

**American Society for Microbiology Response to
Request for Information (RFI): Inviting Comments and Suggestions to Advance and Strengthen
Racial Equity, Diversity, and Inclusion in the Biomedical Research Workforce and Advance Health
Disparities and Health Equity Research
April 9, 2021**

The American Society for Microbiology (ASM) is one of the oldest and largest life sciences societies, with more than 30,000 members in the United States and around the globe, and a mission to promote and advance the microbial sciences. Microbiology is at the core of an array of interdisciplinary scientific fields and enables us to address fundamental opportunities and threats for humanity. The COVID pandemic is an acute example of how critical knowledge of the microbial sciences is for life on earth and how an incomplete response can uncover gross disparities in equity throughout our society.

ASM achieves its work by comprehensively supporting all aspects of science: generating scientific research, communicating the results and ensuring its impact on society. Specifically, ASM supports professional development, research fellowships, recognition of distinction and achievement, convenings and global meetings, premier journals and publications, policy and advocacy and global public health. We recognize and appreciate that this collection of activities has the potential to impact a scientist's development and career trajectory as well as shift the culture of the community as a whole.

An essential part of ASM's mission is to embrace diversity in the science, technology, engineering, and mathematics (STEM) community. Being inclusive enhances innovation, broadens the health research agenda and furthers scientific advancement. ASM is committed to fighting social injustice and racial disparities, as well as addressing systemic inequities in the microbial sciences and across the globe. ASM recognizes that complex scientific problems are better solved by harnessing diversity, utilizing different perspectives, training, cultural backgrounds and experiences.

ASM is committed to supporting and expanding our scientific community as we advance the microbial sciences. As a demonstration of this commitment, ASM recently commissioned an external review of the diversity, equity and inclusion (DEI) within its programs.¹ Many of the findings of the report address the recommendations to evolve programs that are reported in this document. ASM is committed to driving change in the microbial sciences, and we understand that addressing issues of equity, inclusion and diversity requires immediate action and will be an ongoing work in progress. ASM believes that a complete culture shift is required so that all aspects of microbiology and related sciences incorporate considerations for DEI.

In summary, two approaches are recommended for the NIH to consider.

1. Incorporate DEI in all aspects of the scientific process and enterprise
2. Provide resources, support, and guidance as STEM demolishes obstacles and barriers to replace the models that perpetuate exclusion and inequity with ones of collaboration, diversity, inclusivity, accessibility, and equity.

For both of these recommendations, ASM is offering a full and committed partnership to NIH.

¹ <https://asm.org/Reports/Diversity,-Equity-and-Inclusion-Taskforce-Report>

Background: ASM’s Programs Dedicated to Supporting Underrepresented Groups

ASM has a strong and robust history of supporting scientists from historically excluded and underrepresented groups. The most notable ASM programs in this area are the student research fellowships and the Annual Biomedical Conference for Minority Students (ABRCMS)². Neither of these efforts would have been possible were it not for support from NIH. As ASM looks to increase its role in advancing the education and career trajectory of an increasingly diverse workforce, we expect there will be additional opportunities to collaborate with NIH.

ASM has a long history of partnering with NIH to support scientists from underrepresented groups across the life sciences. An exemplar program is ABRCMS. In 2000, the NIH named ASM a sole partner in sponsorship of the largest undergraduate student STEM conference dedicated to underrepresented and historically excluded groups. In nearly two decades, ABRCMS became the premier undergraduate student STEM conference serving over 5,000 participants annually. The conference aims to allow:

1. Undergraduates to share their research project data and demonstrate scientific expertise.
2. Undergraduates to prepare for successful transition to graduate or professional education, training, and research careers.
3. Undergraduates to prepare for the evolving, global, and interdisciplinary nature of biomedical and behavioral sciences research and careers.
4. Faculty advisors, research scientists, and program directors to develop professionally as biomedical scientists, advisors, educators, and leaders.

Since its founding, ABRCMS has served >62,000 participants from all 50 states, Puerto Rico, Guam, and more recently, internationally. Since 2005, attendance at the conference has more than doubled to ~5,200 participants, a significant proportion of whom are women (62%), with ~73% of the attendees coming from groups underrepresented in science (**Table 1**). Over this period, the number of student presentations increased by nearly 300% (707 in 2001 to 2,676 in 2019), and while the initial intention was to provide a conference targeted towards undergraduate students, the ABRCMS leaders acknowledged the immense benefit towards undergraduates and worked to extend the impact to include graduate students and postdoctoral fellows.

