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# National Security, the Assault on Science, and Academic Freedom

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*The following report, prepared by a subcommittee of the Association's Committee A on Academic Freedom and Tenure, was approved in October 2017 by Committee A and adopted in November 2017 by the Council.*

The Trump administration's alarming hostility to science has exacerbated already troubling threats to academic freedom in the physical and natural sciences in two different areas. In the area of international scientific exchange, Chinese or Chinese American scientists have been targeted and charged with espionage. The second area, the field of climate science, has been subjected to vicious attempts to discredit its validity, which have intensified significantly since Donald Trump took office. Two incidents illustrate the nature of the attacks:

- On the morning of May 21, 2015, about a dozen armed federal agents entered the home of physicist Xiaoxing Xi, guns drawn, with a warrant for Xi's arrest. His wife and daughters stood by in fear as Xi was handcuffed and escorted away. At the time Xi was interim chair of the physics department at Temple University and a naturalized US citizen. He is among the world's leading experts on superconducting thin films, which carry electricity without resistance at very low temperatures. Citing a nondisclosure agreement Xi signed in 2006 in order to conduct research with a pocket heater—a patented device that makes thin films of the superconductor magnesium diboride—the US attorney's office in Philadelphia charged him with four counts of wire fraud stemming from four emails sent to scientists in China about establishing labs and about a collaboration involving a thin-film deposition device that the government charged was a pocket heater. Xi faced eighty years in prison and a \$1 million fine, but before a trial date was set the charges

were dropped. It turned out that the devices Xi had discussed with Chinese colleagues did not include a pocket heater and the exchanges posed no threat to US interests. Professor Xi has now filed a civil suit charging malicious prosecution.<sup>1</sup>

- In August 2010 climate scientist Michael Mann, professor of atmospheric science at Pennsylvania State University, was opening mail when white powder fell from a letter. It was cornstarch, not anthrax, but this was but one in a long series of threats Mann has received since the late 1990s in response to his research demonstrating how global warming was producing a rising temperature curve whose shape he likened to a hockey stick. The sender of one email said that he and his collaborators “ought to be shot, quartered, and fed to the pigs along with [their] whole damn families.”<sup>2</sup> Later this report

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1. On October 31, 2017, the American Civil Liberties Union joined Professor Xi's suit, filing an amended complaint that “sets out troubling allegations of unconstitutional government conduct” and charges the Federal Bureau of Investigation and the Justice Department with bias and discrimination against Xi and other American scientists of Chinese descent. See Ryan Parchment, “The Chilling Surveillance and Wrongful Arrest of a Chinese-American Physics Professor,” *Speak Freely* (blog), American Civil Liberties Union, October 31, 2017, <https://www.aclu.org/blog/privacy-technology/surveillance-technologies/chilling-surveillance-and-wrongful-arrest-chinese>.

2. “Perspectives of Scientists Who Become Targets: Michael Mann,” Climate Science Legal Defense Fund, July 20, 2017, <https://climatesciencedefensefund.org/2017/07/20/perspectives-of-scientists-who-become-targets-michael-mann/>.

discusses the persecution of Mann by the Virginia attorney general and a private foundation seeking to stop his climate research, as well as efforts by the Trump administration to throttle environmental science and silence scientists.

The first incident illustrates how concerns about national security and espionage have led to increasing restrictions on and threats to the global exchange of scientific research and the academic freedom of American scientists to interact with foreign colleagues. Mann's case demonstrates how a growing politicization of science in the United States, now combined with a powerful antisience bent in the Trump administration, has led many scientists to conclude, in the words of Harvard historian of science Naomi Oreskes, "that the time for sitting on the sidelines has passed."<sup>3</sup>

These two trends together threaten not only the academic freedom of scientists but also the ability of American science to maintain its international stature and continue to contribute to the improvement of American lives. This report investigates the nature and extent of these interlinked threats and provides principles and recommendations for responding to them. Part I examines the tensions between academic freedom and national security in international scientific exchange, building upon conclusions in the 2003 report of an AAUP special committee, *Academic Freedom and National Security in a Time of Crisis*. That report "urge[d] the implementation of fair measures deemed vital to controlling the entry of foreign students and visitors" consistent with broader principles of academic freedom and international scholarly exchange.<sup>4</sup> Part II examines politically motivated threats to scientific research, with emphasis on threats to climate science and on the initial actions of the Trump administration. Part III concludes the report by endorsing statements of principle and recommendations offered by national scientific organizations.

### **I. Academic Freedom and International Scientific Exchange**

"The overwhelming U.S. dominance in scientific research in the last half of the twentieth century is being replaced by a more multipolar landscape of science, technology, and innovation, with the United

States remaining a very strong force," wrote two prominent State Department science advisers, E. William Colglazier and Elizabeth E. Lyons, in 2014.<sup>5</sup> According to a 2013 report by the National Science Foundation, more than five million of the twenty-nine million scientists and engineers in the United States were born in other countries. Approximately 25 percent of US Nobel Laureates and 25 percent of the members of the National Academies of Sciences, Engineering, and Medicine immigrated to the United States as students or senior scientists. In 2013, 33 percent of US publications in science were coauthored with scientists in other countries, compared with just 19 percent in 2000. Nearly a fifth of all papers published in scientific journals internationally in recent years have authors from at least two countries.<sup>6</sup>

These realities suggest that in today's world, as Colglazier and Lyons have argued, "sustaining American leadership" in science will require "vigorous international collaboration across the new dynamic landscape. If the United States can no longer be assured of leadership . . . through sheer dominance of size and resources, it will need to maintain leadership through synergistic partnerships." Hence, "U.S. scientists and institutions should sustain the free exchange of ideas and enter collaborations with strong agreements that articulate the mutual benefits for all participants and the arrangements for sharing outputs and benefits."<sup>7</sup>

As early as 1999, a committee of the National Academies of Sciences and Engineering and the Institute of Medicine reached a similar conclusion, with special reference to nuclear weapons laboratories: "The world is awash in scientific discoveries and

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3. Amy Harmon and Henry Fountain, "In Age of Trump, Scientists Show Signs of a Political Pulse," *New York Times*, February 6, 2017.

4. Special Committee on Academic Freedom and National Security in a Time of Crisis, "Academic Freedom and National Security in a Time of Crisis," *Academe*, November–December 2003, 35.

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5. E. William Colglazier and Elizabeth E. Lyons, "The United States Looks to the Global Science, Technology, and Innovation Horizon," *Science and Diplomacy* 3, no. 3 (September 2014).

