

**Directorate for Biological Sciences
National Science Foundation**

Response to the Committee of Visitors Report
Division of Molecular and Cellular Biosciences
(FY 2018-2021)

The Directorate for Biological Sciences (BIO) and the Division of Molecular and Cellular Biosciences (MCB) would like to thank the Committee of Visitors for their efforts and thoughtful feedback in evaluating MCB's review processes, portfolio characteristics, and portfolio management practices during FY2018-2021. The Division has reviewed the Committee's recommendations and suggestions over a series of retreats dedicated to developing and implementing strategies for addressing the Committee's recommendations. This document contains the BIO response to specific recommendations¹ made by the Committee in its report.

General Recommendations in the Executive Summary

- 1. Merit Review.** *(a) The COV suggests MCB provide clarity to reviewers on what constitutes a thorough and impactful review of a proposal's broader impacts. New BI Rubrics under development (<https://aris.marine.rutgers.edu/wizard/rubric.php>) should be incorporated into reviews. (b) MCB should also develop longitudinal metrics to track the impact and success of projects funded through the internal review process.*

Response:

- BIO agrees it is critical for reviewers to understand the significance of broader impacts in the NSF merit review process and that broader impacts should be substantially addressed by the reviewers. MCB currently provides training for panelists and reviewers that includes detailed information on what NSF is looking for in assessing broader impacts. Panelist training encourages reviewers to consider the impact of the proposed broader impact activities, rather than novelty, and requests that reviewers provide substantive comments that would be helpful to PIs. Training currently points panelists to the 'Advancing Research Impact in Society' (ARIS) website. Ad hoc reviewers are often solicited expressly for their expertise in the intellectual merit and while they are provided guidance on the review criteria for broader impacts, it is not atypical for these reviews to focus more on intellectual merit.
 - BIO also agrees with the importance of developing longitudinal metrics to track the impact and success of intellectual merit and broader impacts in all funded projects, including for proposals that are internally reviewed. Efforts to develop such metrics are underway across BIO.
- 2. Quality of Science.** *(a) The COV expressed concerns that the cost for running a research operation has increased over the years (higher salaries, including graduate students and postdocs, lab supply, instrument time, etc.), which is not well reflected in increased budgets of the awards. MCB should explore whether an increase in grant size should be leveraged against a lower funding rate. (b) The*

¹ Our responses to the COV Report address recommendations contained in the Executive Summary, as well as those made in other sections of the Report. In instances where recommendations from other sections duplicated those that were in the Executive Summary, we provide a consolidated response to the recommendation in the Executive Summary.

COV would recommend a more transparent mechanism (for the wider community) for evaluating and assessing high risk awards like RAPID and EAGER and other internally reviewed awards. (c) It may be helpful to clearly define what MCB means by “theory-driven” research as the phrase may vary in meaning by different disciplines and has been changing over time.

Response:

- a) BIO appreciates the Committee’s awareness of MCB’s budgetary constraints. MCB will continue to weigh the impact of the increased cost of research on award budgets and funding rates and will continue to work with PIs to ensure that budgets for newly funded projects are appropriate for the scale of the research and broader impacts activities..
- b) Invitation and review of RAPIDs, EAGERS, and other internally reviewed proposals, is based on criteria provided in NSF’s Proposal & Award Policies & Procedures Guide (PAPPG). Program directors in MCB encourage potential applicants to familiarize themselves with those criteria and to discuss the appropriateness of the suggested research area prior to proposal submission. As with externally reviewed proposals, applicants who are declined, or who are discouraged from submitting internally reviewed proposals, are provided substantive feedback.
- c) As with all Divisions in BIO, MCB is continually updating its solicitation and web presence to be reflective of emerging research areas and changes in scientific priorities. MCB has noted the Committee’s recommendation regarding “theory-driven”, and we have updated our language to to clarify our intent.