Table 1. Undergraduate, Postbaccalaureate, and Graduate Student Populations at ABRCMS (%)

Race or Ethnicity	2005	2010	2015	2019
Asian American	3.36	3.78	5.38	6.79
Biracial	-	-	-	3.74
Black/African American	64.97	57.35	43.18	38.89
Hispanic/Latino	22.56	28.93	33.60	32.61
Native Hawaiian, Alaska Native or Pacific Islander	2.94	2.33	0.60	1.06
Native American	1.24	1.32	.85	-
White	1.98	3.26	5.96	7.28
Other/Did Not Disclose	4.20	4.35	10.33	9.63

² <https://www.abrcms.org/>

In addition to ABRCMS, ASM has a long history of supporting underrepresented groups through fellowship programs. In 1980, ASM launched the first national fellowship program for underrepresented graduate students in the microbial sciences, now known as the Watkins Fellowship. ASM also partnered, in the past, with NIH's National Institute of General Medical Sciences (NIGMS) through the Minority Access to Research Careers in the Biomedical and Biological Science (MARC) Program to sponsor a summer research fellowship for undergraduate students to conduct research. This program recruited students from Historically Black Colleges and Universities (HBCUs) and other minority serving institutions (MSIs). These are only two of the many fellowship programs that ASM sponsored in order to support underrepresented groups in STEM. Overall, ASM has awarded over 760 fellowships to students from underrepresented groups in the student-fellowship research programs.

The highly sought after ASM fellowships were the pride of ASM and became an exemplary model for STEM professional societies. In 2000, US President Clinton bestowed ASM with the Presidential Award for Excellence in Mentoring Underrepresented Minorities in STEM, recognizing ASM for its contributions in advancing underrepresented scientists through doctoral education. ASM was the first professional society to receive such honor, paving the way for other professional societies to follow.

Furthermore, in addition to ASM's programs, the Society had various members, volunteers and committees that worked to ensure DEI was at the forefront of the organization's efforts. From the 1990s-2000s, in particular, significant initiatives were established that led to the inclusion of African Americans on editorial boards, on committees, as committee chairs and to elected memberships in the American Academy of Microbiology.³ Additionally, programs that highlighted the achievements and recognition of previously excluded⁴ African Americans were developed. Though there was still much work to be done, these advancements were major as compared to ASM's first 90 years of existence. To this day, ASM continues to elevate this work and expands the initiatives to ensure inclusive diversity.⁵

The ASM fellowships dedicated to supporting historically excluded and underrepresented scientists, ABRCMS and the committee led initiatives are positive steps towards increasing diversity in the microbial sciences and the biomedical sciences at large. However, much work still remains if we are to be successful in evolving the culture of the biomedical sciences so that it is more diverse, inclusive, equitable and accessible.

Barriers inhibiting recruitment and hiring, promotion, retention and tenure, including the barriers scientists of underrepresented groups may face in gaining professional promotions, awards, and recognition for scientific or non-scientific contributions (e.g., mentoring, committees), and proven strategies or novel models to overcome and eliminate such barriers

As described above, ASM has invested in filling gaps in the professional development pathway for underrepresented groups. While these have been extraordinarily successful, they are insufficient. Several barriers remain in the academic structures themselves discouraging capable scientists from entering the field, continuing to advance, gather support and engage the community. Despite the large investments to support underrepresented scientists, a lack of inclusive diversity persists, not only within ASM, but also

³ Johnson-Thompson, M. 2007. Revisiting the contributions of African American scientists to ASM. *Microbe*, 2(2):82 – 87.

⁴ Johnson-Thompson, M.C. and Jay, J. 1997. "Ethnic Diversity in ASM: The Early History of African- American Microbiologists." *ASM News*. 63, 77–82.

⁵ <https://asm.org/Reports/Diversity,-Equity-and-Inclusion-Taskforce-Report>

across the STEM fields.⁶ To combat the perpetuation of exclusion and lack of diversity, we must affirm the extent to which we, as the entire STEM community, are prepared to evolve programs and projects to achieve the broader goal of inclusive diversity.