6. Sarah Kaplan, "How Trump's Travel Ban Could Hurt Science," *Washington Post*, January 30, 2017; National Academies of Sciences, Engineering, and Medicine, letter to David T. Donahue, May 16, 2017, [http://www.nationalacademies.org/NRC\\_test/Submission Comment on Supplemental Questions for Visa Applicants \(DS-5535\) NASEM 05162017.pdf](http://www.nationalacademies.org/NRC_test/Submission%20Comment%20on%20Supplemental%20Questions%20for%20Visa%20Applicants%20(DS-5535)%20(NASEM%2005162017).pdf); National Science Board, *Science and Engineering Indicators 2016* (Arlington, VA: National Science Foundation, 2016).

7. Colglazier and Lyons, "The United States Looks to the Global Science, Technology, and Innovation Horizon." See also Susan Sutton and Elizabeth E. Lyons, "Unintentional Diplomats: International Science Engagement and Science Diplomacy by U.S. Higher Education Institutions," [http://www.aieaworld.org/assets/docs/Additional\\_Resource\\_PDFs/suttonsb%20and%20lyonsee-%20unintentional%20diplomats.pdf](http://www.aieaworld.org/assets/docs/Additional_Resource_PDFs/suttonsb%20and%20lyonsee-%20unintentional%20diplomats.pdf).

technological innovations. If the United States is to remain the world's technological leader, it must remain deeply engaged in international dialogue, despite the possibility of the illicit loss of information.”<sup>8</sup>

It remains unclear, however, whether the United States has been able to meet the challenge posed by global science. A January 2016 report by the National Science Foundation found that although the United States “invests the most in research and development, produces the most advanced degrees in science and engineering and high-impact scientific publications, and remains the largest provider of information, financial, and business services, . . . Southeast, South, and East Asia . . . now account for 40 percent of global R&D, with China as the stand-out.”<sup>9</sup> A June 2017 report warned that between 2007 and 2012, combined private- and public-sector research expenditures (adjusted for inflation) in the United States declined by 1.9 percent, as compared with an increase of 32.8 percent for China and 10 to 11 percent for Singapore and South Korea. The report added that, in particular, “stagnation in federal support for biomedical research . . . could undermine the leading role the US has played” in that field.<sup>10</sup>

A comprehensive November 2012 report on the state of US scientific research by the President's Council of Scientific Advisors argued that “[t]he United States is in the midst of a profound reorganization of how research is done, where it is done, who does it, and how its results find their way to the marketplace. This confluence of circumstances threatens the Nation's world-leading position in innovation and technology and the benefits it brings.” The report noted that total US expenditures on

research and development as a percentage of gross domestic product, formerly first in the world, now ranked just eighth. “The United States today has fewer and smaller corporate laboratories than it did just a generation ago,” the report stated. Moreover, “research by industry now focuses more on development and less on basic and applied research; industry supports a much smaller fraction of basic research than it once did.” As a consequence, “research universities are today performing not only the basic research for which they have been best known during the last 50 years, but to an increasing extent applied and translational research with the potential to deliver innovations, new industries, and market efficiencies over the next 50 years. Today, American research universities are closer to the marketplace than they have ever been, with a focus on translating and transferring research discoveries to industry. Universities . . . are also increasingly hubs of research for national needs such as national security, health, and environmental stewardship.”<sup>11</sup>

Yet as the need for international scientific exchange expands, national security agencies have sounded the alarm over threats of espionage. An April 2011 report prepared by the Counterintelligence Strategic Partnership Unit of the FBI argued that while “most

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8. Institute of Medicine, National Academy of Sciences, and National Academy of Engineering, *Balancing Scientific Openness and National Security Controls at the Nuclear Weapons Laboratories* (Washington, DC: The National Academies Press, 1999), 11.

9. National Science Foundation, “U.S. Science and Technology Leadership Increasingly Challenged by Advances in Asia,” news release 16-006, January 19, 2016, [https://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=137394&org=NSF&from=news](https://www.nsf.gov/news/news_summ.jsp?cntn_id=137394&org=NSF&from=news).

10. Marisa L. Conte, Jing Liu, Santiago Schnell, and M. Bishr Omary, “Globalization and Changing Trends of Biomedical Research Output,” *JCI Insight*, June 15, 2017, <https://insight.jci.org/articles/view/95206>. The US share of all research and development funding worldwide dropped from more than a third to a fourth from 2003 to 2013 (National Science Board, *Science and Engineering Indicators 2016*, chap. 4). The United States now ranks ninth among members of the Organization for Economic Cooperation and Development in proportion of gross domestic product spent on research.

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11. President's Council of Advisors on Science and Technology, *Transformation and Opportunity: The Future of the U.S. Research Enterprise*, November 2012, 1, 6. Universities now perform more than half of all basic research in the United States, with public universities accounting for two-thirds of the funds allocated annually by the federal government (National Science Board, *Science and Engineering Indicators 2016*, chap. 5). For an account of the state of scientific and technological research in the United States that also emphasizes the importance of international collaborations, see National Research Council, *Furthering America's Research Enterprise* (Washington, DC: The National Academies Press, 2014). The AAUP has commented extensively on the implications of these trends for research universities. See the Association's 2004 *Statement on Corporate Funding of Academic Research* and its 2014 book-length *Recommended Principles to Guide Academy-Industry Relationships*. For discussions of problems associated with maintaining sufficient funding for university research on this basis, see Art Jahnke, “Who Picks Up the Tab for Science?” *BU Today*, April 6, 2015, <http://www.bu.edu/today/2015/funding-for-scientific-research/>; Christopher Newfield, “University Research and the Great Mistake,” *Inside Higher Ed*, April 13, 2017, <https://www.insidehighered.com/views/2017/04/13/how-universities-have-gotten-caught-privatization-trap-essay>; and Brian Herman and Claudia Neuhauser, “Is It Time for a New Model to Fund Science Research in Higher Education?,” *The Conversation*, October 12, 2016, <https://theconversation.com/is-it-time-for-a-new-model-to-fund-science-research-in-higher-education-63691>.

foreign students, researchers, or professors studying or working in the United States are here for legitimate and proper reasons,” some are “actively working at the behest of another government or organization.” The report added that “some foreign governments pressure legitimate students to report information to intelligence officials.”

