecular and Cellular Biosciences (MCB) appreciate the hard work, insightful comments, and constructive recommendations of the Committee of Visitors (COV) while assessing the processes and portfolio management in MCB during FY2011-13. After receiving the COV report, the Division held a series of discussions to develop an implementation strategy and found the recommendations made by the COV to be thoughtful. This document contains the BIO response to specific recommendations¹ made by the committee in its report.

General recommendations:

1. MCB must continue to provide an intellectual hub for key foundational research centered at quantitative, predictive, theory-driven biology at the molecular and cellular level.

This approach is vital to the advancement of the entire field of Biology. The proactive outreach and connections to other fields spawns new emerging areas of research. The co-funded interdisciplinary projects are an excellent complement to the important single-investigator research grants. This is a funding model of how NSF should work.

Response:

The Division agrees with the recommendation and will continue to give high funding priority to the quantitative, predictive and theory-driven research in molecular and cellular biosciences. This will be achieved through budgetary considerations and catalytic investments in the emerging areas at the intersection of biology and other disciplines.

Sponsoring workshops in leading edge topics is one mechanism to ensure that MCB continues to be an intellectual hub for key foundational research centered on quantitative, predictive, theory-driven biology at the molecular and cellular levels. The Division believes that a clear plan to achieve outcomes such as well publicized reports and publications is essential for a successful workshop. A small list of workshop ideas will be developed based on the COV's suggestions and internal budget development discussions. These will be sponsored to obtain community input into budgetary priorities and the Division's portfolio development strategies.

2. Seeking transparency for Division and Directorate vision, process and policy.

¹ The COV report summarized the major recommendations in the executive summary as well as additional recommendations in the body of the report. The two sets of recommendations are largely, but not completely, overlapping. In this document, the Division has first responded to the recommendations in the executive summary and has added a section 'other recommendations' to discuss the additional recommendations that were made throughout the body of the report.

The COV became aware of concerns about morale within the Division. The COV has confidence in the management structure of MCB, and values the fundamental and multi-disciplinary program that MCB has developed via the portfolio of funded projects. The COV perceives a threat to this valuable program if morale in the Division becomes a distraction. There appears to be many recent and imminent changes in the organization; the COV is concerned about how these changes will impact the scientific community. The COV recommends greater transparency in the mechanisms used to recruit and fill key management positions in BIO (e.g., Division Director, Deputy AD, AD positions).

Morale and HR inconsistencies were noted by the administrative staff. Staff were proud of their performance and of the Division and its management; however, they feel as though their efforts go unrecognized by the Directorate as a whole and would benefit from more transparency in policies and hiring practices. Many of the staff do not have a clear sense of their career development opportunities or potential for upward mobility.

Response:

The Division agrees that transparency in the Division and Directorate vision, processes, and policies is critical in efficient and effective functioning of a Division towards accomplishing NSF's mission of advancing the progress of science. The Division values transparency, as it pertains to maintaining a working environment grounded in openness, communication, and accountability. The Division understands that transparency can be undermined in times of change, especially if staff perceive there is not enough sharing of information about the outcomes—good and bad—of the change. Therefore, the MCB leadership will increase its efforts to communicate information in the Division.

Currently MCB uses several methods to implement transparency in the Division, including: twice monthly staff meetings, the 'FYI MCB' emails to the staff when there are some important developments, and staff input in hiring process. In the recent Division retreat, we started implementing the COV recommendation by including open discussions on the organization of administrative staff, and to enhance transparency further, the Division will undertake the following actions:

1. Implementing additional regular communication: Currently the Division has a monthly staff meeting for providing updates to and receiving input from the staff. It will experiment with increasing the frequency of these meetings. All communications and standard operating procedures will be archived on a SharePoint site to make them easily accessible to all staff.
2. Streamlining communication responsibilities: Currently many persons are involved in internal and external communication (AAAS Fellow, Division Director, Deputy Division Director, Program Support Manager, etc.). The Division will streamline both external and internal communication by making it the primary responsibility of one program specialist/biologist or program analyst/biologist in the Division. This individual will report to the Deputy Division Director who will oversee the development and implementation of communication strategies for MCB.
3. Changes in personnel practices: The Division strives to be open and fair in its recruiting and hiring practices. MCB will increase transparency in the personnel processes through the following steps.