In the process of evolving these programs, we must solidify our intention to attract, grow, and continue attracting the dynamic and diverse groups of historically excluded scientists that will build and enhance the future of the biomedical sciences. To do this, we need to identify ways to demolish the systemic barriers that perpetuate the exclusion of groups that fall outside of the majority. An example of a systemic barrier is the traditional apprentice-based model that creates an exclusive hierarchical model. The traditional apprentice-based model of scientific training necessitates that a young scientist moves from undergraduate, graduate and post-doctoral apprenticeships into other career opportunities that lead to greater responsibility and stature. Because of this model, scientists in leadership positions typically employ an informal set of criteria for decisions such as publications, presentation opportunities, hiring and promotion. Although long-standing, the current model must change to broaden participation in order to achieve parity. The use of informal criteria to prepare scientists for success prioritizes existing networks over transparency and equitable access and tend to reproduce existing networks rather than diversifying them. Informal criteria are especially susceptible to both overt and unconscious bias. This tradition of handoff during one's training and throughout one's career, has a snowballing effect that prevents many historically excluded and underrepresented scientists from entering, persisting and advancing in the field. In order to build and sustain a field that is inclusive, we must dismantle the training tradition that thrives on exclusion. This is merely one example of the many barriers we must work to remove.

Potential mechanisms and enhancements that will work to demolish barriers are:

1. More sustained attention to longer-term mentoring and sponsorship;
 - a. Promoting entry and retention in the field by training educators, creating mentorship programs and professional development opportunities.
2. Establish guidelines and expectations to serve as formal criteria to standardize the progression of a scientist's career, such as improving the hiring policy (i.e. promote cohort hiring), facilitating early career start up packages, etc.;
3. Develop leadership opportunities so that representation in the field is more diverse and inclusive;
4. Enhance professional development programs to strengthen the career pipeline and opportunities outside of academia;
 - a. Utilize industry support and collaboration. ASM's corporate council program illustrates a strong partnership with companies who have demonstrated a willingness to support underrepresented minority initiatives. Forming the neutral broker to enable industry support can further enhance programs.
5. Evaluate the current climate of STEM departments and programs across the nation to understand and identify the cause of students from underrepresented groups to feel excluded in the field;
6. Develop programs to eradicate the climate that perpetuates such exclusion and biases and focus on developing a climate of inclusivity, and
7. Sponsor and host platforms and resources that curates and distributes potential training and professional opportunities so that mentors do not feel obligated to preserve the "who you know" system.

⁶ <https://www.pewresearch.org/social-trends/2018/01/09/diversity-in-the-stem-workforce-varies-widely-across-jobs/>

As a scientific society, ASM has the capability of defining best practice, establishing guidelines and working across the career trajectory to enable a consistent approach throughout the professional and academic fields of STEM across the globe. By building new and enhancing existing influences, partnerships, and/or collaborations with both the internal NIH workforce and the NIH-funded biomedical research enterprise, as well as academic institutions, ASM will be better positioned to coordinate, contribute to, and execute these initiatives.

Factors that present obstacles to training, mentoring, or career path (e.g., training environments) leading to underrepresentation of groups in the biomedical research enterprise throughout the educational and career continuum and proposed solutions (novel or proven effective) to address them

It is apparent that equitable representation is not present in the STEM field. The recent ASM DEI Taskforce Report⁷ spotlighted this by acknowledging that historically, women and BIPOC are underrepresented in participation in ASM activities and leadership roles. To examine the underrepresentation of certain groups, in 2015, ASM investigated the gender equity of podium presenters at ASM's annual meeting.⁸ This study identified that the proportion of women speakers was 28% in 2011 and after deliberate actions taken by the meeting organizers, the society was able to achieve better gender parity by 2015 with 48.5% of the podium presentation being delivered by women.⁸ The mechanisms identified in the studies that facilitated movement towards gender parity at ASM's annual meeting are:

1. Making the Program Committee aware of gender statistics;
2. Increasing female representation among session convener teams, and
3. Providing direct instruction to try to avoid all-male sessions.⁸

This is an example of how purposeful actions in selection criteria can achieve broader participation. It is important for the entire STEM enterprise to begin to be deliberate in their actions towards broader participation. ASM applauds the leadership of the NIH on developing policies to be mindful of gender parity and avoid all-male sessions.⁹ However, STEM needs additional policies that help ensure inclusive diversity across the board.