“The open environment of a university,” the report claimed, “is an ideal place to find recruits, propose and nurture ideas, learn, and even steal research data, or place trainees who need to be exposed to our language and culture—a sort of on-the-job-training for future intelligence officers. Foreign intelligence services have been taking advantage of higher education institutions and personnel for many years, either through deliberate stratagems or by capitalizing on information obtained through other parties.”<sup>12</sup>

There is good reason to question such reasoning, because it often exaggerates the security threat without providing the kind of evidence that makes that concern credible. In *Academic Freedom and National Security in a Time of Crisis*, the AAUP argued that “when the government invokes claims of security to justify an infringement of our civil or academic liberties, the burden of persuasion must be on the government to satisfy three essential criteria”:

1. The government must demonstrate the particular threat to which the measure is intended to respond, not as a matter of fear, conjecture, or supposition, but as a matter of fact.
2. The government must demonstrate how any proposed measure will effectively deal with a particular threat.
3. The government must show why the desired result could not be reached by means having a less significant impact on the exercise of our civil or academic liberties.

With respect to research, the report added: “Under certain circumstances, academic research can directly affect national security, and in those circumstances, a system of classification may be necessary, as it has been in the past. The hazards of a dangerous world cannot be ignored. At the same time, secrecy, an inescapable element of classified research, is fundamentally incompatible with freedom of inquiry and freedom of expression. . . . Not only are fewer

restrictions better than more, but restrictions on research, to the extent that any are required, must be precise, narrowly defined, and applied only in exceptional circumstances.”<sup>13</sup>

A survey of some recent cases suggests that when it comes to international scientific exchange, these criteria have not always been met. Professor Xi’s experience is not isolated. In 1996, the US Congress passed the Economic Espionage Act. In subsequent years the act’s provisions were employed against a series of Chinese and Chinese American scientists. The focus on China, arguably, relates to that country’s growing ascendancy as a world economic power and to US anxiety about retaining its competitive edge. For example, the June 2017 report cited above found that Chinese researchers have steadily increased the number of articles they publish in high-ranking biomedical journals, while the number of articles published solely by American authors has declined.<sup>14</sup> These cases raise the question of the relationship between national security and commercial competition, as anxieties about commercial hegemony seem to have overshadowed considerations of the balance between national security and academic freedom:

- In a widely publicized case from 1999, Wen Ho Lee, a physicist at the Los Alamos National Laboratory, was charged with stealing secrets relating to the US nuclear arsenal. After nine months in solitary confinement he was cleared of fifty-eight of fifty-nine charges, and in 2006 a court awarded him \$1.6 million in damages.
- In 2010, Guoqing Cao and Li Shuyu, two Eli Lilly biologists, were accused of passing research into cancer and diabetes treatments to China. After the scientists spent a year in detention, the US attorney dropped charges.
- In 2014, Xiafen Chen, a National Weather Service hydrologist, was indicted for allegedly passing information about the US dam system to China. Once again, charges were later dropped with little explanation.
- In 2015, Yudong Zhu, a New York University magnetic resonance imaging researcher, reached a plea deal (pleading to a single misdemeanor) after being charged with bribery and fraud in an

12. Federal Bureau of Investigation, *Higher Education and National Security: The Targeting of Sensitive, Proprietary and Classified Information on Campuses of Higher Education*, April 2011.

13. Special Committee, “Academic Freedom and National Security,” 37–38, 43–44.

14. Conte, Liu, Schnell, and Omary, “Globalization and Changing Trends.”

eight-count indictment for supposedly attempting to pass university-owned research to China.

- In 2016, Allen Ho, a Taiwan-born US citizen, was charged with espionage for hiring retired US nuclear engineers and consultants to advise China General Nuclear Power Corporation. Ho and one of his former consultants, Ching Ning Guey, whose plea deal helped the government build a case, were the first people charged under a provision of the Atomic Energy Act of 1954 that requires individuals who help make special nuclear material outside of the United States to ask the government for permission to do so. Ho's attorney claims that his client's alleged offenses are simply ordinary business activities—what a consultant does when hired by a foreign company. “This is commercial, why is this a problem?” opined Carl Olson, a consultant interviewed by the FBI in the case.<sup>15</sup>

These and similar efforts to prevent both industrial and military espionage carry serious risks to academic freedom. There are certainly instances in which foreign governments or corporations have violated both national security and intellectual property rights of Americans. Nonetheless, Professor Xi's case in particular highlights the dangers associated with careless actions by the government. According to an account in the journal *Science*, the case “was based on a misreading of the scientific partnerships and teaching exchanges that have flowered since China began aggressively investing in research in the 1990s. Xi's offer to help Chinese colleagues build a world-class lab is a common gesture in international collaborations on superconductivity, which is highly developed in China.” According to one scientist, “ninety percent of scientists involved in this kind of international exchange” are engaged in activities similar to Xi's. Another said, “I am mystified as to why the case was brought.”<sup>16</sup> One explanation may well have to do with the conflation of commercial interest and national security; in that process the contributions of uncensored science to the national interest are obscured, if not entirely discounted. However, Professor Xi's

lawsuit charges that his prosecution was “malicious” and that FBI agents “knew or recklessly disregarded the fact that the interactions Professor Xi had with Chinese colleagues were legitimate normal academic collaboration.”<sup>17</sup>

The cases cited above targeted Chinese American or Chinese scientists working in the United States. President Trump's executive orders restricting entry to the United States for residents of specified majority-Muslim countries, as well as the Trump administration's efforts to limit the number of H-1B visas available to foreign scientists, pose equally disturbing threats to scientific exchange. The proposed immigration ban—currently under challenge in the courts—met with widespread opposition in the academy. A petition signed by more than forty-two thousand scholars—including sixty-two Nobel laureates; 813 members of the National Academies of Sciences, Engineering, and Medicine; and 105 recipients of prestigious awards like the Fields Medal and Pulitzer Prize—in January 2017 charged that the ban “significantly damages American leadership in higher education and research.”<sup>18</sup> An amicus brief filed in February by seventeen prominent private research universities argued at length that the proposed restriction “hurts American universities by deterring international students, faculty, and scholars from studying here.” The brief added that “American laboratories, which are a major driver of our economy, depend on the ability to attract the best trainees and postdoctoral fellows from around the world, as well as the collaboration of foreign scientists in areas of science that have no defense or security implications. The Order diminishes [universities'] ability to attract these scientists, who will otherwise go to foreign laboratories.”<sup>19</sup>

The American Geophysical Union and the Geological Society of America expressed their concern, emphasizing that the president's executive order “could undermine U.S. leadership in science and reduce our access to the best science to address pressing societal issues. . . . It most certainly will

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15. Anya Litvak, “Nuclear Secrets: The Ex-Westinghouse Employee Accused of Helping a Foreign Power,” *Pittsburgh Post-Gazette*, September 15, 2016; Lucy Hornby and David Lynch, “US Nuclear Secrets Trial Cools Co-operation with China,” *Financial Times*, October 24, 2016.

