# Benjamin Franklin, Civic Scientist

**That early American prototype of a civic scientist would probably address many of today's concerns with wisdom, practicality, and a deep sense of civic responsibility.**

Neal Lane

A scientist and a civic-minded activist, Benjamin Franklin called upon his scientific intuition and skills to address broad societal questions at the time the US was founded. He was in many ways a model of a civic scientist, a term I have often used in the past, perhaps without adequately defining it. To me, a civic scientist is one who uses his or her special scientific knowledge and skills to influence policy and inform the public. In this article, with Franklin's help, I expand that definition.

This portrait of Franklin offers guidance and significance for the work of today's scientists, particularly as we seek to advise government in the ever optimistic hope of informing sound public policy and as we work to raise the American public's level of understanding of science and technology. We can learn much, I believe, from Franklin's scientific accomplishments and disposition combined with his exemplary sense of the responsibilities of citizenship.

As an Oklahoman, I have a tendency to cite the wisdom and humor of that great American cowboy-philosopher, Will Rogers. He was not a scientist, but he probably shared many of Franklin's views about politics and civic responsibility. For example, Rogers once had this to say about leadership: "If you're rid'n ahead of the herd, take a look back every now and again and see if it's still there." And about American partisan politics, he said, "I'm not a member of any organized political party. I'm a Democrat." Frankly, Rogers could have uttered those words today.

For the purposes of this article, however, I find that the clearest examples of Franklin's pragmatism, clarity, and unusual character come from his own words. With the sagacity of a Solomon, he warned us, "They that can give up essential liberty to obtain a little temporary safety deserve neither liberty nor safety."[1] That comment is as fresh and relevant today as it must have been in the tumultuous times surrounding the American Revolution.

One aspect of Franklin's place in the founding of this nation is of increasing interest to me, personally: his age. Born in 1706, Franklin was not only the first American scientist of note but arguably one of the first Americans; his pre-revolutionary writings indicate that he envisioned not 13 colonies but one nation. He was an elder statesman and mentor who could have been a father to any one of his fellow founders of this nation. And he moved among a group of upstarts who, in retrospect, represented one of history's most significant confluences of talent and wisdom. How lucky we are to have had the marvelous mix of Thomas Jefferson—one of those young upstarts—and Franklin approaching the same problems and tasks from two different perspectives and generations. Jefferson was 37 years younger than Franklin. Theirs must have been a fascinating interaction, rather like the experience many of us have had with our children.

As I prepared this article, I thought deeply about Franklin and about how he has been most frequently portrayed in secondary-school American history textbooks. As taught in our schools—and in our universities, for that matter—history gives little attention to science in any form. Franklin has received seriously short shrift as a scientist.

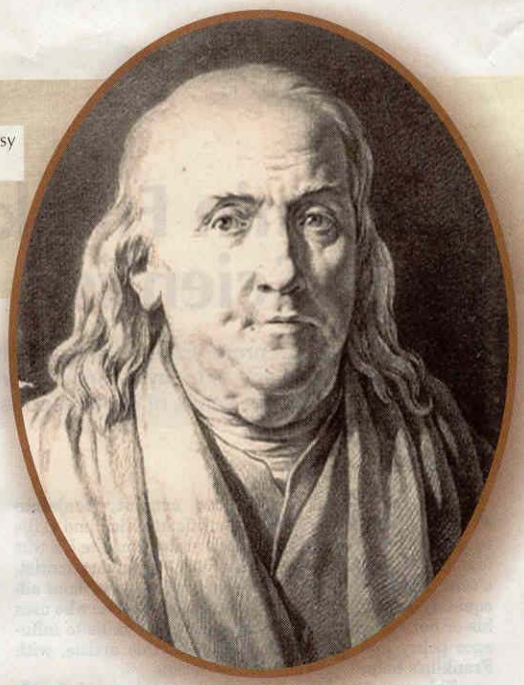
Students get only a trifle of the full measure of this amazing man. They emerge with a picture of Franklin as that crazy balding guy flying a kite in a thunderstorm while holding a handful of keys. Or they come away with an alternate portrait of him as colonial emissary to London and Paris. Students are given no connection between the two images and no sense of what he added to our understanding of science. Franklin confirmed, in 1752, that lightning is an electrical phenomenon. And in so doing, he opened to the scientific world the idea that electricity might be a valuable field of study. (Some sources say that a similar experiment in France preceded Franklin's by about a month, but news of it had not reached him.)

