Received: 9 February 2022 | Accepted: 14 February 2022

DOI: 10.1096/fba.2022-00019

FASEB BioAdvances WILEY

PERSPECTIVE

From pipettes to policy: Reflections on a decade working to expand opportunity and equity in science

Kenneth D. Gibbs Jr.

Division of Training, Workforce Development, and Diversity, National Institute of General Medical Sciences, Bethesda, Maryland, USA

Correspondence
Kenneth D. Gibbs, Jr., Division of Training, Workforce Development, and Diversity, National Institute of General Medical Sciences, Bethesda, MD 20892, USA.
Email: kenneth.gibbs@nih.gov

This article is part of the Bioscience Careers special collection.

Abstract

Science policy focuses on the allocation of resources within the scientific enterprise and the downstream impacts of these investments. Here, I describe my journey from being a curious kid, to becoming a signaling biologist, to my current role as a science policy professional focusing on the areas of biomedical research training, workforce diversity, and promoting basic research. I provide insights on skills important in this career track—collaboration, diplomacy, adaptability, and resilience. Finally, I share the vision that animates my work—"science by all, science for all"—and encourage you with the career advice my mother gave: "never self-eliminate."

KEYWORDS

basic research, biomedical careers, equity, Science policy, workforce development, workforce diversity

1 | PATH TO SCIENCE

Like many of you reading this, I was a curious kid. I did not know that my curiosity could turn into a job, let alone what it meant to be a "scientist." However, I was deeply fascinated with how the world worked and wanted to understand it more. Underlying my curiosity was the strong influence of my parents, who emphasized that my sisters and I use the opportunities afforded us to help make our communities and our world better and more just—a perspective shaped by my family's experience in America.

Like many Black Americans, I am primarily descended from Africans who were stolen from their homelands, enslaved here for centuries, and then legally and socially denied many of the basic rights of humanity and citizenship for another century. My grandfathers attained only fourth and eighth grade educations due to the lack of opportunity for Black boys born in the 1920s and 1930s. Though my grandmothers aspired to help others in health fields, including one who enrolled in nursing school, they too had opportunity cut short because of the social constraints placed on Black women in the first half of the 20th Century. They raised my parents in public housing with a lot of love, but not much else in terms of material goods or the social capital needed to navigate higher education and the professional world.

My parents, however, were the first in their families to graduate from college through the support of Upward Bound—a program designed to help promising students from low-income backgrounds transition into and succeed in higher education.[1] This public investment changed the trajectory of their lives, and mine. As a result, while growing up, my parents imparted on me and my sisters the twin imperatives of (a) getting an education and (b)

using our abilities in service of others (the Biblical passage "To whom much is given, much is required" was often repeated in my home). As a scientifically inclined teenager, I figured I would become a medical doctor to serve people. However, this changed when a speaker at a pre-college summer research program[2] mentioned:

> If you're a medical doctor, you'll likely treat at most 10,000 patients in your lifetime. The person who discovered penicillin has treated billions of people on every continent for the past six decades.

This opened my eyes to the potential impact of research to help humanity and led me on the path to a career in science, where again public investment played a key role. After graduating from the North Carolina School of Science and Mathematics, I attended the University of Maryland, Baltimore County as a Meyerhoff[3] and Maximizing Access to Research Careers (MARC)[4] scholar. I then completed my PhD in the Stanford immunology program (with support from the National Science Foundation (NSF) Graduate Research Fellowship and the National Institute of Allergy and Infectious Diseases T32 award), where my work focused on the signaling mechanisms regulating hematopoietic[5] and leukemic[6] stem cells.

2 | FROM PIPETTES TO POLICY

The further my training progressed, the farther I felt from the service-oriented motivations that drew me to research. While I could clearly see the *potential impacts* of my work by providing basic mechanistic knowledge of fundamental processes, I desired to see these impacts in a more tangible and direct way. I began talking to friends and other Black scientists about this as the "Tyrosine/Tyrone" dilemma—where "Tyrosine" represented the technical knowledge valued by the research community, and "Tyrone" represented the Black community of which I am from and that I wanted my work to serve.