16. Mara Hvistendahl, “Not Guilty as Charged,” *Science* 350 (November 13, 2015): 735.

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17. *Xi v. Haugen et al.*, No. 2:17-cv-02132-RBS (E.D. Pa. Oct. 31, 2017).

18. Hank Reichman, “Academics against Immigration Executive Order,” *Academe Blog*, January 28, 2017, <https://academeblog.org/2017/01/28/academics-against-immigration-executive-order/>.

19. *Darweesh v. Trump*, No. 17-cv-480 (CBA), 2017 U.S. Dist. LEXIS 27208 (E.D.N.Y. Feb. 8, 2017).

have a chilling effect on international scientific collaboration.”<sup>20</sup>

Although the immigration restrictions have not been implemented, nearly 40 percent of US colleges and universities reported declines in applications from international students, and international student recruitment professionals reported “a great deal of concern” from students and their families about visas and perceptions of a less welcoming climate in the United States, according to a survey conducted in February 2017 by multiple higher education groups.<sup>21</sup>

Moreover, as the presidents of the National Academies of Sciences, Engineering, and Medicine warned in a May 2017 letter to the State Department, proposed supplemental questions for visa applicants “will have significant negative unintended consequences on the nation’s international leadership in research, innovation, and education.” They added that, when combined with the proposed immigration ban, “the message being sent to the world is that the United States is no longer a welcoming country to these future leaders in science, engineering, and medicine.”<sup>22</sup>

The AAUP has extensively documented and actively opposed government efforts, dating back to at least the early Cold War, to exclude foreign scholars on questionable grounds. In 1952 its annual meeting passed a resolution urging “the removal of legislative and administrative barriers to the visits of foreign students and scholars to this country.” In 2006, the AAUP joined the American Academy of Religion and the PEN American Center in a suit contesting the exclusion of Tariq Ramadan, a scholar who accepted a tenured position at the University of Notre Dame only to have the government revoke his visa, apparently on the basis of what is known as the ideological exclusion provision of the USA PATRIOT Act. The same year Adam Habib, a scholar coming to meet with officers of the Social Science Research Council, Columbia University, the National Institutes of Health, and the World Bank, was intercepted at the airport and denied entry to the United States based on a portion of the USA PATRIOT

Act excluding aliens who have “engaged in a terrorist activity.” The government did not, however, provide any evidence for its determination that Habib had engaged in terrorist activity or define the type of activity in which he had supposedly engaged. The AAUP joined the American Civil Liberties Union in filing suit on behalf of the organizations that had invited Habib to speak in the United States.

Academic freedom eventually prevailed in those cases—the bans on entry for both men were lifted in 2010—but the restrictions under consideration now, even if they are ultimately defeated in the courts, create a much more broadly chilling environment for the international exchange of scholars, including scientists whose work may have no obvious political implications.

## II. Politicized Science and Academic Freedom

Not only attacks on individual scientists, but also a more general outlook that associates scientific work with subversion, threatens academic freedom. Indeed, that outlook—profoundly anti-intellectual, invoking anti-elitism as its mantra—makes the attacks on individuals possible. Here the issue is not national security but the validity of scientific findings and the free pursuit of scientific inquiry themselves. As former AAUP general secretary Ernst Benjamin has reminded us, “scientific disputes inherent in exploring and testing new scientific understandings have long been used as a cover for politically motivated, unscientific efforts to discredit otherwise sound science.” In the 1930s none other than Albert Einstein (an AAUP member from 1935 until his death in 1955) was subject to attack as an alleged Communist, a Jew, and an immigrant, and his theory of relativity was mocked by antisience forces as “a crazy vagary” and “a disgrace to our age.”<sup>23</sup>

It would be a mistake to assume, therefore, that attacks on science and the proliferation of “fake news” began with the inauguration of Donald Trump. The opening months of the George W. Bush administration were also marked by hostility to science. In March 2001 Bush announced he would not regulate power plant emissions of carbon dioxide, reversing a campaign promise. He then withdrew regulations

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20. “AGU, GSA Respond to Immigration Ban’s Impact on Science,” *From the Prow* (blog), January 20, 2017, <http://fromtheprow.agu.org/jagu-gsa-respond-immigration-bans-impact-science/>.

21. Elizabeth Redden, “Will International Students Stay Away?,” *Inside Higher Ed*, March 13, 2017, <https://www.insidehighered.com/news/2017/03/13/nearly-4-10-universities-report-drops-international-student-applications>.

22. National Academies, letter to David T. Donahue.

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23. Ernst Benjamin, “The March for Science Is Also a March for Academic Freedom,” *Academe Blog*, April 18, 2017, <https://academe.blog.org/2017/04/18/the-march-for-science-is-also-a-march-for-academic-freedom/>.

drafted under President Clinton to reduce arsenic in drinking water.

Bush's February 2001 budget proposal drew wide criticism among scientists for its cuts to expenditures on science, technology, and the environment. Articles in *Science*, *Physics Today*, and *Nature* criticized "drastic reductions in environmental research" as well as a failure to fill top leadership positions, including the president's failure to appoint a science adviser. "Rapid-fire decisions on ergonomics, arsenic levels and carbon dioxide emissions indicate that scientific opinion sits low in the pecking order of influence inside the new Bush administration," wrote the editors of *Nature*.<sup>24</sup>

A report prepared in 2001 by the Democratic minority staff of the House Committee on Government Reform concluded that the administration had damaged science "by manipulating scientific advisory committees, by distorting and suppressing scientific information, and by interfering with scientific research and analysis." The report found that these practices had undermined the integrity of information on more than twenty scientific issues, including lead poisoning, breast cancer research, wetlands policy, global warming, stem-cell research, missile defense, abstinence education, and condom use.

