Written Testimony of
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American Association for the Advancement of Science
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Chairman Wenstrup, Ranking Member Ruiz, and Members of the Select Subcommittee, thank you for the opportunity to testify today. I am Holden Thorp, Editor-in-Chief of the *Science* family of journals. The *Science* family of journals is published by the American Association for the Advancement of Science (AAAS), one of the largest multidisciplinary, non-profit scientific societies in the world. The mission of AAAS is to advance science, engineering, and innovation throughout the world for the benefit of all or — put more simply — to advance science and serve society.

I am a chemist by training with 40 years of experience as a researcher and administrator. For the past five years, I have had the best possible opportunity to observe the scientific publishing system at the *Science* family of journals.

Let me begin by saying how extraordinarily proud I am of the *Science* journals' work, including in the first year of the pandemic, when our team worked around the clock. Further, I am proud of the role the scientific enterprise plays in society writ large.

It is important to begin by noting that the journal *Science* is unlike most other publications in that it has three components, each of which operates independently. Each issue of *Science* covers scientific news, offers commentary about science, and publishes peer-reviewed research in many disciplines. As Editor-in-Chief, my role is different for each section. For the research journal, I oversee a staff of expert editors in different specialties. For news, I oversee award-winning coverage led by an editor and team of journalists that enjoy the same freedoms as any other media outlet in our country. Finally, as part of our commentary section, called Insights, I am an opinion writer who appears on the magazine's editorial page roughly every other week. Again, each of these three functions is independent from the others.

The peer review process is central to the scientific enterprise. For each research paper we handle at *Science*, we abide by a rigorous, multi-step peer review process that begins with staff editors who assess papers. These staff editors consult with expert colleagues and a board of external scientists. If a paper is determined to be potentially suitable for the journal, it is further evaluated by multiple reviewers who are researchers in related fields. This ensures that all aspects of a given study receive appropriate scrutiny. We also have a careful process to ensure that the reviewers do not have any conflicts of interest. Most studies that make it beyond these evaluations are revised and re-reviewed to ensure that all reviewer concerns have been adequately addressed. Then a paper is reviewed again by our staff editors who clarify language and images to make sure they are consistent with the evidence presented. If a paper makes it all the way through this process, it is then summarized, shared with more than 8,000 reporters under embargo, and posted on our website. Upon publication, it is maintained by us in perpetuity for any corrections or adjustments that happen after publication according to our well-established process.

This process was applied consistently to the nearly 9,000 research papers that *Science* family journal editors have reviewed related to SARS-CoV-2. It is applied to every paper, on every topic.

Regarding the paper at the center of this discussion, *The Proximal Origin of SARS-CoV-2*, it was never submitted to *Science*. In fact, I had no knowledge of this piece, published in *Nature Medicine*, nor of the related letter in *The Lancet*, until they were published.

However, I want to call attention to three publications in *Science* that are relevant to today's discussion.

First, two separate papers, one led by virologist Michael Worobey and another led by virologist Jonathan Pekar, were published in the research section of *Science* in 2022. This research has been heavily scrutinized – as is a typical part of the post-publication process – but this research still stands (see here and here). These papers present geospatial and genetic information that supports, but does not conclusively prove, the theory of natural origin for SARS-CoV-2. Both were posted on the internet, on preprint servers, prior to submission to *Science*. It is not uncommon for researchers to post early drafts of research as preprints to encourage community feedback and improve their work. Indeed, these papers were widely read and reported on at the preprint stage. When they were later submitted to *Science*, they were subjected to our full peer review process. At the end of the process, they were edited under my supervision to ensure that the language was consistent with the extent to which the evidence presented was supportive, but not dispositive, of natural origin. We made these changes because we felt that lab origin was still a possibility. The final published papers' more limited conclusions better reflect the data and evidence presented. To be clear, no government officials prompted or participated in the review or editing of the Worobey or Pekar papers.

We have indicated before, and I want to underscore it here, that any papers supporting the lab origin theory would go through the very same processes. Period. *Science* works by a system that enables people to challenge consensus, a point I've emphasized. Any paper that seeks to challenge consensus follows a path available to all: submit a paper to a journal, undergo multi-step peer review, share relevant data and methodology, and have many people look at the data to see if it really does disprove the consensus. If it does, that paper can be published. In fact, the few papers that genuinely do this are rightly celebrated, and journals like *Science* compete to get them in their pages.

With respect to commentary we publish, we invite open discourse in our journals. For example, we published a letter in our commentary section in May 2021 from prominent researchers in the area of COVID-19 origins, led by virologist Jesse Bloom. This letter called for a thorough investigation of the possibility of a lab origin of COVID-19. When we published it, I wrote in an accompanying blog that "good science requires that the laboratory escape idea be rigorously investigated before being ruled out. China should allow for a dispassionate examination of the data and allow scientists to do what they are trained to do. I thank the Letter writers for their contribution and hope their words will be heeded." I stand firmly by this sentiment today.

That letter ushered in a new era of consideration and debate on COVID-19 origins. That was important. We were intentional in this publication, as letters are some of the only material in *Science* that do not go through peer review. Rather, they are published at our discretion. We evaluate letters at the time they are submitted, in the context of the current state of the field. As our print journal masthead notes: *Science* serves as a forum for discussion of important issues related to the advancement of science by publishing material on which a consensus has been reached, as well as including the presentation of minority or conflicting points of view.