- 3. Effects of Switching to a No-Deadline Submissions.** (a) *The COV strongly suggests following submission trends over the next few years carefully. Especially important will be to uncover what has happened to people who did not submit new proposals (but had been previously funded by MCB).* (b) *The COV recommends making sure all potential PIs are aware of the general cycle of panels, so that no specific group has an unfair advantage in terms of when to submit and to caution people away from times of the year where longer delays from submission to funding actions are likely to occur.* (c) *The COV also recommends continuing evaluation of the ideal number of ad-hoc reviewers and panel logistics.*

Response:

- a) BIO is aware of the decrease in submissions to MCB since the implementation of no deadlines. We will continue to collect data to monitor submission trends and to develop strategies to ensure that MCB continues to serve its research community.
- b) BIO agrees that transparency is a critical element of a fair and inclusive merit review process. MCB promotes transparency of its review cycle and processes through virtual office hours (VOH), our blog, and via program director outreach. We will continue to use these communication strategies to provide information about the time required for proposal processing at different times of the year, but in very broad terms to avoid undermining the principle of ‘no deadlines’. We have no anecdotal or statistical evidence that any ‘group’ has an unfair advantage as to when to submit proposals.
- c) MCB uses ad hoc reviewers most often in instances where a panel may have limited expertise. This need differs by proposal and by panel, but we strive to ensure that each proposal receives substantive evaluations that address both broader impacts and intellectual merits, as directed

by the PAPPG. The opinions of ad hoc reviewers are discussed during the panel deliberation on each proposal and thereby taken into consideration by the panel in rating the proposal.

- 4. Effects of Covid-19.** *The COV urges MCB to continue gathering data about disproportionate effects, and continuing to respond with targeted interventions (whose effectiveness is regularly assessed). In particular, MCB needs to develop explicit, consistent and persistent plans for dealing with gaps in productivity by applicants associated with pandemic shutdowns. Guidance must be provided to ad hoc reviewers and panelists. Some of the interventions, like the REPS program, seem worth retaining for the long-term.*

Response:

BIO recognizes the potential for long-term, disproportionate effects of COVID-19 on PI productivity and career progression. Through monitoring of submission and funding data, MCB continues to follow demographics across proposal submissions and awards, as a way to detect and minimize potentially disproportionate effects of the pandemic. The DCL for Research Experiences for Postbaccalaureates, which was offered to mitigate the negative effects of the pandemic on the ability of undergraduates to gain mentored research experiences, has been archived, but supplements for postbaccalaureates are still available as described in the MCB core program solicitation. Also, the Research and Mentoring for Postbaccalaureates (RAMP) program was begun to support mentoring networks for postbaccs.

- 5. Broadening Diversity and Inclusion.** *MCB should continue to improve diversity among its program directors and panelists to reflect the MCB applicant community.*

Response:

BIO recognizes the importance of diversity among program staff and panelists. MCB always strives to broaden gender, ethnic, and racial diversity among the program directors and administrative staff. With each hire, MCB considers the breadth of expertise, experience, and diverse perspectives a program director will bring to the Division. With respect to panelists, program directors are charged with maximizing diversity of panelists with respect to gender, race, ethnicity, career stage, institution type, and geographic location, and prior to appointment of the panelists, panelist rosters must be approved by the DD/DDD, who evaluate them for diversity.

- 6. Rotators versus Permanent Staff.** *We encourage MCB to evaluate and articulate a sustainable plan for management of their program directors that will provide the needed stability, scientific expertise, and diverse outside perspectives.*

Response:

BIO fully embraces the NSF tradition of employing rotating program directors to complement the permanent program staff. We believe the outside perspectives of rotators is vital to the scientific mission of the Directorate. MCB regularly engages Division staff in strategic discussions of staffing needs, and MCB's staffing plans are reviewed and are subject to approval by the Directorate leadership on an annual basis.

- 7. Distinctions in Workforce Development.** *(a) The COV strongly encourages MCB to pursue additional efforts to bridge workforce development initiatives to other areas of the NSF that can leverage the MCB portfolio to develop opportunities for expanding workforce readiness programming (e.g., Advance Technology Education, TIP). In addition, the COV suggests MCB consider strategies to engage and expand the impact zone for career pathways through incentivizing supplements for*

researchers (INTERN, NSF 18-102/21-013, REPS: 21-085). **(b)** In addition, we suggest increasing participation of 2-year institutions and other federal agencies, such as the Manufacturing Innovation Institutes, who can benefit tremendously from the products of MCB's portfolio (continue investment in Future Manufacturing (NSF 20-552, NSF 21-564)). As NSF expands its programmatic capabilities, it is critical for MCB to establish and maintain connections across the institute to build workforce capacity, entrepreneurship, and career development pathways.