Back when I was a school kid, we used to have a course called civics, as well as history and science. I'm not really clear about what we learned in civics, or in history or science either, except that the three subjects were taught quite separately and apparently had nothing to do with one another. I don't think Franklin would hold that view.

I want to set the record straight on Franklin, whom I consider to be the founding father of civic science. He frequently seemed wiser than his contemporaries, not merely older. For example, he was aware that, "if man could have half his wishes he would double his troubles!"[1] Instead of waxing philosophical about future forms of government, he tended to apply what he knew from experience to solve specific problems, and he made his point with humor and clarity. This inclination toward pragmatic solutions and straight talk was a convenient and congenial balance to Jefferson's more philosophical bent.

Franklin certainly did not lack opinions or suggestions about government; he was merely more specific in his focus. For example, he spoke in favor of a plural executive and a unicameral legislature, neither of which came to fruition in our system. There are moments, though, when

**Neal Lane**, *former director of the National Science Foundation and science adviser to President Bill Clinton, is University Professor, with appointments in the department of physics and astronomy and as senior fellow of the James A. Baker III Institute for Public Policy of Rice University in Houston, Texas.*



**Engraved portrait** of Benjamin Franklin. (Courtesy of the American Philosophical Society.)

I think it might be worth a try! As Rogers once said, "I never make jokes about the government. I just watch what happens and report the facts."

## Wisdom, science, and communication

I've already touched on the subject of Franklin's age. I wouldn't suggest that one has to be old to be a good civic scientist, but it is important for a civic scientist to have commonsense wisdom—beyond one's years or at least equal to them. So wisdom is certainly one element of the definition of a civic scientist.

Of course, a civic scientist must also be a scientist. Without question, Franklin passes that test. He was known and respected on both sides of the Atlantic for his scientific achievements. Twenty years before the Declaration of Independence, Franklin was elected as a fellow of the Royal Society of London, and in 1753, he received the society's Copley Medal, which in his time was perhaps comparable in distinction to a Nobel Prize today. As a result, electricity gained recognition as a bona fide field of science. And in 1772, Franklin was elected to France's Royal Academy of Sciences in Paris—an exceptional honor because by its own regulations the academy could have only eight foreign members at one time.

Franklin fit comfortably into the science-oriented thinking of the 18th century. Historian Garry Wills reminds us that although Isaac Newton, with his genuine quest for a unifying science, was a paradigm of enlightenment thought, Franklin the experimentalist was a fortuitous match for the Enlightenment's obsession with measurement. Wills elaborates further, writing that "men recognized [Franklin's] genius precisely because he moved faster and farther by his native skill than most of his Enlightenment peers."[2]

Only in the last half-century have historians rediscovered the full breadth of Franklin's scientific interests. He studied seawater luminescence and ocean temperatures while charting the path of the Gulf Stream. He warned of the dangers of lead poisoning and hypothesized about continental drift and the wave theory of light. And he fascinated traveling companions by pouring a little oil on a lake's surface and thus stilling the waves.

Franklin's well-honed skills as a writer on various topics for the public also gave him the ability to explain science. I. Bernard Cohen, in *Science and the Founding Fathers*, notes that Franklin's book *Experiments and Observations on Electricity* "ranks among the most notable books on science of that age and of any other age."[3] And it was read not only by scientists but by the general public.

The definition of a civic scientist, then, must also include the ability to communicate effectively with—and communicate science to—the public.

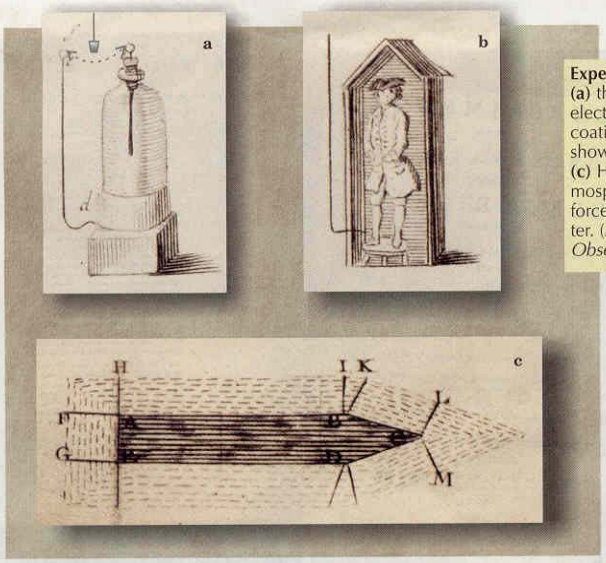
## Consensus and compromise

In keeping with his pragmatic nature, Franklin possessed the ability to form consensus and negotiate a positive outcome. He is credited with the compromise of equal-state representation in the Senate (a reversal of his previous position) and with population-based representation in the House of Representatives. The product of a large working-class family, Franklin was exposed to the economic, social, and educational needs of common society. He was convinced that smaller, poorer regions of the country were vulnerable to being swallowed up in the heat of political maneuvering and that, as a result, their voices would not be heard and their needs would go unmet.

