

Mathematics: An Interview with AMS President Arthur Jaffe

The following interview was conducted by
Notices Senior Writer Allyn Jackson.

Notices: *You have been very active in national issues since you were elected president of the AMS. What do you see as ways that the AMS president can help the mathematics community?*

Jaffe: I have been fortunate to be elected at a time when several opportunities arose right away to do things that affect the way the world thinks about our profession. There is a paradox: we are living in a golden age of mathematics research, yet our infrastructure is in danger of total collapse. So at the moment I am focusing on two special issues. The first concerns public support of science, and mathematics in particular. The second revolves around public awareness. These two focal points are intimately connected. In the long run, success with the former relies on the latter.

Notices: *In fact, your national activities started in late 1995, before you formally began your term, when you became involved in the effort to restore the mathematics graduate program at the University of Rochester.¹*

Jaffe: Yes. Everything I have been doing today at the national level is based on principles I learned from Rochester. One major thing I learned was the importance, value, and necessity of collaborating with our colleagues in other disciplines. At the same time we must preserve our view of mathematics. If anybody is going to make the case for

mathematics, it has to begin with us. But we require help from others.

I firmly believe that progress toward our major goals can be made only when the public has a positive attitude toward science as a whole. We have to see mathematics as part of the whole, and that is why I have put so much effort into working for science. As mathematicians we do many things differently, and we contribute in different ways to society, but the goals of our community overlap with those of other sciences. And the general public will not single us out—except when some unusual problem, like Fermat's, both can be explained and does get solved.

Returning to the subject of the University of Rochester, let me emphasize a couple of points about the university's attempt to downgrade the mathematics department. First, the mathematicians expressed surprise at the decision, while some people from other disciplines saw it coming. It is very important that we talk to our colleagues outside our immediate circle and learn what people are thinking about matters of importance.

Second, the general public often has standard misconceptions about the value of mathematics and stereotypes of mathematicians. The initial reactions of the Rochester administration reinforced these, and I believe unfairly to a large extent. Let me give one example: at every university I know there is an extraordinary effort to teach mathematics well and to strive constantly to improve. Still, at these same universities mathematics teaching tends to be criticized. Judging from teaching evaluations, mathematics teaching at Rochester appeared to be as good as or better than that in

Arthur Jaffe is the Landon T. Clay Professor of Mathematics and Theoretical Science at Harvard University and the president of the American Mathematical Society. His e-mail address is jaffe@math.harvard.edu.

¹See "Whatever Happened to Rochester?" in this issue of the Notices, page 1463.

most of the other science departments. The level of criticism was not justified by the facts.

I believe that one of the main problems at Rochester was that mathematicians were "out of the loop". Fortunately, Rochester mathematicians are now "in the loop". In fact, when I met with President Thomas Jackson of the University of Rochester last April, he commented that mathematics might now be the best-connected department in the university. That is quite a statement to make. But now he knows Rochester mathematicians, and he appreciates them.

Notices: *Do you think that his reactions are connected to the broader question of public views of mathematics?*

Jaffe: Yes. But even more generally I would say that we are going through a period in which the national perception of science and of scientists is very negative. For fifteen to twenty years the press has focused on how developments in science adversely affect the environment, on how science is elitist, on how scientists sometimes falsify or misinterpret data, and in general on how science represents not truth, but merely a parochial viewpoint, as valid as any other. These attitudes affect mathematics too, if only indirectly, because we get lumped in with the rest of science. We need to try to turn these attitudes around. We need to focus attention on the multitudinous positive aspects of science. This is no easy task, but I believe that a positive public perception of science and of mathematics is the key to our future.

Furthermore, mathematics is the least understood and most difficult to explain of all the sciences. Most people think that mathematics is handed down on a stone tablet and do not think it is possible, much less fundamentally important, to discover new mathematics. Despite these difficulties, we have to do our best to communicate and to explain our subject to those outside our discipline.

Notices: *What is the AMS doing to promote public awareness of mathematics?*

Jaffe: At the moment we are taking small but important steps. After our very successful (and, I believe, first-time) mathematical briefing in the Rayburn Office Building on Capitol Hill,² we are planning another briefing on mathematics next spring, probably in the first week in March. In a different venue, I've just become co-chair with Paul Anderson of the Public Awareness Forum of the Council of Scientific Society Presidents. Here the role of mathematics will be folded into the question of the awareness of science in general. I believe it is important that mathematicians take a visible part in the efforts to bring science to the

public. On the Web we have instituted an information page oriented toward nonmathematicians called "What's New in Mathematics", under the auspices of the Working Group on Public Awareness of Mathematics, begun within the Committee on the Profession by Steve Weintraub.