This led to a significant amount of internal consternation as a I considered my career steps after graduate school. I recognized that with the great network and resources afforded me by a Stanford education, I was well positioned to obtain a postdoc position in a prestigious laboratory and then launch an independent research career. I further recognized that as a Black man in stem cell biology, my existence as an independent investigator in academic science could represent a type of real, tangible, and positive change. For example, during my graduate career, the number of Black Presidents of the United States (one) exceeded the number of Black, tenured basic science faculty at my institution (zero). Furthermore, I was typically the only Black person *in my research building* who was not a mailman, janitor, or technician—all of which are critically important roles, but not roles of scientific leadership. Additionally, I saw three of my friends, all Black women at Ivy league institutions with first author publications in *Science*, *Nature*, and *PNAS* leave academic science because of how poorly they were treated. This was a loss for them personally and a loss for the field because these fabulous scientists could not see a place for themselves in biomedical research given the racism and harassment they endured. I wondered: If I became a professor, could I somehow be a role model and academic influencer to stop this from happening in the future? I also struggled with the idea that, if I chose a different path, I would not only be disappointing all those who invested in me, but somehow also letting down Black people more broadly.

On top of my own challenges stemming from the persistent underrepresentation of Black as well as Latina/o/x and Indigenous scientists, I became increasingly aware of broader structural issues[7] in biomedicine that were impacting me and my peers from all backgrounds. I observed firsthand postdocs with *Cell* papers taking more than seven years to get a faculty job; faculty stressed by the challenges of obtaining funding; a lack of accountability for how faculty treated (or mistreated) their trainees; and a disconnect between a graduate education curriculum focused on producing future faculty and the wide variety of careers my colleagues pursued. So much of academic life, in my perception at the time, seemed centered on "building your own empire" in an increasingly unstable system. And while I considered it might ultimately be worth it to pursue an academic research career despite the challenges (because all job sectors have issues), I wanted to try to help solve some of these problems *now*. When I had the opportunity to be part of the AAAS Science and Technology (S&T) Policy Fellowship program[8]—designed to help scientists learn firsthand about federal policymaking and use our knowledge and skills to address pressing societal challenges—I knew I had to pursue it. I figured I'd do this "policy thing" for a year and then return to the academic path, but life had other plans.

3 | A DECADE IN DC: FROM IDEA TO IMPACT

Even as I knew I was motivated by the issues I saw—graduate education, postdoctoral training, faculty diversity, and hypercompetition for research funding—I did not have a road map for what I could do as a "science policy person." As an AAAS S&T policy fellow, I worked in the NSF's Directorate for Education and Human

Resources, Division of Human Resource Development (HRD).[9] HRD works to strengthen STEM education for underserved communities, broaden their participation in the workforce, and add to the knowledge base about programs of inclusion.

My first few months were amazing. I visited the White House Office of Science and Technology Policy and was involved in planning events to tangibly meet the career development needs of graduate students from underrepresented groups. But I soon realized I missed the intellectual engagement that I derived from research. The advice I received from one of my committee members as I was leaving the lab stuck with me: "Whatever you do make sure you publish, because you're known by what you publish." While many DC science policy conversations at this time focused on enhancing American scientific competitiveness[10] or underrepresented minority participation,[11] I recognized that there were gaps in the literature and the broader policy discourse related to the career development of biomedical PhD scientists in the postdoctoral space. Put another way, while there was a clear consensus on the importance of getting students from all backgrounds interested in science early and supporting them through their educational pathways, I did not hear clear conversations that reflected the reality I saw around me—where my friends and I went through high-quality training programs (general or "minority" focused), earned degrees from elite institutions, published high-quality research, and yet did not see academia as a place for us. I thought telling the stories of my generation of scientists in a rigorous and academic manner could be a meaningful contribution in the policy arena.