He may not have anticipated that, with our present seniority system in Congress, much of the leadership is now in the hands of several of the smaller, less wealthy states. Then again, perhaps that is precisely what he had in mind. Let's add consensus-building and compromise to the attributes of a civic scientist.

Even in the years when he was spending most of his time on government matters, Franklin considered himself a scientist. He took comfort and delight in his experiments and expressed the desire to continue unfettered on that path. But the duties of patriot and diplomat took him in another direction. It was, in fact, his scientific celebrity as the tamer of lightning that gained him access to many influential French and British government officials. Franklin seemed well aware of his celebrity and had few qualms about exploiting it to gain access. From there, his intellect, wit, and charm carried his concerns to the highest-level audiences.

But of particular note, Franklin's scientific mind was




**Experiments in electricity.** Franklin demonstrated **(a)** that a qualitative difference exists between the electrical behavior of the inner versus the outer coating on a Leyden jar. **(b)** The sentry box diagram shows Franklin's design for attracting lightning. **(c)** His illustration of the binding of electrical atmospheres suggests the existence of an attractive force between electrical matter and common matter. (Adapted from B. Franklin, *Experiments and Observations on Electricity*, London, 1751–53.)

what enlightened his thoughts about government. In a letter to Jonathan Shipley in early 1786, Franklin offered this comment about the formation of government: "We are, I think, on the right Road of Improvement, for we are making Experiments."[3] Indeed, he likely argued for the inclusion of the constitutional amendment process because he knew full well that perfection was not a promising premise and that, based on experience and empirical findings, change was inevitable.

## Scientist and citizen

Franklin's disciplined scientific thinking proved useful in the debates and formation of policy; it shed light on the path of future scientists. Franklin was not simply a good scientist who engaged in public service. He was one who used his scientific curiosity, nature, intuition, and powers of analysis in ways only a scientist could, and that made him especially effective in the political and public domains.

I think Franklin would have been pleased with the moniker of civic scientist. His scientific life broadened into a life of public service that caused him to put all his knowledge and skills to work for the improvement of society. He promoted education and established schools, started a library loan system, wrote for the average citizen, founded civic organizations, lobbied for the establishment or improvement of many public services, and served as adviser—on science and everything else—to the first president of the US. I guess you could say that Franklin was the country's first science adviser to the president.

Certainly, Franklin lived in a world of dramatic change. He was at the forefront of overturning the old paradigms of government at a time when enlightenment in politics complemented that in science. What he made of those two concurrent revolutions is instructive for us today.

The nation that Franklin and the younger founding fathers were constructing of new cloth would have both more freedom and more responsibilities for its citizens. Franklin's awareness of the need to educate citizens and provide access to books was an indication of his benevolence, surely, but not solely. He understood that the new structure of government held new requirements for leaders and followers. As much as he loved science and continued to practice it, he saw and accepted the larger responsibilities of establishing democracy and preparing citizens for it.

We scientists face a similar situation in our own time. We are not, of course, fighting to remove a colonial master. But more than 200 years after the founding of this country, we are again threatened by forces—some external, some internal, some genuine, and some political—that would take away the very freedoms that Franklin and his contemporaries fought so hard to obtain. Science is not the root cause of these problems, nor is it an assured solution; but without question, science and technology must be a significant part of the solution. And, I believe, in order for that to happen, scientists will have to play a larger role in society and policy.