Response:

- a) BIO agrees that bridging workforce development initiatives to other areas of NSF is an excellent means for leveraging MCB's portfolio to expand workforce development programming. MCB continues to partner with DBI to co-manage and co-fund BIO-wide programs on human resource development across multiple career stages, e.g., K-12 teachers, undergraduate and graduate students, post-baccalaureates, postdoctorals, and early- and mid-career academics. We will continue to incentivize supplement opportunities, to develop programming that has workforce development as a requirement (Biology Integration Institutes and Integrative Research in Biology) and to work with partners across the Foundation to invest strategically in efforts to build workforce capacity and entrepreneurship.
- b) BIO recognizes that many two-year institutions do not have a research-intensive mission, which may limit the opportunities available to them for requesting BIO funding directly. Nevertheless, through new programmatic activities in partnership with the new Directorate for Technology, Innovation, and Partnerships, BIO and MCB should have opportunities to expand connections for workforce and entrepreneurship development.

8. Thematic Selection and Balance Between Distinct Clusters. *Going forward, MCB should make sure to maintain an appropriate balance of single-investigator, curiosity-driven research and larger thematically driven science.*

Response:

MCB conducts annual portfolio reviews to evaluate the balance of the scientific portfolio in each cluster and will continue to emphasize the importance of curiosity-driven research in our core solicitations. Thematically driven solicitations are used to push new frontiers or new areas of intersectionality to drive fundamental research via individual and collaborative endeavors.

9. Responses to Prior COV. **(a)** *The COV recommends that MCB focus on the actual impact of broader impacts and less on the development of new and "transformative" programs.* **(b)** *One partial solution might be to explicitly ask for an extended retrospective accounting of broader impacts activities from any PI that has received previous funding (beyond the cursory coverage in the Prior Funding section), with a more minor role for future activities (building/improving on what they have already established).* **(c)** *While assessment plans for BI are increasingly being included, funds to pay for this work and expectations for reporting back on results should become routine parts of new submissions.*

Response:

- a) BIO appreciates the Committee's recognition of MCB's prior efforts and activities in response to the previous COV report. We continue our efforts to better assess the impacts of funded broader impact activities, and panelists will continue to be instructed by program directors, and

also by the DD/DDD, to consider the impact, rather than the novelty, of proposed broader impacts activities.

- b) NSF policy for proposals, as laid out in the PAPPG, gives specific guidance for what should be included in the Results from Prior Support section and in the Broader Impacts sections of the proposal, thus limiting what BIO might specifically ask at the time of proposal preparation. MCB has instead developed new templates for annual reporting of broader impacts such that Program Directors may better assess progress and impact of these activities.
- c) We agree with the idea that funds to pay for broader impacts activities should be included in the budget, as needed. MCB Program Directors emphasize this point in VOH and other outreach presentations.

10. Communication with Stakeholders. *The efforts to reach PIs new to NSF through various outreach activities should be continued, including trying new ways, such as those experimental methods mentioned to the COV (direct emails to potential PIs). The PDs need to continue efforts to communicate with declined PIs (PO Comments, direct emails) to encourage conversations with a PD, which is a first-step to successful resubmissions.*

Response:

BIO agrees about the importance of outreach and transparent communication with the PI community. MCB continually strives to improve our outreach and to evaluate the success of our efforts. VOH are well attended by the research community and cover topics useful to all stakeholders (reviewers, PIs, and trainees). We will continue to leverage our virtual capabilities to expand these and other outreach efforts, including blogs, webinars, PO comments, as well as direct emails.

Other recommendations:

Additional suggestions, as made in the templated sections of the COV report and responses follow.

- *Ensure review process is accessible to all potential reviewers.*

Response: BIO makes every effort to address the needs of reviewers and will continue to encourage reviewers to let us know if there are particular needs that need to be accommodated.