To do this, I first teamed up with Kimberly Griffin, PhD, during my AAAS fellowship to study how biomedical PhD students and postdocs make career decisions and the extent to which these processes differ across demographic groups.[12–14] Later, I partnered with David Broniatowski, PhD, to model the impacts of various strategies to enhance faculty diversity.[15] These collaborations were key because, while I had a sense of the issues in the workforce, I lacked the methodological expertise to study them in a rigorous way. Kim and David, experts in higher education and policy modeling, were great partners in this endeavor. Through these publications, I began to gain prominence in the workforce development and diversity space.[16–18] Furthermore, I found that my research gave my words and recommendations an additional level of authority when speaking to leaders in academia and government regarding changes they could make in their training programs.

This work eventually led me to an opportunity at the National Institute of General Medical Sciences (NIGMS),[19] where I have been for the past 6 years. Part of my journey to NIGMS was also dictated by personal considerations. During the AAAS S&T policy fellowship, I met and married my wonderful wife, and during my fellowship at the National Cancer Institute[20] we had our first child. While I still found the research to be interesting, I wanted a more secure job, did not want to upend my wife's career for academic pursuits as I was not 100% committed to, and felt that staying in DC to work on these issues would be a way to continue having a broad and systemic impact. I mention this only because I sometimes encounter trainees who feel bad for even considering personal factors when evaluating their career options. In my view, you can only do good and creative work in any field if you are attending to your personal well-being (whatever that looks like for you).

NIGMS supports basic research that increases our understanding of biological processes and lays the foundation for advances in disease diagnosis, treatment, and prevention. In addition, NIGMS provides leadership in training the next generation of scientists, enhancing the diversity of the scientific workforce, and developing research capacity throughout the country. I have had a number of roles, including program analyst[21] in our Division of Data Integration, Modeling and Analytics, where I conducted analysis and evaluation of NIGMS training programs; program officer[22] in our Divisions of Training, Workforce Development and Diversity (TWD) and Genetics, and Molecular, Cellular and Developmental Biology (GMCDB) where I oversee research training and basic science grant portfolios; director of the intramural Postdoctoral Research Associate Training[23] program where I mentored and developed a professional development curriculum for a group of postdoctoral scientists doing their training at the NIH; and currently as branch chief in TWD where I oversee the teams of program officers that manage our Undergraduate and Predoctoral Cross-Disciplinary Training programs (including the MARC program that supported me as an undergraduate).

Through these roles, I have been able to directly impact issues of importance to me.

Graduate Education: When I started at NIGMS, one of my first tasks was to help with the implementation of our leadership's desire to promote modernization in graduate education.[24] This included working with colleagues to organize a symposium[25] on the topic, and to develop and analyze the feedback from a Request for Information (RFI),[26] through which the government can solicit public comment on items of interest. I was then able to work with our leadership to create a Funding Opportunity Announcement[27] (FOA) that, for the first time, focused on student skill development, mentoring, and career and professional development, and stated that diversity is integral to excellent research training no matter the discipline of science. FOAs (also called solicitations at other agencies) are how funding agencies give applicants

information about what areas of research or training they will fund and instructions for applying. FOA development is one of the key levers for driving policy change because it allows us to tie ideas to resources, and by funding meritorious proposals, promote change across the nation. In the context of graduate education, NIGMS funds more than 3100 graduate students through basic biomedical and medical scientist training programs at over 100 campuses with a cost of about $150 million each year. Much of this work that we started at NIGMS has been adopted NIH wide. It also served as the basis for recommendations from the National Academies of Sciences, Engineering and Medicine's consensus study report Graduate STEM Education for the 21st century,[28] and I had the honor of serving as part of the expert panel.