We, ASM and the STEM field at large, must be alert to implicit and overt biases when building and providing opportunities for contribution and recognition. Furthermore, we must expand our criteria of diversity to extend beyond the realm of race/ethnicity and the binary construct of gender. Toward this goal, ASM is diligently working to collect enhanced demographic data from members, such as information on affectional identify and physical ability. This will allow ASM to cultivate a deeper understanding of our membership, measure our progress and adjust our efforts as needed. A primary example within ASM is the work from the ASM Journals Department in addressing DEI in scientific publications.

Research shows that “gender-related inequities in the ordering of authors sharing the first position in biomedical research articles, with males being favored”.¹⁰ Attempting to decrease gender biases associated with the first author position, in 2019, ASM Journals developed and implemented a policy to require authors to provide “an explanation for how order was determined”.¹⁰ Potential outcomes of this policy have not yet been identified, but ASM continues to monitor and analyze the collected data.

⁷ <https://asm.org/Reports/Diversity,-Equity-and-Inclusion-Taskforce-Report>

⁸ <https://mbio.asm.org/content/6/4/e01146-15>

⁹ <https://www.nih.gov/about-nih/who-we-are/nih-director/statements/time-end-manel-tradition>

¹⁰ <https://mbio.asm.org/content/10/5/e01981-19/article-info>

Furthermore, in an effort to foster an environment that embraces the complexity of identity representation, ASM Journals has created a pathway for authors to request name change updates to their published record.¹¹ Authors may update their name on ASM publications to reflect name changes made for personal reasons including, but not limited to, marriage, divorce, religious conversion and gender identity changes.

A final example that ASM is working on to address DEI in scientific publications is the Inclusive Science Issue from the *Journal of Microbiology and Biology Education*.¹² The issue covers three key areas – (i) an understanding that inclusion is the foundation for the future of colleges and universities, (ii) the need for radical changes in faculty support and (iii) the removal of barriers to understand social issues and the university experience. Strategies for LatinX inclusion in microbiology programs and policy enhancements to permit service animals in the lab are also highlighted in this collection of papers.

While ASM acknowledges the success of efforts to identify and address inequities to date, we realize that there is more to be done. Despite decades of recognition of the lack of equity in the sciences and despite earnest piecemeal efforts to address them, inequities remain. For this reason, ASM makes the following recommendation:

Incorporate DEI throughout the entire scientific process and enterprise from the generation of scientific research to publication to achieving impact. As a scientific society, ASM proposes to partner with other similar societies and NIH to ensure that STEM captures and implements best practices towards the following:

- Collect enhanced demographic data from all constituents of the scientific community, including information on affectional identify, physical ability, neurodiversity, etc. This will allow STEM to cultivate a deeper understanding of the community and their needs to ensure their success.
- Leverage early education programs to encourage and expose underrepresented groups to STEM fields. Further support is needed to ensure they are retained and supported in STEM.
- Continue and expand engagements that foster community building at convenings like ABRCMS, which remains a critical event for underrepresented scientists.
- Develop programs for undergraduate educators that focus on infusing DEI in their curriculum. ASM's Conference for Undergraduate Educators (ASMCUE) serves as an exemplar in this regard.
- Dedicate scientific publications and presentations to emphasize research focusing on new concepts, analyses and achievements involving inclusive diversity in science.

Successful actions NIH and other institutions and organizations are currently taking to improve representation, equity, and inclusion and/or reduce barriers within the internal NIH workforce and across the broader funded biomedical research enterprise

ASM is mindfully aware of the work that still remains in order to holistically embody diversity, equity and inclusion. ASM has initiated various efforts to begin addressing these gaps. For example, in 2019, ASM underwent a rigorous review of its policies and devoted efforts to achieving consistency across the organization on important ethical issues.¹³ As a result, ASM's ethics resources, policies and procedures

¹¹ <https://journals.asm.org/author-name-change-policy>

¹² <https://www.asmscience.org/content/journal/jmbe/21/1?tab=current>

¹³ <https://asm.org/Articles/Ethics/2020/Centralizing-ASM-Ethics>

were centralized to provide greater uniformity in responding to ethics issues across the society.