Notices: *You have been especially active in science policy affairs in Washington. Can you talk about what the AMS has been doing in this arena?*

Jaffe: First of all, we have worked hard on unifying the leadership of a number of professional scientific organizations to work toward common goals. As I mentioned, unless there is an environment sympathetic to science as a whole, it is very difficult to have an environment sympathetic to mathematics. One common long-range goal that was easy to agree upon is the importance of positive public perception of science. Of course we would like every person in the government to understand the importance to our country of maintaining our position of scientific leadership. And this means the support of science across the board.

Much of our federal budget is spent on the present or makes up for deficiencies in the past. Science is different. It is an investment in the future of our country. The future outweighs the past, and we cannot emphasize this point too often. We should continue until our public accepts this fact, as the public does in many other countries (especially in Europe and in the Pacific Rim).

The AMS began working together with the American Physical Society, the American Chemical Society, and also with some biologists from the Federation of American Societies in Experimental Biology. Of course we have also been partners in these efforts with the other mathematics societies: the Association for Women in Mathematics, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics.

By this spring our informal coalition had expanded to include forty-six presidents of scientific societies, who endorsed a statement in support of strong funding for science.³ The statement points out the importance to the country of federal investment in scientific research and also the interdependence of scientific disciplines. It calls for increases for 1998 in the range of 7 percent in the research budgets of agencies that fund science. It was mailed to every member of the House and of the Senate and was given quite a lot of attention in the press, with supporting stories and editorials appearing in the *New York Times*, the *Washington Post*, *U.S. News and World Report*, and the *Wall Street Journal*, among other publications. In addition, I was part of a small group of presidents that paid visits to a number of key legislators and their staffs in order to emphasize our views and

²See "AMS Congressional Briefing: Mathematical Transcriptions of the Real World", *Notices*, May 1997, pages 586-588.

³See "Coalition Presses Congress for Increases for Research," *Notices*, May 1997, page 585.

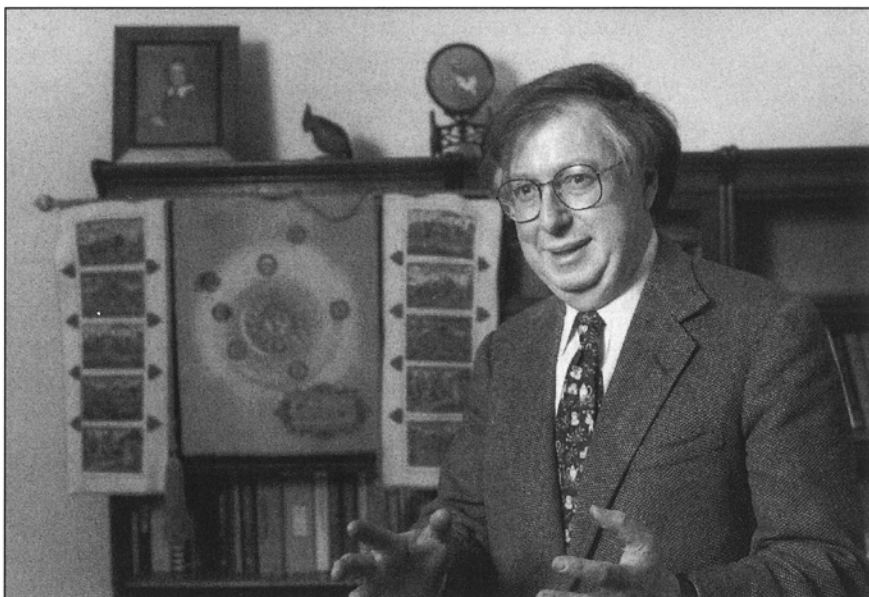
to offer assistance with their implementation. At the same time, a group of about ten Washington representatives of science organizations—including Sam Rankin of the AMS Washington Office— began to meet regularly to plan special projects.

It has been wonderful to see how rapidly opinions changed.

Notices: *What exactly did you observe?*

Jaffe: For example, the day after the press conference in which we presented the statement, we held the briefing about mathematics on Capitol Hill that I mentioned earlier. In his introduction the chair of the House Science Committee, Congressman James Sensenbrenner, gave quite a negative prognosis for the support of science in the 1998 budget. Just two weeks later he changed his opinion and proposed a 3 percent increase in the science budgets under the auspices of his committee. And then, a few weeks after that, his committee actually voted an authorization bill with a 7.2 percent increase! The Appropriations Committee cut this back to 6.8 percent, but it was still more than double the increase that the president had requested and far beyond any prediction at the beginning of the year. Later, the Senate authorization bill was similar, but the appropriations bill cut the increase back to 3.3 percent (an unusual reversal of roles in the Senate and House). During August we did a good deal of work to encourage mathematicians and others to speak to the twelve senators on the conference committee in their local districts and to urge their support of the House version of the bill. In September the final figures will be decided in Senate/House conference.

