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LETTERS

Edited by **Jennifer Sills**

Retraction

We have obtained new evidence, 6 years after the publication of our Report "Ammonia synthesis by N_2 and steam electrolysis in molten hydroxide suspensions of nanoscale Fe_2O_3" (*1*), that there is a trace NO_x^- impurity in the nanoscale Fe_2O_3 that was unknown at the time. We no longer have the original nanoscale Fe_2O_3, and manufacturers' content levels of impurities in chemicals may vary over time. However, recently purchased nanoscale Fe_2O_3 per gram contains 0.0005 g N as NO_x^-, and an $^{15}N_2$ isotopic tracer analysis conducted by Wenzhen Li, Yifu Chen, and Hengzhou Liu at Iowa State University; Shuang Gu at Wichita State University; and author S.L. suggests that this trace impurity, rather than N_2, is the major nitrogen reactant in the observed ammonia synthesis. We are retracting the original Report, and we encourage exploration of an N_2 to NO_x^- intermediate to ammonia pathway, rather than direct elemental nitrogen pathway, to ammonia synthesis. All observed stimulation of ammonia generation with these (likely NO_x^--containing) nanoscale Fe_2O_3 materials, as well as all thermodynamic calculation results, remain accurate as documented in the original Report.

Stuart Licht[1]*, Baochen Cui[1], Baohui Wang[1], Fang-Fang Li[1], Jason Lau[2], Shuzhi Liu[1]
[1]Department of Chemistry, George Washington University, Washington, DC 20502, USA.
[2]Department of Chemistry, Contra Costa College, San Pablo, CA 94806, USA.
*Corresponding author. Email: slicht@gwu.edu

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Controlling the coronavirus narrative

The corruption of scientific results has serious consequences for human health. Climate change deniers (*1*, *2*) and people who amplify anti-vaccine messages (*3*) have created dangerous, enduring myths, giving rise to new problems for which scientists must now find solutions. Now, politicians are undermining the response to coronavirus disease 2019 (COVID-19) by disregarding scientific facts and the guidance of epidemiologists (*4*). Simultaneously, nonscientists have asserted that Black Lives Matter protests caused increases in COVID-19 cases, when preliminary evidence suggests they were not a substantial factor (*5*). To combat this new misinformation, scientists must communicate clearly and dispute inaccurate, politically motivated narratives.

Black, Native, and Latinx Americans have shouldered the greatest burden of the unscientific COVID-19 mismanagement in the United States (*6*). Protests against police brutality have been dismissed as nonurgent or unnecessary, despite evidence that systemic racial injustice disproportionately kills Black Americans (*7*). Scientific evidence, which should be at the forefront of public discussions and policy on health and civil rights, has been drowned out by political arguments.

Scientists cautiously explain uncertainties while politicians and politically motivated media outlets emphatically cast blame and misappropriate scientific evidence. Scientists cannot allow propagandists to spread lies that dismantle a reasoned response to COVID-19 or urgently needed progress toward health equity and social justice for Black Americans. Informed scientists must take a strong public stance on complex issues, emphasizing evidence to clearly communicate and contextualize scientific results to the public, not just to other scientists. Institutions must recognize that the current system of promotion and tenure devalues such communication, at a huge societal cost.

Irresponsible, unscientific voices have killed too many because of their reach and efficacy. Academic incentives must be updated to meaningfully reward outreach efforts, and scientific training should prepare scientists to discuss their findings with the public. In the meantime, scientists who have the capacity, seniority, and job security should help value and amplify the messages and motivations of those who are willing to participate in public engagement, often at the expense of career advancement. It is essential for scientists to work across disciplines and integrate multiple communication strategies to make scientific evidence understandable, engaging, and approachable.

Nita Bharti
Biology Department, Center for Infectious Disease Dynamics, The Pennsylvania State University, University Park, PA 16802, USA.
Email: nita@psu.edu

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Dismantling systemic racism in science

In his Editorial "Time to look in the mirror" (12 June, p. 1161), H. H. Thorp calls on scientists to recognize systemic racism

Preliminary evidence indicates that protests demanding justice for Black Americans, such as this one, have not caused a spike in COVID-19 infections.

within the science community. As part of this self-reflection, scientists should consider the many ways that inequality manifests in science, including science's historical contributions to discrimination, the lack of representation in science, and the extra burden placed on minority scientists to fix issues relating to diversity and inclusion. Understanding the scope of systemic inequality in science will enable genuine and sustainable efforts to make scientific institutions fair for all.

Racial categories historically developed and endorsed by scientists led to a hierarchy of groups seen as superior or inferior. Although unsupported by biological evidence, these categories have had devastating effects on non-white communities throughout history. The myth that racial groups were fundamentally different was used to justify colonialism, slavery, genocide, and eugenics (*1*), and it still governs policies today. The intersectionality of racism and modern society has left a legacy of racial disparities in socioeconomic status (*2*), education (*3*), and health (*4*, *5*).

The lack of diversity in scientific institutions reveals ongoing systemic racism in the field. As of 2019, less than 1% of UK professors were Black (*6*). Black female professors in the United Kingdom experience bullying, racial discrimination, and institutional neglect (*7*). Systemic racism has also contributed to the lack of diverse representation. Even textbooks currently lack representation of Black female scientists (*8*). According to a recent report, leadership positions such as CEO or executive in the biotech industry are largely occupied by white professionals (*9*). A majority of these leaders claimed to be committed to diversity and inclusion, but diversity and inclusion training or programs existed in only half of the organizations surveyed, and 41% of organizations did not monitor diversity (such as employee demographics) or discrepancies in performance rankings, pay, and promotion (*9*).