When I give talks on the subject of the civic scientist, I am sometimes asked, "Isn't it enough to be a good scientist and a good citizen?" Clearly, the answer is yes. Even if one is motivated solely by curiosity and a sense of adventure, making discoveries that add to the store of human knowledge is a major societal contribution in itself. The 20th-century philosopher Bertrand Russell wrote, "Almost everything that distinguishes the modern world from earlier centuries is attributable to science."[4]

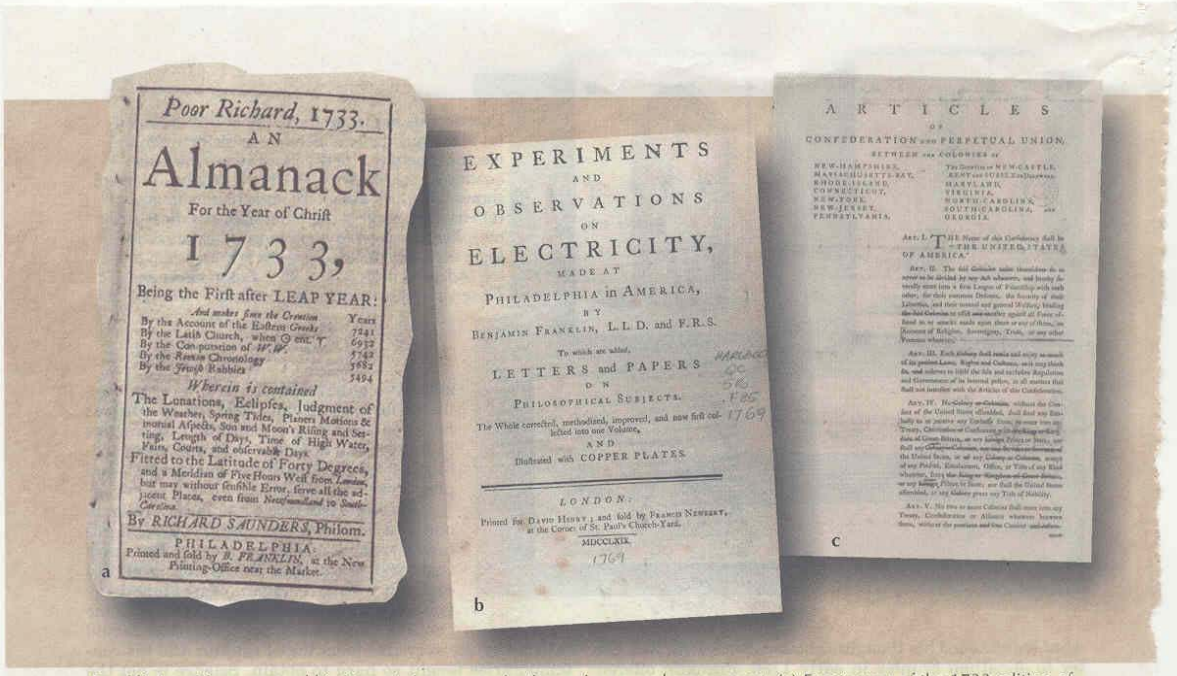
In fact, that view is widely held in this country. The surveys in *Science and Engineering Indicators*, a biennial report from the National Science Board, make clear that the American people are positive about science and believe it is important, even though most don't understand much about it. Given the impact that modern science and technology have on people, that lack of knowledge is a dangerous situation, for both science and society.

We should reflect on the reality that our science has helped shape the modern world in enormously powerful ways and is causing dramatic changes in people's lives. Moreover, much of today's science is so complex that sometimes only we can understand and explain it—and increasingly, only in our own disciplines. By default, this reality places new responsibilities on the science community.

## Updating Franklin

I think it is useful to ask what we can learn from Franklin today. "Ben, what would you do as a modern civic scientist? How would you respond to some of today's missed opportunities and neglected participants?" Let us compose a checklist; I'll call it "Franklin's List" (see the summary box on page 44).

Franklin would want us to address the conundrum that, at a time when science is so integral to society, gov-




**Franklin's writings** spanned his interests in communication, science, and government. **(a)** Front cover of the 1733 edition of *Poor Richard's Almanack*. **(b)** His *Experiments and Observations on Electricity Made at Philadelphia in America*. **(c)** An early draft of the *Articles of Confederation*, initially written by Franklin and submitted to the Continental Congress in 1775. (Image (a) courtesy of the Independence Hall Association, http://www.ushistory.org; Image (b) courtesy of the National Oceanic and Atmospheric Administration Photo Library; Image (c) from Thomas Jefferson Papers Series 1, General Correspondence 1651–1827, courtesy of the Library of Congress.)

ernment policy, and world affairs, scientists are rarely called to the table when the big decisions are made. He might point out that one reason scientists are not called to the table is that they are not even in the room.

