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SOCIETY FOR
MICROBIOLOGY

**American Society for Microbiology Response to
White House Office of Science and Technology Policy
Request for Information to Improve Federal Scientific Integrity Policies
FR Doc. 2021–13640
June 28, 2021**

The American Society for Microbiology (ASM) is one of the oldest and largest life science societies with 30,000 members in the U.S. and around the world. Our mission is to promote and advance the microbial sciences. We appreciate this opportunity to weigh in on actions the federal government, in partnership with stakeholders, can take to improve scientific integrity policies.

ASM is fully invested in the highest standards of rigor and reproducibility in experimental design, interpretation, and reporting. In recognition that scientific advancement is a global pursuit, we support policies that balance the spirit of international collaboration and preservation of scientific freedom with the protection of national security and economic interests. As a global and diverse scientific society, ASM also recognizes the importance of ensuring a safe and inclusive research environment.

ASM's honorific branch, the American Academy of Microbiology, addressed the topic of responsible scientific research in a 2016 colloquium in which participants considered issues related to reproducibility, the ethical conduct of scientific research, and good practices. The Academy's discussions focused on several areas where Federal policies may impact scientific integrity both directly and indirectly, including funding uncertainties. These recommendations remain relevant today and our responses to the Scientific Integrity Fast Track Action Committee (SI-FTAC) RFI are drawn in large part from this report.

ASM encourages the Office of Science and Technology Policy to develop and implement uniform scientific integrity policies and training across the federal research enterprise. Congress should ensure that funding is provided for this work.

Scientific advancement is incremental and requires a solid foundation of rigorous and reproducible information to translate fundamental discoveries into real world applications. Poorly designed experiments, reporting bias, and misconduct all contribute to the publication of erroneous and non-reproducible information and hinder scientific inquiry. However, it is important to avoid conflating lack of reproducibility or replicability, which are key to sound science, with ethical and academic transgressions; there are many scientifically valid reasons that findings may be unable to be reproduced or are difficult to reproduce.

All stakeholders, including funding agencies, research and academic institutions, journals, professional associations, individual investigators, private sector and industry partners and research groups, have a role to play in ensuring rigor and integrity in scientific practice. This premise is supported by the San Francisco Declaration on Research Assessment (DORA), which set forth recommendations to improve the ways in which scientific research output is evaluated by funding agencies, academic institutions, and other parties to avoid incentives that inadvertently undermine rigor and integrity.

ASM commends federal agencies for taking numerous steps to enhance scientific integrity and transparency over the past several years. OSTP should work toward harmonization of these policies and engage with federal scientific agencies and the scientific community to develop uniform underlying principles for scientific integrity policies.

ASM recommends that federal agencies, with OSTP coordination and stakeholder input, publish clear guidelines governing data stewardship and open access, and that Congress provide funds for data management and data infrastructure. SI-FTAC can lead in this area by taking thoughtful steps toward requiring open data but must do so with input from the nonprofit scientific publishers and the research community. Additionally, federal agencies should uniformly encourage adoption of FAIR data standards in federally funded science, as well consider incentivizing private companies to harmonize approaches to metadata underlying experiments.

Data availability and sharing are critical to ASM's mission to advance the microbial sciences. Without access to data, it is virtually impossible to evaluate reproducibility and potential causes or explanations for any lack of reproducibility. A critical component of peer review is to piece together what the authors did to ensure results are both understandable and interpreted correctly. Better data management with metadata that provides crucial insight into exactly what was done and when would alleviate much of the guess work in peer review, and in turn enhance the quality of the science that is published. Better and more rigorous requirements for data management solutions will lead to more rigorous peer review.

In 2019, ASM expanded our own data policy to be more comprehensive and to apply across all our journals, not just those that are open access. As of October 2019, to publish in any ASM journal authors need to make their data publicly available except in rare circumstances, preferably by depositing it in publicly accessible, curated, and sustainable data repositories. While this policy is not without challenges, we believe the open data policy benefits both authors and readers. Data receive persistent, unique identifiers when they are deposited in these repositories, making them findable and citable. Readers have access to the original underlying data described in a paper, enabling the reuse of that data either for reproducibility purposes or for entirely new analyses. In return, the original data generators will receive credit for their work in the form of data citations. Formal data citations promote reproducibility and help identify how data are reused. We also recognize that many scientists are hesitant to share data in advance of publication due to unscrupulous actors who seek to exploit this information. Efforts to encourage data sharing should also seek to address these unfortunate and detrimental circumstances.

Specific requirements for data availability would vary by discipline. Therefore, scientists, institutions, funding agencies, and scientific societies encompassing specific fields should develop best practices and guidelines to address the following: the types or levels of data to be shared (e.g., raw vs. processed), designating responsibility for the storing and sharing of data, and the appropriate centralization of data. Examples of well-established standards for data sharing include those developed by the Genomic Standards Consortium and various repositories of "omics data."

Creating a peer review process that allows for open data sharing will require investment and technological development by the vendors that create the systems journals use for peer review. It also will require investments by companies that create the tools that scientists use to collect their data (e.g., to enable conversion of proprietary file types into open file types while retaining any underlying

metadata). There may be a role for the federal government in facilitating or encouraging these investments.

Publishing both positive and negative data are valuable to the scientific community and reporting of negative results should be encouraged in respected venues. ASM encourage SI-FTAC to consider how this practice might be implemented in federal science agencies.

ASM is committed to providing an outlet for the publication of sound, scientific information that is important to the overall body of research, including null or negative data and results. For example, ASM Journals recently relaunched Microbiology Spectrum¹, which is aimed at publishing all good quality research, including replication studies, negative results, and re-analyses. Scientific societies also provide a multitude of forums for scientists to discuss research outcomes, including but not limited to annual conferences.