Unfortunately, scientists from underrepresented groups are often the ones who take on the responsibility (often coupled with additional labor and minimal recognition) of trying to change a racist system (*10*). To lighten their burden, white colleagues should also take responsibility for dismantling systemic racism in the science community. Although there is no single "one size fits all" approach to addressing inequality, there are common themes and actions that can be implemented in scientific institutions.

Scientists involved in hiring should implement advertising strategies, especially at leadership levels, that attract diverse applicant pools, and they should facilitate fair decisions by forming diverse recruitment panels. To retain diverse individuals, leaders should promote an inclusive environment. To do so, they must develop training material on understanding and tackling bias and create safe spaces for professionals to speak freely and honestly. All departments should develop zero-tolerance, anti-racism policies and put procedures in place that effectively handle complaints about racism and race-related aggression. Mentoring schemes should be embedded into departments to address the neglect that Black, Indigenous, and people of color often experience when navigating their career. Underrepresented individuals (many of whom are already used as unpaid consultants) should be given the power to make important decisions.

All scientists should recognize the achievements of diverse individuals. Recognition includes citing their work, referring them for opportunities, nominating them for awards, and teaching their work in classes. Appropriately recognizing the work of underrepresented individuals will enable them (rightly) to be as competitive as their white counterparts when looking to progress professionally. By taking these steps, scientists of all backgrounds can help create a more inclusive, diverse, and fair community.

Esther A. Odekunle
GlaxoSmithKline, Stevenage, Hertfordshire SG1 2NY, UK. Email: e.a.odekunle@gmail.com

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Untapped resources for medical research

A therapeutic solution to the coronavirus disease 2019 (COVID-19) pandemic is urgently needed, but new drug discovery and development are lengthy processes. Pharmaceuticals derived from plants and fungi remain important in our armory against numerous diseases (*1*, *2*), yet much of plant and fungal biodiversity remains unexplored for drug discovery (*3*). Of about 350,000 known plant species, 7% have medicinal uses (*1*, *4*), and the wider potential of the world's flora to yield new medicines has been discussed by conservation biologists for decades (*5*). We urgently need a comprehensive scientific study of biodiversity to inspire, accelerate, and innovate medicinal discovery.

Acquiring usable plant and fungal material is resource-consuming, but a partial solution lies in specimens already housed in herbaria, botanic gardens (*6*), and fungal biological resource centers. Herbaria host about 380 million specimens from all described plant species (*7*), and botanic gardens maintain about one-third of all known land plant species (*8*). Fungal collections currently host about 860,000 strains worldwide (*9*). These collections are invaluable resources representing unparalleled chemical diversity.

Evolutionary relationships inferred from DNA could be used to guide selection of species with medicinal potential. Just a few milligrams from specimens enable comprehensive chemical profiling, uncovering new chemical entities that share chemical or physical characteristics with drug molecules, potentially with novel modes of action (*1*). Artificial intelligence and emerging technologies could reveal compounds with mechanistic effects relevant to diseases threatening humanity (*1*, *10*). Furthermore, collections are increasingly used to generate genomic data, which could be used to identify members of gene families known to be involved in the synthesis of useful compounds (*11*).

Investing in a new era of large-scale exploration of therapeutic candidates from nature could help humanity prepare for future health challenges. Scientists, governments, and other stakeholders must establish functional and equitable agreements to ensure that this work complies with the Nagoya Protocol and associated access and benefit sharing legislation and reflects the value and origins of specimens collected during the colonial era (*12*). It is also critical that benefits are shared with the nations and Indigenous peoples from where these resources derive.

Oscar A. Pérez-Escobar[1], James E. Richardson[2,3], Melanie-Jayne R. Howes[1,4]*, Eve Lucas[1], Noelia Álvarez de Róman[5], Jérôme Collemare[6], Ian A. Graham[7], Joachim Gratzfeld[5], Paul J. Kersey[1], Ilia J. Leitch[1], Alan Paton[1], Peter M. Hollingsworth[3], Alexandre Antonelli[1,8]

[1]Royal Botanic Gardens, Kew, TW9 3AE, UK. [2]Department of Biology, Faculty of Natural Sciences, Universidad del Rosario, Bogotá, Colombia. [3]Royal Botanic Garden Edinburgh, Edinburgh, EH3 5LR, UK. [4]Institute of Pharmaceutical Science, Faculty of Life Sciences & Medicine, King's College London, SE1 9NH, UK. [5]Botanic Gardens Conservation International, Richmond, TW9 3BW, UK. [6]Westerdijk Fungal Biodiversity Institute, Utrecht, Netherlands. [7]Department of Biology, Centre for Novel Agricultural Products, University of York, York, YO10 5DD, UK. [8]Gothenburg Global Biodiversity Centre and University of Gothenburg, Gothenburg, Sweden.
*Corresponding author: Email: m.howes@kew.org

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COMPETING INTERESTS

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Controlling the coronavirus narrative

Jennifer Sills and Nita Bharti

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