So, first on the list, Franklin would undoubtedly encourage scientists to run for Congress and other public office. He might even run for office himself, in part because there are so few scientists in Congress. I think he would consider our current national legislature, made up of lawyers and businessmen, with far too few women and ethnic-minority members, to be unrepresentative of our increasingly diverse society and inconsistent with the notion of democracy. Franklin would not understate the required level of commitment and sacrifice of running for public office, especially given today's highly partisan climate of backbiting, poor demeanor, and low morale in Washington, DC. I find it remarkable that a number of dedicated senators and representatives, regardless of party affiliation, continue to try to make the system work. Their numbers are shrinking, though, so they need all our support.

Franklin might organize a series of science seminars for policymakers and cajole some members of the science community to lead that task, perhaps in partnership with the few scientists in Congress. He might even try the heretical idea of a bipartisan, joint House–Senate science caucus, in which Congress, for the first time ever, could focus on science, technology, and the R&D budget.

## National science literacy

Next, the science literacy of the general population would likely get Franklin's attention. He would recognize that, to be truly enfranchised and empowered in the 21st century, citizens need to know a lot more about how scientific discoveries are made, how science and technology affect their own and others' lives, and how important it is that science be taught well in our schools. He'd also realize that the general public must know why it is essential to maintain freedom, openness, and international cooperation in science and, in particular, why discouraging women and men from coming to America to study science is so damaging to this nation's future.

### Franklin's List

Benjamin Franklin would likely have valuable insight into solutions for many of today's societal concerns. Here are some steps he might recommend taking:

- Encourage scientists to run for Congress and other public office, and establish a bipartisan science caucus
- Organize a series of science seminars for policy makers
- Work to increase the nation's overall science literacy
- Assemble a science literacy handbook that includes dos and don'ts for scientists
- Educate students about science and civic responsibility. Scientists could volunteer to help in settings from preschool child development centers through the entire educational system.
- Gather the best scientists and science writers to reform and rewrite science textbooks and curricula
- Make better educational use of television, computers, and computer games

He would not be timid about convening town meetings where community leaders and other citizens could candidly discuss with scientists the moral, ethical, and practical implications of cloning, stem cell research, genetically modified crops and foods, nanotechnology, nuclear energy, missile defense, and so forth. And he would encourage scientists to listen as well as talk. No doubt Franklin, who taught by example nearly everywhere he went, would ask scientists of all disciplines to become more personally involved in their communities.

Franklin would suggest that scientists could benefit from a little Communications 101, that is, lessons in how to communicate effectively with politicians and the general public about the essentials of science, without the esoteric details. He might urge us to tell science like we would tell it to our neighbor or our broker.

Franklin might even assemble a science literacy handbook, replete with dos and don'ts for scientists. His recommendations might include the following:

- Explain that all knowledge is current but not ultimate knowledge—there's always more to learn.
- Ask people about their wants, concerns, and fears, and what they consider most important; and listen to their answers.
- Don't talk down to the public, on science or any other matter, lest you confirm suspicions some people have about scientific arrogance.
- Don't imply that science has all the answers, but make sure people understand the promise it offers.

Also high on Franklin's list of responses to present challenges would undoubtedly be education. I think he would be astonished at the dull, cookbook way we teach science and mathematics in most of our schools. He would be disappointed and troubled at the mediocre performance of our boys and girls in science and math in the most technologically sophisticated nation in the world. Franklin's belief that education makes people equal would motivate him for a full-scale initiative that would likely depend on many scientists as volunteers and would reach from preschool child development centers right through the whole of our educational system.

He would be particularly aware of today's demographic trends. He'd insist that, through education and other means, we close the gender, ethnic, and other social gaps, not just because it is right to do so but because it is so vital to the nation's future.

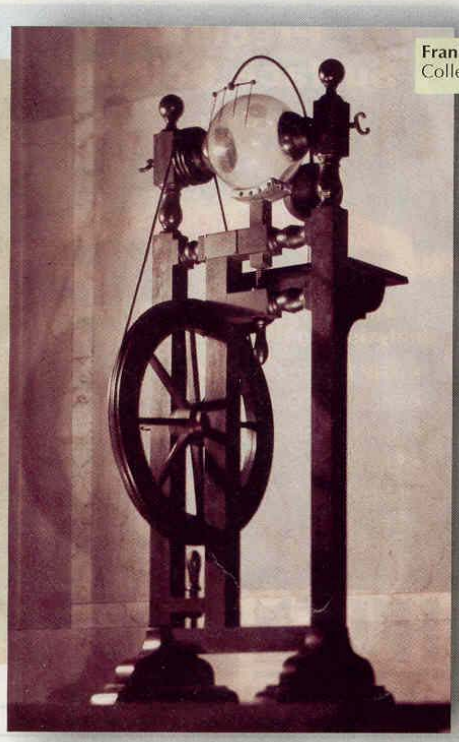
Because most public education requirements are determined at state and county levels, Franklin would begin close to home. He might start a movement that would enlist scientists to conduct Saturday science sessions at local libraries.