- a. When making offers to prospective candidates, the Division will clearly communicate the opportunities that exist for career advancement, thus providing realistic expectations.
- b. Regular updates on recruitment efforts will be provided to the Division even if there has been no progress.

At the Directorate level, transparency will be further enhanced in future hires and appointment of Deputy Division Directors, Division Director, Deputy AD, and AD positions through the development and communication of standard operating procedures by the permanent BIO Senior Executives.

3. Generate mechanisms to foster interactions among the divisions of the BIO Directorate. *The entire field covered by the BIO directorate is moving towards more quantitative and predictive science. More coordination and interaction within MCB would help all the divisions better realize their full potential. Mechanisms should be developed to provide incentives for collaborative funding among Divisions of the BIO Directorate.*

The COV observed a general lack of cohesion and integration between Divisions of the BIO Directorate, and also among some clusters within MCB. In particular, Genetic Mechanisms Division seemed disconnected and not coordinated with the rest of the MCB team.

The COV recommends a regular strategic planning meeting involving PDs, DDs and ADs across the Bio Directorate in order to develop better cohesion and coordination of Bio funding activities. This will provide the opportunity to better integrate the Bio Directorate team.

Response:

The Division agrees that the interactions among BIO divisions are critical for investing in the transformation of biology from a descriptive science to a predictive science. The COV questions in the standard report template did not refer to the interactions among the divisions within a discipline. Therefore, data were not provided to the COV regarding the extensive interactions between MCB and other divisions in BIO. During the period under review, MCB has collaborated with each of the three other divisions for special activities as well as for supporting regular research grants. Here are the examples of MCB's collaborations with other BIO divisions.

IOS:

- NSF-BBSRC Ideas Lab on Enhancing Efficiency of Photosynthesis and continuation of the Ideas Lab projects
- NSF-BBSRC Ideas Lab on Improving Nitrogen fixation and utilization
- NSF-JST program on metabolomics and continuation of the funded projects

DEB:

- Workshops to develop a research agenda on the ecological impacts and evolutionary implications of synthetic biology

DBI:

- NSF-BBSRC Lead Agency agreement for evaluation of US-UK collaborative projects in computational biology, system biology, and bioinformatics

The newly developed portfolio management process in the Directorate contains opportunities for the Program Directors to plan strategic collaborations for managing the exciting science frontiers in their portfolios. These increased opportunities for interactions and for sharing information will help to further increase the inter-divisional interactions in the Directorate.

MCB has provided budgetary incentives for aligning the portfolios of all clusters with the Division's consensus vision, while providing enough flexibility to maintain diversity of topics and systems. It will continue to provide budgetary incentives for funding research projects that align with the NSF, Directorate, and Division vision and priorities.

4. Ease Domestic and Foreign Travel Restrictions.

The current restriction on travel budget is a detriment to the overall well-being of the MCB program. The PDs need to continue to have opportunities to travel to national and international meetings, and for other outreach activities as well as to various institutions to interact with funded PIs and with potential future PIs.

The ability of MCB program leaders to remain active participants in the greater scientific community is crucial to their effectiveness in managing the competitive review process, but more so in their ability to make quality judgments on proposals. Undue travel restrictions on MCB program leaders will jeopardize portfolio balance.

Response:

The Division agrees that restrictions on Program Director travel (imposed by OMB guidelines) have the potential to undermine the Division's ability to meet its scientific goals and to serve its PI communities. To implement the COV recommendation, prioritization of domestic and foreign travel will continue to be determined by the Division, because the Division is in the best position to understand the potential outcomes of the travel.

5. Generating a plan for broadened career development for MCB trainees.

The COV is concerned about the general challenge presented by the limited opportunities for Ph.D. and postdoctoral scientists who are being trained with NSF support, and the evolution of the scientific workforce and its diversity in the United States. How are MCB and NSF responding to the Alberts et al. PNAS paper noting that only 8% of Ph.D. trained-scientists go to academic positions?