ASM encourages SI-FTAC to harmonize anti-harassment and anti-discrimination policies across science agencies, to support and serve as convener for the various entities that are responsible for implementing those policies, and to collect data on an ongoing basis to inform anti-harassment and anti-discrimination policies. Federal support also is needed for the development of infrastructural resources, such as effective training programs to address harassment in science.

Harassment in any form or for any reason undermines the facilitation of good science. As a global and diverse professional scientific society, ASM recognizes the significant role that we can play in ensuring a safe and inclusive environment.² We are committed to promoting an environment that both allows for the free expression and exchange of scientific ideas and promotes equal opportunities and respectful treatment for all. However, the responsibility of the federal science agencies in addressing and eradicating discrimination and harassment cannot be overlooked.

The best science is conducted when research environments are diverse and inclusive, regardless of gender, race or ethnicity, religious affiliation, or sexual orientation. Congress has recognized the need to address these issues through legislation such as the Combatting Sexual Harassment in Science Act. If enacted, this legislation would clarify and strengthen the federal government's role in addressing this by convening stakeholders, authorizing data collection, and funding research to better understand how to address harassment in STEM. ASM supports this legislation and encourages these efforts to expand beyond sexual harassment to address racism and other forms of bias in the scientific enterprise.

ASM commends the NIH leadership for establishing a working group, which has now issued a report making recommendations for changing the culture to end sexual harassment. The report includes recommendations for scientific societies regarding conferences, meetings, and events. ASM also commends the leadership of the National Science Foundation for efforts to directly address harassment among grantees. These efforts are critical to changing the culture and such efforts should be required for all federal science agencies.

¹ Microbiology Spectrum: <https://journals.asm.org/journal/spectrum/about>

² ASM expanded its Member Code of Ethics to capture conduct component. See "Code of Ethics and Conduct" (<https://asm.org/Articles/Ethics/COEs/ASM-Code-of-Ethics-and-Conduct>).

SI-FTAC should consider recommending that federal agencies expand their efforts to educate scientists on fundamental best practices in both conducting and reporting research at all research institutions and across the career spectrum.

Scientific training is, by its very nature, individualized to fields of study, institutions, and laboratories. Such training typically focuses on STEM students and postdocs, though there are data showing that the problem of misconduct spans generations and includes senior scientists ([Fang et al. 2013](#)).

An important way to instill principles of integrity in the research enterprise is to strengthen oversight. This can be done by establishing a comprehensive, consistent, and transparent system to report problems to both research institutions and federal oversight entities (e.g., HHS's Office of Research Integrity) to enforce integrity at all levels. This is certainly an area where collaboration will be needed between federal science funding agencies and the stakeholder community. We appreciate that ORI offers grants that are open to scientific societies. We also support the requirement that every four years, NIH grantees must participate in a Responsible Conduct in Research training; such training should be required of all federally funded scientists, regardless of career stage.

While the scientific enterprise would benefit from federal scientific integrity policies that create a clear set of standards and mechanisms for enforcement across agencies, the SI-FTAC should also consider the underlying factors that drive mistrust, misunderstanding, and misconduct in science. These include inconsistent federal funding, misunderstanding of science among the public, and rhetoric that fuels mistrust.

The members of the American Academy of Microbiology who participated in our 2016 colloquium noted that scarcity of funding can fuel sloppy and dishonest science where it exists. Congress and the federal government can support scientific integrity by providing consistent funding levels for scientific research. Colloquium participants acknowledged that the double-edged sword of competition and scarcity could persist as a complication in resolving problems with reproducibility. Positive forms of competition incentivize the quest for new knowledge or the creation of a particular product. Negative competition—where competition dictates job security or the ability to continue practicing science—can impair creativity and spawn undesirable research practices. Sustainable, predictable funding for research and training is a means by which many of these problems can be addressed.

Concurrent with the pressures induced by decreased funding availability is the rapidly expanding size of today's scientific enterprise—in both numbers of projects and the personnel and resources required—that creates huge pressures on institutions to hit regular home runs with research results. Colloquium participants expressed concern that the focus on “high-impact” science might distort the course of science, such that some important questions are no longer pursued. Publication in high-impact journals has disproportionate rewards for those who succeed. Coupled with the expectation of these journals to publish innovative, flashy, and newsworthy science, these academic and financial rewards might tempt scientists to decrease rigor, artificially tidy up results, and inflate import to submit the “perfect story,” which is, frankly, rare.

Finally, primary, secondary, and university curricula must be based on sound, rigorous science, as opposed to politics or personal beliefs. Curricula must also provide students with a deep understanding

of the role of science in the global challenges they face and prepare them to solve problems creatively, ethically, and innovatively at all levels.

We urge SI-FTAC to continue an open dialogue with the scientific community and research institutions, with the goal of finding an appropriate balance between our nation's security and an open, collaborative, scientific environment.

Scientific advancement is a global pursuit, and it is critical that public policies allow and encourage formal and informal scientific collaboration regardless of national boundaries. At the same time, ASM recognizes that vigilance is required to protect integrity of the publicly funded research enterprise.

The American Society for Microbiology thanks the White House Office of Science and Technology Policy and for making research and development a key priority. ASM and its members look forward to next steps in this endeavor and stand ready to assist you. For more information, please contact Allen Segal, ASM Director of Public Policy and Advocacy, at asegal@asmusa.org or 202-942-9294.

Sincerely,



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Chair, ASM Public and Scientific Affairs Committee