For those paying attention, therefore, it came as no great surprise that the first months of the Trump administration would follow a disturbingly similar pattern. Even before Trump's inauguration, renowned scientist Lawrence Krauss, director of the Origins Project at Arizona State University, chair of the board of sponsors of the *Bulletin of the Atomic Scientists*, and a member of the board of the Federation of American Scientists, called Trump's initial appointments "alarming" and "part of a larger effort to undermine the institution of science, and to deprive it of its role in the public-policy debate."<sup>25</sup>

Mick Mulvaney, director of the Office of Management and Budget in the Trump administration, has asked whether "we really need government-funded research at all." Specifically, Mulvaney questioned research demonstrating the connection between the

Zika virus and microcephaly.<sup>26</sup> Trump's secretary of energy, Rick Perry—who famously proposed eliminating the department he now leads—wrote in 2010 about climate change that "we have been experiencing a cooling trend," when quite the opposite has been the case. Ryan Zinke, Trump's secretary of the interior, has called climate change "not proven science."<sup>27</sup>

Perhaps most troubling both for science and for the welfare of the planet has been Trump's appointment of Scott Pruitt to head the Environmental Protection Agency (EPA). Pruitt, like Trump, has a long history of disputing the validity of climate science, even if during his confirmation hearings he disagreed with the president's past statements that global warming is a hoax perpetrated by the Chinese to harm the US economy. William K. Reilly, EPA administrator under President George H. W. Bush, fears the agency is "going down a very dark road."<sup>28</sup> Responding to reports that under Pruitt the EPA would bar employees from communicating with media or engaging on social media, former member of Congress and scientist Rush Holt, now CEO of the American Association for the Advancement of Science (AAAS), wrote, "Many federal agencies have existing scientific integrity policies that prohibit political interference in the public dissemination of scientific findings. As the AAAS Council stated in 2006: Censorship, intimidation, or other restriction on the freedom of scientists employed or funded by governmental organizations to communicate their unclassified scientific findings and assessments not only to each other but also to policymakers and to the public is inimical to the advance of science and its appropriate application in the policy domain."<sup>29</sup>

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24. "Problems with the President," editorial, *Nature* 410 (March 29, 2001). See also Paul Rosenberg, "Lies, Damned Lies and Donald Trump: How the Reagan and Bush Assaults on Truth and Science May Presage What's Coming," *Salon*, December 18, 2016, <http://www.salon.com/2016/12/18/lies-damned-lies-and-donald-trump/>.

25. Lawrence M. Krauss, "Donald Trump's War on Science," *New Yorker*, December 13, 2016.

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26. Phil Plait, "Another Day, Another Anti-Science Trump Pick for Federal Office," *Bad Astronomy* (blog), *Slate*, December 20, 2016, [http://www.slate.com/blogs/bad\\_astronomy/2016/12/20/trump\\_omb\\_chief\\_pick\\_mick\\_mulvaney\\_questions\\_need\\_for\\_funding\\_science.html](http://www.slate.com/blogs/bad_astronomy/2016/12/20/trump_omb_chief_pick_mick_mulvaney_questions_need_for_funding_science.html).

27. Michael E. Mann, "Henhouse for Rent—Only Foxes Need Apply," Columbia University Center for Climate and Life, January 9, 2017, <http://climateandlife.columbia.edu/2017/01/09/henhouse-for-rent-only-foxes-need-apply/>.

28. Michael Biesecker and Seth Borenstein, "EPA Science under Scrutiny by Trump Political Staff," Associated Press, January 26, 2017, <https://www.apnews.com/c1423276fb574b07953651a68a082db9>.

29. "AAAS Responds to Moves to Halt EPA and USDA Public Communications," American Association for the Advancement of Science, January 24, 2017, <http://www.aaas.org/news/aaas-responds-moves-halt-epa-and-usda-public-communications/>.

In May 2017 the EPA effectively fired nine members of its Board of Scientific Counselors. In June it was announced that Pruitt's EPA would initiate a formal process to challenge established climate science by empowering rival "red" and "blue" teams to respond to the issue. One team would support the overwhelming scientific consensus while the other would challenge it, thereby politicizing a scientific issue and undermining long-standing peer-review procedures. On November 3, 2017, Pruitt announced the appointment of dozens of new members to the Science Advisory Board, the Clean Air Safety Advisory Committee, and the Board of Scientific Counselors. These appointees represented various regulated industries. Tony Cox, named to lead the clean air committee, runs a consulting firm serving oil and chemical clients. He has questioned whether reductions in pollutants yield health benefits. Robert Phalen, a new science board member, has argued that the air in the United States is currently too clean for "optimum health." Other appointees included officials from Phillips 66 Company, Southern Company, and the North Dakota Petroleum Council.<sup>30</sup>

Pruitt has also put John Konkus, a political appointee and Trump campaign operative with no background in science, in charge of grants. "In this role," the *Washington Post* reports, he "reviews every award the agency gives out, along with every grant solicitation before it is issued." Konkus has said that he is looking for "the double C-word"—climate change—and has instructed grant officers to eliminate references to the subject in solicitations. Konkus, who officially works in the EPA's public affairs office, has canceled close to \$2 million in grants competitively awarded to universities and nonprofit organizations.<sup>31</sup>

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30. Timothy Cama, "EPA Names Industry, State Officials to Advisory Boards," *The Hill*, November 3, 2017, <http://thehill.com/policy/energy-environment/358640-epa-names-industry-state-officials-to-advisory-boards>.

31. Juliet Eilperin, "EPA Now Requires Political Aide's Sign-Off for Agency Awards, Grant Applications," *Washington Post*, September 4, 2017. On August 18, 2017, allegedly as part of a departmental review of all grants costing more than \$100,000, Trump's Interior Department ordered the National Academies of Sciences, Engineering, and Medicine to halt a \$1 million study of the health risks of mountaintop-removal coal mining that had been requested by two West Virginia health agencies. The order came just hours before a scientific panel was to hear public testimony. See Ken Ward Jr., "Trump's Interior Department Moves to Stop Mountaintop Removal Study," *Charleston Gazette-Mail*, August 21, 2017.

On September 1, 2017, Trump announced plans to nominate Rep. Jim Bridenstine (R-OK) to be administrator of the National Aeronautics and Space Administration (NASA). Unlike previous NASA chiefs, Bridenstine is a politician without any scientific credentials; he serves on the House Science Committee, where he has been a vocal climate change denier. "Mr. Speaker, global temperatures stopped rising ten years ago," Bridenstine said on the floor of Congress in 2013. "Global temperature changes, when they exist, correlate with sun output and ocean cycles." He even demanded that President Obama apologize for funding climate research.<sup>32</sup>

Bridenstine's appointment was one of several in which, to use the words of the *New York Times* editorial board, "denial and mediocrity abound."<sup>33</sup> But the administration has also left numerous science positions unfilled. In his first hundred days Trump filled only eleven science-related positions. As of early June 2017 he had announced nominees for only seven of forty-six top science-related positions requiring Senate confirmation.