Faculty Diversity: One of the most satisfying projects I have been involved with is the development of the Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC)[29] program to promote faculty diversity. This program was developed to address the persistent underrepresentation[30] of scientists from certain backgrounds at the faculty level, despite substantial increases in the number of well-trained PhD scientists and postdocs from these groups.[15] Again, this involved analyzing feedback from an RFI,[31] developing the FOAs[32] in partnership with our leadership, and then working across NIH to ensure the success of this important initiative. By making it clear that NIH is interested in supporting early career scientists with demonstrated and compelling commitments and contributions to enhancing diversity in the biomedical sciences, MOSAIC has been able to attract a much more diverse pool of applicants than previous career development programs and consequently support a more diverse pool of scholars.[33]

One benefit of working as a program officer at NIGMS is the ability to oversee various fields of basic research as well as training programs.[34] For example, I serve as the program officer for most of NIGMS' stem cell biology grants, which allows me to stay in touch with my scientific roots and continue to learn and impact the field. In addition to managing various grant portfolios, as a branch chief, I now lead a team of program officers overseeing our training programs, and support them to better do their work. Beyond my program officer work, I have contributed to NIGMS,[35] NIH-wide,[36] and national[37] efforts to promote racial and ethnic equity in the biomedical enterprise.

4 | ADVICE FOR THOSE INTERESTED IN A CAREER IN SCIENCE POLICY

I have written previously on career planning advice for PhDs and postdocs,[38] and much of that holds for those interested in a career in science policy (*especially the part on networking*). There are *many types of science policy careers* ranging from advocacy, commercialization, science communication, research on the "science of science," to working in government (legislative, executive, or judicial branches) on the local, state, or federal levels. Even at NIH, there are many roles for scientists interested in shaping the future of biomedical research and research training.[22] Below I elaborate on the skills that have been important in my career in scientific administration.

- **Collaboration**. While academic research often focuses on "independence," I have found that it is critical to be able to work well with others in a wide variety of roles to make any initiative successful. For example, the development and implementation of the graduate education and faculty diversity programs I have been involved in at NIH have required integrating the feedback from groups including senior leadership, scientific review, grants management, communications, academic institutions, and even legal counsel. To that end, I have found the following approaches to be particularly fruitful for effective collaboration:
  - *Ask questions*. We often think we understand others' points of view, but I have found the simple question "can you help me understand?" to be quite effective in helping me hear where my colleagues are coming from. This often results in raising points I had not yet considered, and ultimately helps the team produce a better result.
  - *Be accountable and give grace*. As people, we will mess up. We will miss critical details that should inform our decision-making, or sometimes get overly heated in meetings or on email. These things happen. I have found that when I mess up, apologizing without qualification (i.e., "I am sorry that I did that" as opposed to "I'm sorry if you were offended by my actions") is a good way to repair the relationships needed to continue the work. And, more importantly, being accountable means working to correct the mistake and putting additional processes in place to minimize the chance of it happening again—this shows the words are not an empty gesture. Just as it is important to apologize, it is equally important to be willing to extend forgiveness to others for their mistakes.
  - *Say "thank you*." It is simple, but I have found the words "thank you" can go a long way with ensuring your colleagues know that you see and appreciate their efforts. While program officers are often "the face" of initiatives to the public, our work is only made possible because of many dedicated colleagues who often receive little recognition for their efforts. I find it important to thank people for their efforts and

to take steps to ensure others can also be recognized for their hard work.

- **Diplomacy**. A key part of this role is learning to communicate effectively with others, especially when the information might be politically sensitive, challenge current thinking, or be tough to hear. As a federal employee, I learned early that people often view my words with a great deal of weight. In addition, our emails are subject to scrutiny through the Freedom of Information Act. All of this promotes and necessitates a great degree of discretion when communicating.

A large part of my work focuses on enhancing opportunity in science, especially for those who have been impacted by the structural racism[39] that characterizes the enterprise. For many—both outside and, unfortunately, some inside NIH—the word "diversity" often draws significant criticism. This often expresses itself in ideas that (a) efforts to broaden participation somehow "lower standards," or (b) that we are simply "giving awards" to rigorous, well-trained scientists from groups that have been historically excluded *because of their demographics* as opposed to their merits. These sentiments grate on me. Beyond my own frustration, I am saddened to encounter the many Black, Latina/o/x, Indigenous, and other underrepresented scholars who are made to question themselves and feel "less than" by virtue of the structural barriers and interpersonal biases that continue to manifest within our enterprise. Through my roles, I have had to learn to communicate effectively to a wide range of individuals (trainees and faculty, advocates, and critics) regarding the important work of expanding opportunity in science.