In addition to scientific misconduct, the broader scientific community has become acutely aware of the prevalence of professional misconduct, including harassment and bullying. Accordingly, ASM developed and implemented its Events Code of Conduct¹⁴ to address sexual harassment and other forms of harassment. We expressly prohibit and outline a zero tolerance policy for harassment or bullying of any kind, and we have established an anonymous reporting mechanism through which complaints can be reported and responses made. ASM also broadened its membership “Code of Ethics” to reflect the importance of this policy to “Code of Ethics and Conduct.”¹⁵ As such, ASM members shall avoid conflicts of interest, professional misconduct, and potential abuse of privileged positions, including the recognition of the potential power differential between mentors and trainees.

In order to move the STEM field toward inclusivity, it will require substantial investment, both financial and temporal. STEM, as a field must realize that the service-based enterprise limits access, as many individuals do not have the resources needed to develop their career traditionally (i.e., unpaid internship, unpaid volunteer work, etc.). STEM must commit to investing in the next generation of scientists to such an extent that our future leaders are compensated for their time, expertise, and invaluable contributions that ultimately sustain, grow, and progress the field. Innovatively remodeling the current approaches to incorporate the service-oriented enterprise will assist in removing such barriers that prevent access. The National Summer Undergraduate Research Project (NSURP)¹⁶ launched in response to the COVID-19 pandemic is an example of such remodeling and provided virtual research opportunities where researchers are not required to be physically present in the lab to participate in program activities. Remodeling to provide virtual and/or remote opportunities so researchers are not required to be physically present in the lab during the training process, would help decrease the travel and/or relocation costs most researchers must self-provide in order to participate in programs, thus providing greater accessibility and inclusivity. Collectively bringing these topics to the attention of policy makers, ASM hosted a webinar¹⁷, in fall of 2020, dedicated to understanding how to better support underrepresented groups in the STEM fields.

An additional barrier hindering the flourishing and inclusion of all groups, especially those historically underrepresented in STEM, is the process of advancing through an academic’s careers, such as the recruitment and selection, retention and tenure, and recognition and contribution an individual must engage in, to ensure success. We must pay attention to the issue of supporting, retaining, and fully utilizing the talent of individuals historically underrepresented in STEM. To address this, in 2020, ASM introduced a new criterion for broadening participation of scientists from non-traditional groups to its honorific branch of the ASM, the American Academy of Microbiology (AAM). ASM developed these criteria because the Academy is aware that there are excellent scientists from underrepresented groups who deserve this honor but are rarely nominated. In 2020 and beyond, fellows are encouraged and empowered to nominate scientists who come from diverse backgrounds for election to fellowship in the Academy. Additionally, ASM is currently revisiting its nomination process with the goal of ensuring inclusion and representation from historically excluded and underrepresented scientists in the microbial sciences and provide greater access to ASM volunteer opportunities. ASM will be piloting a new process in 2021, will analyze the results in 2022 and formally incorporate the successful revisions.

¹⁴ <https://asm.org/Articles/Meetings/ASM-Events-Code-of-Conduct>

¹⁵ <https://asm.org/Articles/Ethics/COEs/ASM-Code-of-Ethics-and-Conduct>

¹⁶ <https://nsurp.org/>

¹⁷ <https://asm.org/Webinars/Strengthening-Career-Pathways-in-Science-for-Under>

Conclusion

Addressing the systemic barriers within STEM and elevating DEI to the forefront of the field will take a concerted effort and buy in from the entire scientific community. The NIH can provide resources and guidance as STEM demolishes these barriers and replaces the models that perpetuate exclusion and inequity with ones of collaboration, diversity, inclusivity and equity. Together, we can elevate the STEM community ensuring accessibility to all. The much-needed dynamic and deliberate culture change may be difficult and will require continuous effort, analysis and accountability. As STEM collectively embraces inclusive diversity, innovation will flourish, broadening the biomedical and health research agenda, including that of the NIH, to further scientific advancements on a global scale. We will accomplish this by empowering and supporting the future scientists. Now is the time for STEM to convert its values into paradigm-shifting actions, yet be mindful that perfection does not get in the way of progress. It is each of our responsibilities to be a catalyst of change.

ASM and its members look forward to next steps in this endeavor and stand ready to assist you. Please contact the ASM IDEAA¹⁸ Team at dei@asmusa.org for more information.

¹⁸ Inclusive, diversity with equity, access and accountability