The administration's initial proposed budget contained potentially massive cuts to science programs. These included a \$900 million cut to the Energy Department's Office of Science, an 18 percent cut to the National Institutes of Health, and cuts to NASA that would reduce funding for Earth science research by \$102 million, terminate four missions aimed at understanding climate change, and eliminate NASA's \$115 million Office of Education. The EPA would see its funding slashed by 31 percent, eliminating a fifth of its workforce. More than fifty agency programs would be eliminated altogether. The proposal was from the start destined for dramatic revision by the Congress, but as a reflection of the administration's priorities it was alarming.<sup>34</sup>

In an important and exhaustive report, *Sidelining Science Since Day One*, the Center for Science and

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32. David Roberts, "As Hurricanes and Wildfires Rage, US Climate Politics Enters the Realm of Farce," *Vox*, September 8, 2017, <https://www.vox.com/energy-and-environment/2017/9/7/16258848/us-climate-politics-farce>.

33. "President Trump's War on Science," editorial, *New York Times*, September 9, 2017.

34. Kim Soffen and Denise Lu, "What Trump Cut in His Agency Budgets," *Washington Post*, updated May 23, 2017, <https://www.washingtonpost.com/graphics/politics/trump-presidential-budget-2018-proposal/>.



Democracy at the Union of Concerned Scientists concluded: “A clear pattern has emerged over the first six months of the Trump presidency: multiple actions by his administration are eroding the ability of science, facts, and evidence to inform policy decisions, leaving us more vulnerable to threats to public health and the environment. The Trump administration is attempting to delegitimize science, it is giving industries more ability to influence how and what science is used in policymaking, and it is creating a hostile environment for federal agency scientists who serve the public.”<sup>35</sup> The report documented a variety of tactics seemingly designed to diminish the role of science, including

- sidelining independent science advice;
- appointing conflicted individuals to scientific leadership positions;
- leaving key science positions vacant;
- revoking science-based safeguards;
- misrepresenting climate science and rolling back climate change safeguards;
- weakening science-based pollution standards without scientific justification;
- undermining protections from hazards at work and home;
- altering scientific content on federal websites;
- reducing public access to data;
- restricting communication of scientists; and
- creating a hostile environment for scientific staff.

The assault on science, particularly climate science, also has powerful support in the Congress, especially from those beholden to industrial interests that benefit from a lack of regulation of the environmental damage produced by their practices. In his first six months in office, President Trump signed an unprecedented thirteen Congressional resolutions revoking science-based protections on drinking water and protections ensuring that workers are not exposed to harmful chemicals.

Lamar Smith (R-TX), chair of the House Committee on Science, Space, and Technology, has been at the forefront of Congressional efforts to curb scientific work, especially in climate science. Smith has received \$759,047 in campaign contributions

from the oil and gas industry since 1998.<sup>36</sup> In the past Smith has taken aim at the National Oceanic and Atmospheric Administration (NOAA). A 2015 study sponsored by the agency rebutted the notion propagated by climate change deniers that we have experienced a “pause” in global warming. A British tabloid claimed that the NOAA study had “manipulated global warming data,” but those claims were swiftly debunked by experts. Nonetheless, Smith has repeatedly cited the story as evidence that federally funded scientists are “falsifying data to justify a partisan agenda.”<sup>37</sup>

In 2015, George Mason University’s Institute of Global Environment and Society (IGES) inadvertently posted a letter to President Obama from twenty climate scientists that recommended an investigation of the energy industry’s silencing of climate science research. Smith then wrote the IGES director, who had signed the letter, noting that “IGES appears to be almost fully funded by taxpayer money while simultaneously participating in partisan political activity” hostile to “companies and organizations that disagree with the Obama administration on climate change.” Smith demanded that IGES

1. Preserve all e-mail, electronic documents, and data (“electronic records”) created since January 1, 2009, that can be reasonably anticipated to be subject to a request for production by the Committee. . . .
2. Exercise reasonable efforts to identify and notify current employees, former employees, contractors, and third party groups who may have access to such electronic records that they are to be preserved.<sup>38</sup>

Last year, responding to media reports that ExxonMobil had for years understood the climate risks associated with fossil fuels but played them down, Smith subpoenaed the New York and Massachusetts attorneys general as well as a number of environmental

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35. Jacob Carter et al., *Sidelining Science Since Day One: How the Trump Administration Has Harmed Public Health and Safety in Its First Six Months*, Union of Concerned Scientists, July 2017, <http://www.ucsusa.org/sites/default/files/attach/2017/07/sidelining-science-report-ucs-7-20-2017.pdf>.

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36. “Rep. Lamar Smith—Texas District 21,” OpenSecrets.org, accessed November 9, 2017, <https://www.opensecrets.org/politicians/industries.php?cycle=Career&cid=N00001811&type=l>.

37. Sam Ross-Brown, “The Republican Climate Science Witch Hunt,” *American Prospect*, March 31, 2017. In August 2017 NOAA dissolved its fifteen-member climate science advisory committee, established to translate the findings of the National Climate Assessment into guidance for business and the public.

38. David Roberts, “The House Science Committee Is Worse Than the Benghazi Committee,” *Vox*, October 26, 2015, <http://www.vox.com/2015/10/26/9616370/science-committee-worse-benghazi-committee>.

and scientific groups, including the Union of Concerned Scientists, charging that their efforts to investigate ExxonMobil “deprive companies, non-profit organizations, and scientists of their First Amendment rights and ability to fund and conduct scientific research free from intimidation and threats of prosecution.”<sup>39</sup>

With a Republican in the White House, Smith has now sponsored two bills that would gut scientific research. In March 2017, Smith’s committee passed the Honest and Open New EPA Science Treatment Act (HONEST Act) and the Science Advisory Board (SAB) Reform Act. The HONEST Act repeats Smith’s earlier proposed Secret Science Reform Act, which would require the EPA to use only studies for which all data are publicly available and whose results are easily reproducible. The SAB Reform Act would change the makeup of the board that reviews the “quality and relevance” of the science the EPA uses to discourage the participation of academics. Scientists who receive EPA grants would be barred from serving on the board, while industry-sponsored experts with a direct interest in being regulated would be allowed. On October 31, 2017, the EPA implemented this policy by administrative order. In addition, a proposed Regulatory Accountability Act would require federal agencies to conduct adversarial hearings on proposed regulations, thereby enabling regulated industries to undermine independent scientific opinion. The proposed regulations from the Executive in Need of Scrutiny Act would allow Congress to override science-based rules developed at federal agencies.<sup>40</sup>

While some antiscience bills have little chance of becoming law—for instance, a bill filed this year to abolish the EPA—both of Smith’s proposals passed the House in 2014 and 2015. After Republicans won control of the Senate, Smith’s secret science bill was approved in committee there, before President Obama issued veto threats.