Communicating with empathy is especially important as a program officer. As one of the main "faces" of NIH to applicants, I regularly speak with people who are angry at issues they perceive in the peer review system or, frankly, desperate because despite their best efforts, they have not been successful in obtaining funding. I have found that listening first and then providing helpful and actionable recommendations in a manner they can receive is a key aspect of my role.

- **Adaptability**. In basic research, scientists are often rewarded for becoming increasingly specialized. However, my roles in scientific administration have required the ability to quickly assess and integrate large fields of information and then utilize that information as the needs of the organization change. For example, in my first weeks as an AAAS policy fellow, I was asked to draft a section of the federal STEM education strategic plan. While my training in signaling biology had not directly prepared me to learn educational psychology, the process of independent knowledge acquisition that a doctoral research degree cultivates did allow me to figure out what kinds of questions to ask and what types of sources to rely on.

More recently, when there was a presidential directive to move away from the use of human fetal tissue in NIH supported research,[40] I was asked to write a FOA on methods to improve reproducibility of human induced pluripotent stem cell derivation, growth, and differentiation[41] because I manage much of the stem cell biology portfolio for NIGMS. Additionally, I have had to stay up to date on the latest research advances using stem cell-based models of early human development to ensure I can appropriately advise grantees and inform leadership of potential compliance issues with federal regulations. In science policy, as in life, change is ever present. Whether it is a local change (e.g., a wonderful colleague moving on to a new position), an organizational change (e.g., a reorganization, and you get a new boss), or a broader change that reaches the popular press (e.g., a change in presidential administration), I have learned it is important to know how to adapt messaging and approach so the important work can continue.

- **Resilience**. Careers in science policy, like any career track, will have challenges. It is important to develop resilience if you intend to move forward. For example:

  - I was rejected from the first two fellowships I applied to in DC. I mention this because, often people only the see the outcome (in this case, my current position of leadership) and not the setbacks I experienced along the way. However, I learned from those experiences and eventually landed the AAAS S&T policy fellowship that set me on my current trajectory.
  - I have seen good ideas that clearly align with the stated goals of our organization not allowed to advance, sometimes with explanations that counter available evidence and seem dubious. This can be disappointing and discouraging. That said, I have also learned that there are cycles to policy, so sometimes what is "no" in one year is "yes" in another year.
  - By virtue of having a public-facing job, NIH staff often deal with a great degree of hostility. There can be misinformation spread about you or your initiatives, and occasionally you can even have your integrity or competence impugned. I do not say this looking for pity—it is just part of the territory. However, especially early on, it can be quite jarring and tough to deal with. When this happens, I think of the words my father told me as a teenager: "When people say things about you that are not true, let it roll off your back like water off a duck."

- **Resilience.** is not simply absorbing challenges (including obstacles that you should not have to deal with) and saying things are "OK" when they are not. It is about learning from the challenges and leveraging those lessons to continue to advance the mission. This can be, and often is, exhausting—especially when the challenges are tied to issues of identity over which you have no control and around which systems of oppression have been built.

But change is never easy. If it was, it would have happened already. As a Black man descended from enslaved Africans, when things feel especially bleak, I think of what my ancestors endured. Those who were my age 200 years ago would have only seen an America where there was slavery behind them and slavery before them. And yet, they resisted efforts to strip them of their basic dignity and persevered in working to create a better world for those who came after them, including myself. I draw on their strength when faced with the 21st century version of opposition to my existence in science or our efforts to promote opportunities for others from backgrounds who were similarly excluded. For me, resilience has been about maintaining hope that things can be better in the future and continuing to work to make that better future a reality.