In 2021, in addition to publishing the Bloom letter, which has been mentioned in hundreds of news stories globally, *Science* also hosted a video conversation exploring origin theories. We invited scientists from both sides of the debate. Our guests were Alina Chan (Broad Institute of MIT and Harvard), Jesse Bloom (Fred Hutchison Cancer Research Institute), Michael Worobey (University of Arizona), and Linfa Wang (Duke-NUS Medical School, Singapore). Later that year, we published a Policy Forum by members of Former President Obama's Council of Advisors on Science and Technology. It advocated for a non-partisan U.S. COVID-19 commission to examine the pandemic outbreak and recommend steps to ensure the U.S. responds more effectively in future epidemics. *Science* has also published commentary by both Dr. Francis Collins, then-Director of the National Institutes of Health, and Dr. Anthony Fauci, then-Director of the National Institute of Allergy and Infectious Diseases. During the Trump Administration, both Collins and Fauci were authors on a Policy Forum on COVID-19 vaccine research and development.

For my part as the Editor-in-Chief at *Science*, one of my jobs is to populate our Editorial page, which is clearly marked as opinion. I write with the scientific community in mind. I don't shy away from topics that, while sensitive, could benefit a broader discourse between scientists and society at large. This was equally true during the COVID-19 pandemic. I pointed out my thoughts on failings by multiple officials. Just one month after the pandemic took the world by storm, in late February 2020, I wrote an editorial criticizing China's secrecy on the coronavirus. I wrote at that time, "We will never be able to better handle future public health crises without learning lessons from previous experiences. And if every experience is shrouded in secrecy, enforced by a repressive government, then we will never solve this problem." I stand firmly by this sentiment today.

In April 2023, when the world still lacked access to raw data on early COVID-19 cases in China, an editorial on our pages by World Health Organization leader Maria D. Van Kerkhove called on China yet again – urging China "to share any data on the origins of SARS-CoV-2, immediately."

The Select Subcommittee on the Coronavirus Pandemic has highlighted emails I've exchanged with federal officials, including Drs. Fauci and Collins, during the pandemic. These emails were friendly. There are also editorials I've written that are critical of these leaders. Another piece was critical of President Biden.

The third part of our magazine is our news division. The reporters who work for News from *Science* focus on topics that appeal to people who are actively involved in science, and I never tell them what to cover, or how. Their reporting spans many sides of given issues, which was true from the start of the pandemic. They reported as early as January 2020 that a lab may have been a possibility for the emergence of the SARS-CoV-2 virus.

To this point, I've felt it important to respond to points of concern laid out by the Subcommittee. I also want to acknowledge that *Science* and science more broadly did not navigate this global pandemic perfectly. I've previously highlighted missteps by researchers and funding agencies during COVID-19. I've talked extensively about scientists as flawed human beings, all with our inherent biases.

Of course, I am no different. My opinions have been on full display, including in editorials. I know some people don't like this. But just as was true for editorials by Editors-in-Chief before me, these pieces exist to inspire and provoke dialogue on issues that matter to our primary audience: the scientific community. These pieces are always clearly marked as commentary and do not change or influence the peer review processes for the research we publish.

Everyone has opinions, biases, and flaws. Some are upfront about them and others keep them to themselves. Of course, scientists are not and never will be perfect. We are human. But the scientific method enables us to reach beyond our individual limitations by requiring evidence and constant self-correction. It helped us end the pandemic, and it contributes to a strong and prosperous America.

An idea that is inherent in science, and something we take for granted, is that science is a work in progress. For the *Science* family of journals, where we are always striving to improve, we could have more clearly said during the pandemic, "This is what we know now, and it might change." I shared reflections on how we could help young people studying science better articulate this reality in a recent editorial.

It's important to recognize this and work to improve how we engage and communicate ahead of the next great societal challenge. Because there will be a next great societal challenge. I'm a big believer in looking mistakes in the eye and responding. It's something I've been trying to encourage the scientific community to do more quickly and transparently.

In closing, I want to recognize the scientific community and my colleagues at the *Science* family of journals for their roles during the COVID pandemic. We did not get everything right during COVID-19 – no one did. But in 18 months, the scientific community identified the virus, determined how it spreads, and developed therapies that have had major, life-saving impact. Scientists, the scientific method, and peer review are national treasures, and I am thankful every day for all three.

Holden Thorp, Ph.D.
Dr. Thorp became Editor-in-Chief of the *Science* family of journals on 28 October 2019. He also holds faculty appointments in chemistry and medicine at The George Washington University. He came to *Science* from Washington University in St. Louis, where he was provost and Rita Levi-Montalcini Distinguished University Professor from 2013 to 2019. He joined Washington University after spending three decades at the University of North Carolina at Chapel Hill (UNC), where he served as the 10th chancellor from 2008 to 2013.

A North Carolina native, Dr. Thorp started at UNC as an undergraduate student and earned a bachelor of science degree in chemistry in 1986. He earned a doctorate in chemistry in 1989 at the California Institute of Technology. He holds an honorary doctor of laws degree from North Carolina Wesleyan College, is a member of the American Academy of Arts and Sciences, and is a fellow of the American Association for the Advancement of Science and the National Academy of Inventors.

Dr. Thorp is the coauthor, with Buck Goldstein, of two books on higher education: Engines of Innovation: The Entrepreneurial University in the Twenty-First Century and Our Higher Calling: Rebuilding the Partnership Between America and its Colleges and Universities, both from UNC Press.