- *The COV feels that MCB should invest energy and time in evaluating/assessing emerging education opportunities. This is an active area of research and activities, and the COV did not see evidence that MCB is taking advantage of these studies and expertise.*

Response: BIO thanks the Committee for this suggestion. Within NSF, most of the support for education opportunities is funded through the Directorate of STEM Education (EDU). BIO partners with EDU for various educational activities, especially for those targeted to HBCUs and tribal colleges. In addition, through its Division of Biological Infrastructure (DBI), BIO supports a number of opportunities that serve the BIO community writ large, and MCB participates in these efforts.

- *The current cluster categories are broad and do not reveal the real composition of the portfolio and the subdisciplines that comprise them. It might be beneficial to present major subdisciplines and trends within the clusters to appeal to an increased number of scientists*

Response: All Divisions in BIO, including MCB, revise their solicitations and associated webpage descriptions on a periodic basis, most recently in January 2023. We also emphasize cluster funding priorities in outreach materials and in our VOH presentations.

- *The virtual webinars and funding solicitations to HBCUs were viewed as positive and would recommend expanding to MSIs and HSIs to broaden participation. Also It would be worthwhile to articulate more specific goals for that program, beyond increased grant submission.*
- *It is important to start focusing on outcomes and intentionality of engagement in activities related to DEIA. NSF needs specific strategies that lead to tangible outcomes and deliverables to further document that the NSF's efforts on this front are paying off.*

Response: BIO appreciates the Committee's recognition of our DEIA efforts, and MCB continues to develop and introduce initiatives designed to improve outreach and engagement with faculty from HBCUs and other minority serving institutions. NSF's new Strategic Plan includes agency-wide priority goals with specific outcomes, and BIO is committed to playing its part to contribute to achievement of those goals.

- *It would be helpful if the NSF provided and defined clear criteria for evaluating success for different types of grants. The COVs might be better used if they were less focused on procedural features and more on impact and goals of any specific Division.*

Response: The NSF Office of Integrative Activities (OIA) dictates the role and scope of the COV for all divisions and programs. We will pass this recommendation on to them.

- *Developing processes for longitudinal tracking of the success of a grant beyond the end of the funding period and relating that back to the anticipated impact of the original proposal would provide MCB with an important method to assess the effectiveness and long-term impact of funding decisions.*

Response: BIO agrees that this is a worthy long-term goal. We also recognize that the impact of potentially transformative research often may not be realized until many years after the award.

- *Having the COV in a virtual format worked but was more difficult than in person due to difference in time zones. The online format for hosting the COV worked well, but should consider addressing additional accessibility tools to ensure full participation of persons with disabilities.*

Response: BIO and MCB extend sincere appreciation for the effort put forth by the COV, particularly in a virtual meeting with members in multiple time zones. We anticipate that future COVs will be in person whenever possible, with the flexibility to switch to hybrid or virtual meetings, as needed. We will also take steps to improve accommodations for person with disabilities and to explore tools that will improve accessibility to data and reporting features. BIO will share this feedback with OIA.

- *Would there be an advantage to utilizing COV as a science advisory and not just to evaluate procedural approaches?*

Response: As mentioned above, the Office of Integrative Activities dictates the role and scope of the COV. BIO uses an external advisory committee (BIO Advisory Committee) to advise on science to avoid a conflict with the primary charge of the COV to evaluate efficacy of the merit review processes.

- *It might be beneficial for the COV to be provided with some analysis of trends in the biological sciences and how MCB's portfolio fits within this larger field. This would help the COV to give feedback on goals for the next four years.*

Response: BIO appreciates this suggestion. MCB is continually considering how our portfolio fits in the larger field of biological sciences and we hope to share results of some of these analyses with the next COV.

- *The COV did not see evidence of significant change towards standardizing the Ad Hoc reviewer's participation.*

Response: Similar to other Divisions in BIO, as standard panel procedure, MCB tasks one of the panelists (typically the secondary reviewer) with representing the viewpoints expressed by the ad hoc reviews during the panel discussion, and program directors ensure that the content of the ad hoc review is discussed during the panel. Panel summaries do not distinguish between the comments from ad hoc reviewers and those from panelists.

- *The COV felt that NSF still needs to work on better communicating their accomplishments to the general public and the general scientific community.*

Response: BIO and MCB continue to work with the Directorate Communications Specialist and the NSF Office of Legislative and Public Affairs to more effectively highlight and communicate its achievements.