5 | CONCLUDING REMARKS

I have had a wonderful decade personally and professionally since transitioning from bench research to work on issues that are of importance to me and have a tangible impact on the future of biomedical research. While *many (many, many!)* issues remain and the pace of change is painfully slow, I am encouraged by the progress we have made and motivated to continue to work with my colleagues and leadership to promote opportunity and advance equity in biomedical research. I know that progress is often met with retrenchment, yet I am captivated by a vision of what we can be, and so I continue in this field because of the potential for systemic impact.

I envision a future where *science is by all*—that is, a scientific enterprise that cultivates talent and promotes the full inclusion of rigorous contributors across the social spectrum—and *science is for all*—where everyone has the opportunity effectively engage with and benefit from scientific advancement.[42] My life, in many ways, represents the multi-generational impact of public investment (in this case, my parents' participation in Upward Bound and my selection as a Meyerhoff and MARC scholar). My hope is that, through the investments we make in strengthening and diversifying the workforce, we are creating opportunities that will change lives and shape the frontiers of research for years to come.

The final word of advice I will give for those interested in this (or other career paths) is from my mother: ***never self-eliminate***. Do not foreclose the door on an opportunity you are interested in before you even pursue it—make people tell you no. I do not say this with naivete—getting hired for any career opportunity is a challenge (even when exceptionally well qualified). It is important to honestly assess what the organization needs and what you have to offer. That said, if there is an opportunity you are really interested in and where you think you can contribute, even if you don't have 100% of the qualifications listed on the page, go for it! A friend and career coach once told me "No organization expects you to have 100% of the qualifications listed in the job ad. If you did, you'd be applying for the next job." So more than anything, it is important to believe in yourself and take a chance on yourself—science needs more passionate people with good ideas who are willing to do the hard work of promoting positive change.

ACKNOWLEDGMENTS

I am indebted to the wonderful colleagues I have had during my time in science policy—all that I have done has been the result of teamwork with too many contributors to name. That said I must thank Drs. Muriel Poston and Jessie DeAro (NSF) who welcomed me into the field; Dr. Kara Hall and the leadership of the NCI Cancer Prevention Fellowship Program Dr. Hannah Valantine, inaugural Chief Officer for Scientific Workforce Diversity; and NIGMS leadership Drs. Jon Lorsch, Alison Gammie, Dorit Zuk, and my **truly wonderful** colleagues in TWD and GMCDB for being great co-laborers. Many thanks also to Dr. Marguerite Matthews and the NIGMS Communications and Public Liaison Branch for conversations about this manuscript.

Finally, I must thank my family, friends, and faith community for continuing support—they have all been key to helping me develop the resilience described above. I do not have enough words to thank my wife for her steadfast support and exceptional counsel, or our children for their constant inspiration, but this sentence will have to suffice—I love you all deeply.

CONFLICT OF INTEREST

The author declares no conflicts of interest.