Response:

The Division believes that the issues in the Alberts et al. paper should be addressed where appropriate. The focus of this analysis was on biomedical research and training, and as these areas are not supported by MCB, the issues may not be as pressing for the Division's stakeholder community. However, in the next version of the core program solicitation, the Division will encourage PIs to consider the findings of this paper in the mentoring of students and post-docs in individual research projects, recognizing that many might choose careers beyond academia. **The Division will also consider presenting information about alternative science careers in the Foundation during outreach to the community.**

6. Evaluation, documentation and follow up on Broader Impacts

We recommend that applicants and reviewers be instructed to address both aspects of Broader Impacts:

- a) What are the broader scientific and societal impacts of the proposed research, and*
- b) What are the broader impacts associated with the supported personnel, such as education and outreach activities?*

This will encourage better uniformity in the review process and level the playing field for applicants.

The Broader Impacts of the project to society should always be explicitly addressed and will aid in justification of awards to the general public.

Finally, annual reports and the Results of Prior Support sections of proposals should clearly outline progress towards the stated Broader Impact goals to ensure follow up.

Response:

MCB agrees that the broader impacts criterion has to be explained better to the reviewers as well as to the PIs for a consistent evaluation of the criterion. MCB will continue to provide guidance to the PIs and reviewers about the broader impacts definition as stated in the Grant Proposal Guide. The Division has started to consider a number of actions for improving review and evaluation of broader impacts. Based on the previous COV's recommendation, MCB has instituted a reporting requirement for educational and training broader impacts. Now that the annual reports for the projects that were funded since this requirement was instituted are available, the Division will assess the effectiveness of this requirement in evaluating the outcomes of the broader impacts activities of MCB-funded projects.

7. Develop and Improve methods for communicating scientific achievements and the value of fundamental science.

Without basic science there will be no future translational research. This is a particular, but important, challenge for foundational areas such as those funded by MCB. An avenue should be identified to better publicize the highest quality scientific and educational highlights of funded projects.

Response:

MCB agrees that communicating the exciting outcomes of MCB funded research is an important responsibility of the Division. In response to this recommendation, MCB will dedicate one FTE as a Biologist/Program Specialist for internal and external communication. MCB has already started discussions about a communication strategy for the Division, which will be finalized in FY15.

8. Evaluation of the use and review of EAGER awards. *The COV has concerns about the mechanism and use of EAGER grants. Often they are not used for their intended purpose. Evaluations and funding decisions appear to be made primarily by a single PD. The COV suggests that a more inclusive and transparent mechanism be developed, with evaluation by at least 2 PDs documented in the Review Analysis. The basis/rationale for using the EAGER mechanism should be made clear in the documented reviews. Other means for bridging funds on closed grants need to be developed.*

Response:

MCB thanks the COV for its recommendation about the EAGER awards. The Division agrees that EAGERS should be used for their designated purpose - to support the early stages of potentially transformative (high risk-high payoff) ideas. To address the concerns of the COV, provide transparency and accountability, and ensure a level playing field for all PIs, MCB will implement the following actions:

- At least two Program Directors in addition to the cognizant Program Director will be involved in the review of EAGERS and the comments from them will be recorded appropriately.
- The Division Director will ensure that the cognizant Program Director has adequately addressed the criteria for EAGERS.
- The high-risk nature of EAGERS means that some failure should be expected. In such cases, the cognizant Program Director should ensure that the Final Project Report includes an explanation about why the project was not successful in accomplishing its goals.

The Division would also like to share the results from a just-completed study by a summer intern who examined 49 EAGERS funded by MCB since 2009. The intern found that EAGERS had equal or better outcomes compared with peer-reviewed awards, as judged by the numbers of patents, publications, and citations. After the expiration of EAGER awards, some PIs continued their projects while others did not. MCB considers these to be signs of a relatively healthy approach to funding high risk – high reward ideas, and believes the above changes in process, implemented in response to the COV's report, will strengthen it.