Whenever we go to Washington, we hear the same story: Scientists are not very visible. And as mathematicians, we're invisible! However, I think that's changing, and an appreciation is building for the fact that the sciences are interdependent—you can't really study, say, medical imaging without using physics, chemistry, mathematics. Furthermore, it is impossible for the federal government to predict which areas of basic science will yield the most important and revolutionary advances. I believe that the best method to ensure success in mathematics is to encourage bright students to pursue mathematics as a career. We then need to support them, both as students and as active mathematicians, for as long as they are successful.



Our natural allies come not only from universities, but also from industry, business, and the financial community, for the future prosperity of our country depends on our scientific strength. A large problem is that science needs more powerful advocates in Congress, persons who put science on the top of their agenda. But few people in government have scientific training, and many do not understand the way that scientific discovery comes about. We have worked with and are grateful to James Sensenbrenner, the current chair, and to George Brown, longtime former chair of the House committee, and to Vernon Ehlers, a distinguished vice chair. There are some active persons in the Senate, including two with whom we have had recent contact, Senators William Frist and Joseph Lieberman. Senator Phil Gramm has put forward a bill, S124, which advocates doubling the nondefense science budget over ten years.

Notices: *What is the next step in these efforts?*

Jaffe: We have met with Senators Gramm and Lieberman and have worked over the year with their staffs to encourage bipartisan support for science. We hope that these two senators will introduce a new joint bill this fall to replace S124.

We are planning a second statement of the ad hoc coalition of presidents of scientific societies and umbrella organizations this fall. Our aim, rather than focusing on a one-year plan, is to formulate a long-range goal for our country concerning the necessity to increase our investment in basic scientific research. We have increased the size of our coalition from forty-six this spring to over ninety presidents currently on board, and we hope that over one hundred will sign by the time of our announcement.

We are building bridges with various leaders in industry and in business, and we hope that they will coalesce into powerful outside support for our position. We are also working in parallel with certain universities and with the Science Coalition, which is a Washington-based organization of universities, professional societies (including the AMS), and a few individuals. Through the AMS Washington Office and JPBM (the Joint Policy Board on Mathematics) we also are active within the Coalition for the National Science Foundation.

Don Lewis, the director of the Division of Mathematical Sciences at the NSF, has provided a strong voice for mathematics. Don plans to retire this academic year, and a big problem for the community will be how to fill his shoes. The person in that position sets the tone for the visibility of mathematics within the Foundation, as well as ensures that our research funds are well spent.

Much of what I have talked about concerns activities in Washington. However, ultimately the long-term success of science must be based on support from the public, and this means throughout the country. Mathematicians should know who

their local representatives are and try to meet them. The members of Congress should know that they can call on a constituent in case they need some advice of a technical nature. It is generally much easier and more relaxed to establish a relationship in a person's local district than in Washington.

Notices: *What about the longer term?*

Jaffe: Most important of all, we want to see all these individual actions grow into a "grass roots" movement. Scientists and mathematicians need to take the message to our students, to our schools, to our communities, as well as to our local representatives. Only through the efforts of many people locally can we hope to reach the numbers and the variety of persons needed in order to have a long-term effect. Once the message is sufficiently widespread, it will be taken up by the media.

We are trying to develop models for how this can be done. For example, on October 15 the AMS held a town meeting at its headquarters in Providence. State government officials and local scientists and mathematicians came together to discuss the importance of science.

The AMS Washington Office is working on ways to spawn these kinds of efforts around the country. An ideal setting would be to bring together at a university a group consisting of, say, a couple of mathematicians, a chemist, a physicist, a biologist. The group can invite a local delegation to the university and describe what is going on in different areas of science and explain why it is good for the community. While a few such events have already been held, I hope that in the future mathematicians will play a central role.

I would like to see the AMS and the scientific community set in motion a new passion for science. If we are successful in sparking a grass roots movement, then I believe it can be sustained over the long term.

At press time, the House and Senate conferees had agreed on a final version for the 1998 VA, HUD, and Independent Agencies Appropriations Bill, including an increase in funding for the National Science Foundation of nearly 5 percent above the 1997 level, and nearly 2 percent more than the agency requested.