ORCID

Kenneth D. Gibbs Jr. https://orcid.org/0000-0002-3532-5396

REFERENCES

1. United States Department of Education. Upward Bound Program. Accessed February 7, 2022. https://www2.ed.gov/programs/trioupbound/index.html
2. American Chemical Society. ACS Project SEED Program. Accessed February 7, 2022. https://www.acs.org/content/acs/en/education/students/highschool/seed.html
3. University of Maryland Baltimore County. Meyerhoff Scholars Program. Accessed February 7, 2022. https://meyerhoff.umbc.edu/
4. National Institute of General Medical Sciences. Maximizing Access to Research Careers (MARC) Awards (T34). Accessed February 7, 2022. https://www.nigms.nih.gov/Training/MARC/Pages/USTARAwards.aspx
5. Gibbs KD, Gilbert PM, Sachs K, et al. Single-cell phospho-specific flow cytometric analysis demonstrates biochemical and functional heterogeneity in human hematopoietic stem and progenitor compartments. *Blood*. 2011;117(16):4226-4233. doi:10.1182/blood-2010-07-298232
6. Gibbs K, Jager A, Crespo O, et al. Decoupling of tumor-initiating activity from stable immunophenotype in HoxA9-Meis1-driven AML. *Cell Stem Cell*. 2012;10(2):210-217. doi:10.1016/j.stem.2012.01.004
7. Alberts B, Kirschner MW, Tilghman S, Varmus H. Rescuing US biomedical research from its systemic flaws. *Proc Natl Acad Sci U S A*. 2014;111(16):5773-5777. doi:10.1073/pnas.1404402111
8. American Association for the Advancement of Science. Science & Technology Policy Fellowships. Accessed February 7, 2022. https://www.aaas.org/programs/science-technology-policy-fellowships
9. National Science Foundation. Human Resource Development (HRD). Accessed February 7, 2022. https://www.nsf.gov/div/index.jsp?div=HRD
10. Rising above the Gathering Storm. Revisited: Rapidly Approaching Category 5. 2011.
11. Expanding Underrepresented Minority Participation. 2011. The National Academies Collection: Reports funded by National Institutes of Health.
12. Gibbs KD Jr, Griffin KA. What do I want to be with my PhD? The roles of personal values and structural dynamics in shaping the career interests of recent biomedical science PhD graduates. *CBE Life Sci Educ*. 2013;12(4):711-723. doi:10.1187/cbe.13-02-0021
13. Gibbs KD Jr, McGready J, Bennett JC, Griffin K. Biomedical Science Ph.D. Career Interest Patterns by Race/Ethnicity and Gender. *PLoS One*. 2014;9(12):e1147. doi:10.1371/journal.pone.0114736
14. Gibbs KD Jr, McGready J, Griffin K. Career development among American biomedical postdocs. *CBE Life Sci Educ*. 2015;14(4):ar44. doi:10.1187/cbe.15-03-0075
15. Gibbs KD, Basson J, Xierali IM, Broniatowski DA. Decoupling of the minority PhD talent pool and assistant professor hiring in medical school basic science departments in the US. *eLife*. 2016;5. doi:10.7554/eLife.21393
16. Benderly B. Study: Women and minorities less interested in academic research careers. American Association for the Advancement of Science. Accessed February 7, 2022. https://www.science.org/content/article/study-women-and-minorities-less-interested-academic-research-careers
17. Hopp A. Solving the faculty diversity problem. American Society of Biochemistry and Molecular Biology. Accessed February 7, 2022. https://www.asbmb.org/asbmb-today/careers/030117/solving-the-faculty-diversity-problem
18. Yong E. Science's minority talent pool is growing—but draining away. The Atlantic2016.
19. National Institute of General Medical Sciences. Overview. Accessed February 7, 2022. https://www.nigms.nih.gov/about-nigms/who-we-are/overview
20. National Cancer Institute. Cancer Prevention Fellowship Program. Accessed February 7, 2022. https://cpfp.cancer.gov/
21. National Institutes of Health. NIH Job: Program Analyst. Accessed February 7, 2022. https://www.nih.gov/news-events/videos/nih-job-program-analyst
22. National Institutes of Health. Understand Staff Roles. Accessed February 7, 2022. https://grants.nih.gov/help/ic-staff-roles#program-official
23. National Institute of General Medical Sciences. NIGMS Postdoctoral Research Associate Training (PRAT) Program. Accessed February 7, 2022. https://www.nigms.nih.gov/training/pages/prat.aspx
24. Gammie A, Lorsch J, Singh S. Catalyzing the Modernization of Graduate Education. National Institute of General Medical Sciences. Accessed February 7, 2022. https://loop.nigms.nih.gov/2015/11/catalyzing-the-modernization-of-graduate-education/
25. Faupel-Badger J, Gibbs KD. Meeting Showcases Innovations in Biomedical Graduate Education. Accessed February 7, 2022. https://loop.nigms.nih.gov/2015/11/catalyzing-the-modernization-of-graduate-education/
26. Gammie A, Gibbs KD, Singh S. Your Perspectives: Catalyzing the Modernization of Biomedical Graduate Education. Accessed February 7, 2022. https://loop.nigms.nih.gov/2016/11/your-perspectives-catalyzing-the-modernization-of-biomedical-graduate-education/
27. Gammie A, Gibbs KD, Singh S. Early Notice: New NIGMS Institutional Predoctoral Training Grant Funding Opportunity Announcement. Accessed February 7, 2022. https://loop.nigms.nih.gov/2017/03/early-notice-new-nigms-institutional-predoctoral-training-grant-funding-opportunity-announcement/
28. Committee on Revitalizing Graduate STEM Education for the 21st Century. Graduate STEM Education for the 21st Century 2018. https://www.nap.edu/catalog/25038/graduate-stem-education-for-the-21st-century
29. National Institute of General Medical Sciences. Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) (K99/R00 and UE5). Accessed February 7, 2022. https://www.nigms.nih.gov/training/careerdev/Pages/MOSAIC.aspx
30. National Institutes of Health. Notice of NIH's Interest in Diversity. Accessed February 7, 2022. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-20-031.html
31. Gammie A, Gibbs KD, Sesma M. Your Perspectives: Strategies for Enhancing Postdoctoral Career Transitions to Promote Faculty Diversity. Accessed February 7, 2022. https://loop.nigms.nih.gov/2018/11/your-perspectives-strategies-for-enhancing-postdoctoral-career-transitions-to-promote-faculty-diversity/