“I’ve always had a hard time understanding why members of Congress like to tell scientists how to conduct their research,” said Rep. Bill Foster (D-IL), one

of only two scientists in Congress. “Scientists should set the standards for research. Not politicians.”<sup>41</sup>

Smith is not the only member of Congress going after scientists. Some may be motivated by their links to industry; others seem to be responding to the religious and cultural agendas of their constituents. Dr. Eugene Gu is a surgical resident at Vanderbilt University whose research seeks to transplant healthy fetal organs in utero to fetuses with fatal congenital diseases so they can survive to adulthood with fully functioning hearts and kidneys. In April 2016 Gu received a congressional subpoena from the House of Representatives’ Select Investigative Panel on Infants’ Lives, led by Rep. Marsha Blackburn (R-TN). Gu’s start-up research company, Ganogen, is one of more than thirty organizations under investigation by House Republicans over the alleged use of fetal tissue from abortion clinics. A spokesperson for the House panel said the goal of the investigation was to “protect the integrity of research, scientific advancements, and voluntary organ donation in America.” But Gu said the negative attention from Congress created a “harrowing” ordeal for him. Fellow surgical residents at Vanderbilt became suspicious of him. Outside of the university, antiabortion activists began to harass him on social media and send him angry notes.

“I felt under siege,” Gu said. “I’m just trying to save people’s lives, and now I’m being thrown into this abortion fight as a proxy. I have nothing to do with abortion, I don’t encourage abortion; I just use tissue that would otherwise be discarded. And now I’m painted as this ‘baby killer’ just for doing research as a medical student.” “All this controversy and opposition from the Republicans is stymieing my research in a pretty significant way,” he added, “which is kind of weird because the scientific community is supposed to be immune to political shenanigans and oppression.”<sup>42</sup> Gu has temporarily suspended his research because of a lack of funds and the toxic political environment.

As Michael Mann’s experience demonstrates, the kind of harassment that Gu endured is hardly rare. Encouraged by supporters in government and by organizations that use social media to mobilize their constituencies, some private individuals have at times

39. Rebecca Leber, “If You Liked the Inquisition, You’ll Love the House Science Committee,” *Mother Jones*, January 31, 2017. Smith has received \$22,270 in contributions from ExxonMobil since 1998, most of it since 2008. See Steve Horn, “Exxon, Koch Ties May Help Explain Rep. Lamar Smith’s Probing Request of ‘Exxon Knew’ Environmental Groups,” *DeSmog* (blog), June 21, 2016, <https://www.desmogblog.com/2016/06/21/exxon-koch-lamar-smith-exxon-knew>.

40. Carter et al., *Sidelining Science*.

41. Emily Atkin, “Republicans’ War on Science Just Got Frighteningly Real,” *New Republic*, March 9, 2017.

42. Laura Bassett, “How House Republicans Derailed a Scientist Whose Research Could Save Lives,” *Huffington Post*, November 3, 2016, [https://www.huffingtonpost.com/entry/eugene-gu-research-congress\\_us\\_581a3d79e4b01a82df6460de](https://www.huffingtonpost.com/entry/eugene-gu-research-congress_us_581a3d79e4b01a82df6460de).

made threats and engaged in various forms of online and other harassment against scientists and faculty members whose research, teaching, or public commentary run against their own cherished beliefs, notably in the field of climate science. While the AAUP has recognized that critics “are sheltered by the same freedom of expression that we seek for ourselves,” it has also “condemn[ed] efforts to intimidate or silence faculty members.” The Association advises faculty members “to steel themselves against harsh criticism” but adds that “surely such advice does not extend to threats against faculty members’ lives or those of their family members.”<sup>43</sup>

It is not only individuals who engage in such threatening activity. Well-funded and powerful interest groups have also sought to intimidate those conducting scientific research with which they disagree, especially through freedom of information fishing expeditions. Earlier this decade Professor Mann, with the assistance of the AAUP, the Union of Concerned Scientists, and others, won a protracted legal battle to resist requests for his research records and private emails. These requests had come from then Virginia attorney general Ken Cuccinelli and a private non-profit, the American Tradition Institute, later renamed the Energy & Environment Legal Institute.

The Climate Science Legal Defense Fund, established in 2011, has helped Mann and other scientists resist attempts to access their emails and research notes. It assists with half a dozen cases a year. “We are hearing from scientists every week who are worried about what is going to happen,” said the fund’s executive director, Lauren Kurtz.<sup>44</sup> One important case involves a demand by the Energy & Environment Legal Institute that the University of Arizona release more than a decade’s worth of emails from two of its climate scientists, Malcolm Hughes and Jonathan Overpeck. The group demanded all of Hughes’s correspondence with Mann over a six-year period and also sought all of Overpeck’s emails that included the word “deadline.” Because of its

commitment “to the free and open scientific debate necessary to create high quality research,” the AAUP generally supports efforts to ensure greater transparency. But in an amicus brief filed in the Arizona case, the AAUP noted that “the possibility of being faced with burdensome, harassing, and intrusive public records requests for internal research notes and emails” will have the opposite effect, discouraging open communication among researchers and thus inhibiting the creation of high-quality research.<sup>45</sup> For that reason the AAUP supported the university’s efforts to resist the demands. Although a trial judge ruled that the emails must be turned over, on September 15, 2017, the Arizona Court of Appeals reversed that decision because the trial court had not applied the correct legal standard. The appeals court remanded the case to the trial court, instructing the judge to determine whether the public records law’s academic research exemption or, more generally, the best interests of the state warrant protecting the research records from disclosure. Nevertheless, the institute stated that it intends to “keep peppering universities around the country with similar requests under state open records laws.”<sup>46</sup>

### III. Principles and Recommendations

For decades scientists in and out of the academy have endorsed important principles of free inquiry and opposition to secrecy.