9. Avoiding unnecessary conflict of interest (COI) restrictions:

We recommend that the terms, restrictions and definition of COI be re-evaluated and updated. The COV is concerned that with the increased emphasis and funding for large collaborations and interdisciplinary projects, the 48-month restriction of coauthoring a paper will make it difficult to find qualified reviewers who do not have COI. A careful analysis of multi-PI publications might help to distinguish between close collaborations and one-time community projects.

Response:

The 48 month co-author restriction is found in the Supplemental Standards of Ethical Conduct for Employees of the National Science Foundation, a regulation which was approved by the U.S. Office of Government Ethics and the Department of Justice (5 CFR 5301. 102). Depending on the specific facts and circumstances, including the number of authors on a given publication, an authorization for an individual to serve as a reviewer despite the co-authorship may be granted by the appropriate NSF Conflicts officials.

10. Continue to implement the once per year submission cycle for proposals.

The COV appreciates the rationale for the recent implementation of a single annual submission date. The COV strongly believes that the pre-proposal mechanism should not be implemented by MCB.

Response:

As recommended by the COV, MCB intends to continue to accept full proposals annually and does not plan to implement the pre-proposal mechanism at this time.

Other recommendations

In the COV report, there were additional suggestions in the sections in the COV report template (listed below). We will address these suggestions these suggestions or communicate them to appropriate offices at NSF (e.g. Division of Information Systems).

- We further encourage the Division to continue to seek solutions to the problem of promoting substantive reviews without prescribing a "checklist".

Response:

The Division agrees with this recommendation; MCB will emphasize that program directors should provide panelists with guidance on writing reviews that discourages the use of checklists. MCB will investigate ways (e.g. through modifying the invitation letter) to encourage ad hoc reviewers to write substantive reviews.

- We urge that, when Program Directors ask potential reviewers whether they are willing to review a particular proposal, at that stage only the Project Summary should be provided. Access to the entire proposal should only be given to reviewers who actually agree to review the proposal.

Response:

The Division agrees that a system in which a reviewer was given access to the full proposal only after agreeing to review would be desirable. However, formal requests to review proposals are sent to potential reviewers using the NSF electronic correspondence system, because this system requires potential reviewers to acknowledge and accept the conflict of interest rules before they access the proposal. Unfortunately this system for assigning and generating review letters cannot generate review requests that give access only to the abstract. The suggested change could not be implemented manually within the current system, therefore, this recommendation will be forwarded to the Division of Information Systems.

- We have a technical suggestion that will help future COVs: In the spread sheet with the data on the proposals, the Average Merit score is calculated excluding the reviews that give multiple ratings. We wondered why proposals with average scores of 5.0 were declined while proposals with an average score of 3.0 were funded. Upon examination, the former situation arises when a proposal is rated E by one reviewer and G/F by two other reviewers, for instance. We feel that the dual scores should be counted as half-integer scores; thus in this example the average score should be $(5 + 2.5 + 2.5)/3 = 3.3$, not the 5.0 that is currently reported. The latter situation is illustrated by another example, wherein a proposal that is scored as G by one reviewer and E/V by three reviewers should be averaged as: $[3.0 + (3 \times 4.5)]/4 = 4.1$ and not 3.0 as reported.

Response:

MCB agrees with this recommendation. This shortcoming will be reported to the Division of Information Services.

- We think in-presence reviewing is a good practice that should be continued to ensure an open discussion and consensus decisions.

Response:

MCB agrees with recommendation and will use in-person panels as much as possible.

- The COV however, is concerned that the PIs of declined CAREER proposals may not have sufficient time (6 weeks) to resubmit to the regular mid-November deadline, since the way a CAREER proposal is put together is very different from a regular proposal.

Response:

MCB agrees with COV's concern and will consider it in the next revision of the core program solicitation.

- It would have been helpful to provide data segregated by award type to evaluate the size and duration of projects, especially the conference awards, as these tend to be small in size and duration, skewing the aggregate data.

Response:

MCB agrees with recommendation and provide data segregated by award type to the next COV.