32. Gammie A, Gibbs KD, Sesma M. New Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) Programs Announced. Accessed February 7, 2022. https://loop.nigms.nih.gov/2019/08/new-maximizing-opportunities-for-scientific-and-academic-independent-careers-mosaic-programs-announced/
33. National Institute of General Medical Sciences. MOSAIC Scholars. Accessed February 7, 2022. https://www.nigms.nih.gov/training/careerdev/Pages/mosaic-scholars.aspx
34. Zatz M. A view from the NIH bridge: perspectives of a program officer. *Mol Biol Cell*. 2011;22(15):2661-2663. doi:10.1091/mbc.E11-04-0346
35. Lorsch J, Gibbs KD, Gammie A. What Can We Do to Combat Anti-Black Racism in the Biomedical Research Enterprise? Accessed February 7, 2022. https://loop.nigms.nih.gov/2020/06/what-can-we-do-to-combat-anti-black-racism-in-the-biomedical-research-enterprise/
36. National Institutes of Health. UNITE - Ending Structural Racism. Accessed February 7, 2022. https://www.nih.gov/ending-structural-racism/unite
37. Gibbs KD Jr. Promoting diversity and advancing racial equity in the biomedical sciences. American Society for Cell Biology. Accessed February 7, 2022. https://www.ascb.org/publications-columns/science-and-society/promoting-diversity-and-advancing-racial-equity-in-the-biomedical-sciences/
38. Gibbs KD Jr. Planning a Career in Today's Landscape. Accessed February 7, 2022. https://www.science.org/content/article/planning-career-todays-landscape
39. Collins FS, Adams AB, Aklin C, et al. Affirming NIH's commitment to addressing structural racism in the biomedical research enterprise. *Cell*. 2021;184(12):3075-3079. doi:10.1016/j.cell.2021.05.014
40. National Institutes of Health. Notice of Intent to Publish Funding Opportunity Announcements for Research to Develop, Demonstrate, and Validate Experimental Human Tissue Models that Do Not Rely on Human Fetal Tissue. Accessed February 7, 2022. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-19-042.html
41. Gibbs KD. Funding Opportunity: Methods to Improve Reproducibility of iPSC Derivation, Growth, and Differentiation. Accessed February 7, 2022. https://loop.nigms.nih.gov/2019/05/funding-opportunity-methods-to-improve-reproducibility-of-ipsc-derivation-growth-and-differentiation/
42. Korte A. Science Must Be 'By All and For All,' Says Omenn Lecturer. American Association for the Advancement of Science. Accessed February 7, 2022. https://www.aaas.org/news/science-must-be-all-and-all-says-omenn-lecturer

How to cite this article: Gibbs KD Jr. From pipettes to policy: Reflections on a decade working to expand opportunity and equity in science. *FASEB BioAdvances*. 2022;4:217–224. doi:10.1096/fba.2022-00019