In 1970, a Task Force on Secrecy of the Defense Science Board (an advisory group of civilian experts appointed by the Department of Defense) issued a report, submitted to the secretary of defense, which concluded that “more might be gained than lost if our nation were to adopt—unilaterally, if necessary—a policy of complete openness in all areas of information.” Further, the report noted,

With respect to technical information, it is understandable that our society would turn to secrecy in an attempt to optimize the advantage to national security that may be gained from new discoveries or innovations associated with science and engineering. However, it must be recognized, first, that certain kinds of technical

43. “Targeted Online Harassment of Faculty,” AAUP, January 31, 2017, <https://www.aaup.org/news/targeted-online-harassment-faculty#>.

44. Oliver Milman, “Climate Scientists Face Harassment, Threats, and Fears of ‘McCarthyist Attacks,’” *Guardian*, February 22, 2017. Scientists are not the only targets of such efforts; government agencies are too. Judicial Watch, a conservative group, is suing NOAA for thousands of internal communications denied to it because they fall under the “deliberative process” exemption to the Freedom of Information Act.

45. *Energy & Env’t Legal Inst. v. Ariz. Bd. of Regents*, No. 2 CA-CV 2017-0002, 2017 Ariz. App. Unpub. LEXIS 1342 (Ct. App. Sep. 14, 2017).

46. “Win for Climate Science and the AAUP,” AAUP, September 15, 2017, <https://www.aaup.org/news/win-climate-science-and-aaup#>.

information are easily discovered independently, or regenerated, once a reasonably sophisticated group decides it is worthwhile to do so. In spite of very elaborate and costly measures taken independently by the U.S. and the U.S.S.R. to preserve technical secrecy, neither the United Kingdom nor China was long delayed in developing hydrogen weapons. Also, classification of technical information impedes its flow within our own system and may easily do far more harm than good by stifling critical discussion and review or by engendering frustration. There are many cases in which the declassification of technical information within our system probably had a beneficial effect and its classification has had a deleterious one.<sup>47</sup>

While the report quickly conceded that any proposal for complete openness would be impractical, the principle that secrecy has an adverse effect on the production of scientific and technical knowledge is undeniable, even in the context of defense-related research. Therefore, as the AAUP has stressed, any restrictions on research “must be precise, narrowly defined, and applied only in exceptional circumstances.”<sup>48</sup>

In 1976, responding to concerns among scientists about violations of scientists’ rights in other countries, especially the Soviet Union, the National Academy of Sciences voted to circulate “An Affirmation of Freedom of Inquiry and Expression.” Those who signed the statement affirmed their dedication to these principles:

That the search for knowledge and understanding of the physical universe and of the living things that inhabit it should be conducted under conditions of intellectual freedom, without religious, political, or ideological restriction.

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47. *Report of the Defense Science Board Task Force on Secrecy* (Washington, DC: Office of the Director of Defense Research and Engineering, 1970), 9, <https://fas.org/sgp/othergov/dsbrep.pdf>.

48. Special Committee, “Academic Freedom and National Security,” 44. For useful discussions of security classification, see Steven Aftergood, “Government Secrecy and Knowledge Production: A Survey of Some General Issues,” in *Secrecy and Knowledge Production*, Cornell University Peace Studies Program Occasional Paper #23, ed. Judith Reppy (Ithaca, NY: Cornell University Peace Studies Program, 1999), <http://large.stanford.edu/publications/crime/references/dennis/occasional-paper23.pdf> and Institute of Medicine, National Academy of Sciences, and National Academy of Engineering, *Balancing Scientific Openness and National Security Controls*.

That all discoveries and ideas should be disseminated and may be challenged without such restriction.

That freedom of inquiry and dissemination of ideas require that those so engaged be free to search where their inquiry leads, free to travel and free to publish their findings without political censorship and without fear of retribution in consequence of unpopularity of their conclusions. Those who challenge existing theory must be protected from retaliatory reactions.

That freedom of inquiry and expression is fostered by personal freedom of those who inquire and challenge, seek and discover.

That the preservation and extension of personal freedom are dependent on all of us, individually and collectively, supporting and working for application of the principles enunciated in the United Nations Universal Declaration of Human Rights and upholding a universal belief in the worth and dignity of each human being.<sup>49</sup>

It is sadly ironic that this pledge, formulated in the context of the Cold War in response to actions by repressive states, now seems equally relevant to contemporary American science.

Another more recent statement of the importance of free and open communication in science was issued by the American Geophysical Union in August 2011 and reaffirmed in September 2016. It reads:

Advances in science and the benefits of science to policy, technological progress, and society as a whole depend upon the free exchange of scientific data and information as well as on open debate. The ability of scientists to present their findings to the scientific community, policy makers, the media, and the public without censorship, intimidation, or political interference is imperative. With the specific limited exception of proprietary information or constraints arising from national security, scientists must be permitted unfettered communication of scientific results. In return, it is incumbent upon scientists to communicate their findings in ways that portray their results and the results of others, objectively, professionally, and without sensationalizing or politicizing the associated impacts.

These principles matter most—and at the same time are most vulnerable to violation—precisely

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49. *Science* 192 (May 21, 1976): 767.

when science has its greatest bearing on society. Earth sciences and their applications have growing implications for public health and safety, economic development, protection of the environment and ecosystems, and national security. Thus, scientists, policy makers, and their supporting institutions share a special responsibility at this time for guarding and promoting the freedom of responsible scientific expression.<sup>50</sup>

This report endorses these statements and urges the broader scientific and academic community to embrace and explicitly reaffirm them.

In this spirit, this report also recommends that

1. scientists resist efforts by government agencies to unduly restrict or discredit scientific research on grounds of national security and speak out against the politicization of science;
2. colleges and universities—through faculty committees, contracts and grants personnel, public relations officers, and others—vigorously defend colleagues in science and continue to support international collaborations;
3. the various scientific associations remain vigilant and outspoken about violations of scientific academic freedom;
4. scholarly organizations explore ways to provide legal and financial assistance to scientists whose academic freedom is under assault;
5. scientists and government employees report abuses of science, blowing the whistle with the aid of concerned organizations when they witness such abuses; and
6. news outlets report more extensively and accurately on scientific issues and hold the government accountable for attacks on science.

In accord with its traditions, the AAUP stands ready to work with concerned organizations to oppose executive orders, legislation, and all efforts that restrict the academic freedom of scientists. ■

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50. American Geophysical Union, "AGU Supports Free and Open Communication of Scientific Findings," <https://sciencepolicy.agu.org/files/2013/07/AGU-Open-Communication-Position-Statement-September-2016.pdf>.