Surely he would encourage parents to participate and learn with their children. The mentors and teachers would come from a dedicated corps of local scientists, many of whom will have retired from their full-time jobs.

## Textbooks and television

Franklin would be at the forefront of much needed reforms of science textbooks and curricula. He might lead that effort by bringing together first-rate scientists and science writers to develop engaging and accurate material. It would all be available on the World Wide Web, and would be popular because it was good and up-to-date, and not for political or commercial reasons.

He might also encourage scientists to write a paperback or Web module on the history of science and technology. Such a tool could accompany history textbooks in secondary-school classes and give science a much needed historical context.



**Franklin's electrostatic machine.** (From the Historical and Interpretive Collections of the Franklin Institute, Philadelphia, PA.)

As the final item on our list, given Franklin's interest in journalism and his desire and ability to communicate, I think he would look carefully at the media. He would undoubtedly have a witty observation about today's television-oriented public, but would immediately see the unrealized potential of television. He would be fascinated with some of the educational television programs, those that present science for children. The PBS television program *Cyberchase* introduces young viewers to the world of computers and adds mathematical and geometric reasoning, pattern recognition, and complex problem solving, all in an adventurous medium. Franklin would seize the opportunity to develop a repertoire of shows for different disciplines. As a scientist who believed learning comes through experience, he would likely favor the broad expansion of children's television and the virtual experience that the medium provides. Similarly, he would find a way to direct at least part of the computer-games market to science games.

Franklin would not expect children to be the sole beneficiaries of science education. Adult television has already begun to recognize the public's hunger for fascinating scientific realism. Today, one of the most popular television series in the country is *CSI: Crime Scene Investigation*, in which forensic science is put to the test in solving problems of homicide investigations. With the apparent popularity of series like that, we can begin to change the exaggerated media image of a weird, possibly mad scientist with a laboratory full of bubbling beakers into an image of a thoughtful and mainstream contributory member of society. Franklin would urge us to put a human face on science, to make it clear that a career in science is an option for boys and girls from every community and cultural background. We are a long way from that today. Having said this, I sincerely hope Franklin would avoid America's version of "reality TV."

Our Franklin's List is limited only by our imagination. The combination of pragmatist and visionary that worked so effectively for Franklin can work for us as well; it can have some application across the spectrum of this nation's present challenges.

I'd like to emphasize again how science and its influence on the world have changed over time by quoting a short segment of a poem entitled "The kidnapping of science," in which my good friend, poet Patricia Garfinkel, depicts a vision of the beginning of science.

> Finally the link born in silent
> recesses wove through the brain.
>
> Science was hoarded by the few who
> passed it in egg shells and spider
> threads, back and forth to grow
> beyond the palms of both hands, then
> satchels and wicker baskets, to shuttle
> through space, honed at each turn by
> pulleys and planes to the precision
> of typesets and clockworks.
> . . . These things have come to pass.[5]

The early science that began in fragile, tentative ways now encompasses all of us. As scientists, we have a unique role. We work on the fringes of knowledge, where the known and the imagined entwine. Our passion to question, to know, and to explore is a gift to be passed on to future generations.

Science has made a better world for each generation. I think Franklin clearly understood that trajectory. In his time, he was a leader among giants. As we pay attention to and honor his spirit and his work, he can do the same for us today. What Franklin would ask of us, I think, is to ensure that that trajectory for science continues for another couple of centuries. That, I believe he would agree, will require the work of more civic scientists.

At this difficult time in our nation's history, we are again in need of wisdom and models—women and men of intelligence and integrity who value truth, freedom, and the dignity of human beings, in our country and in every other part of the world. I believe that, like Benjamin Franklin in 18th-century America, civic scientists should be prominent among those models.

*The author gratefully acknowledges the able assistance of Patricia and Jef Garfinkel in the preparation of the talk that was the basis for this article.*

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