Presidential Views: Interview with James Arthur

Every other year, when a new AMS president takes office, the *Notices* publishes interviews with the incoming and outgoing president. What follows is an edited version of an interview with James Arthur, whose two-year term as president begins on February 1, 2005. The interview was conducted in fall 2004 by *Notices* senior writer and deputy editor Allyn Jackson. Arthur is a University Professor of Mathematics at the University of Toronto.

An interview with AMS president David Eisenbud appeared in the February 2005 issue of the *Notices*.

Notices: *When you found out that the Nominating Committee wanted you to run for president, why did you say yes?*

Arthur: I actually was quite surprised, not being an American and not working in the United States. I was a little concerned about whether it would be a reasonable thing to do. So I made inquiries to both AMS people and also to a number of my colleagues, and I was convinced that it would be viable. I don't believe there has been an AMS president who has not been actually living in the United States. There have been other Canadians, such as Cathleen Morawetz and Irving Kaplansky. But I cut my mathematical teeth in the United States, and I worked there for twelve years, during graduate school and afterwards. As it happens I am the only member of my family who is not an American citizen. My wife is American, and my two sons are American citizens and are both working at this time in the United States. I am very proud to be a member of the Canadian mathematical community. I came back to Canada in 1979, and I am proud to see the progress that Canadian mathematics has made since then.

Mathematics is an international enterprise, and the AMS has something like one-third of its members outside the United States. The AMS has some purely American mathematical concerns, but it is a major force in international mathematics. It is the most influential mathematical organization in the world and reaches well beyond the boundaries of the United States. I don't have a congressperson I can write to! But I suppose that one letter from a president to his local congressperson does not make that much of a difference. I expect to be able to play a significant role in discussions with people in Washington on mathematical questions.

Notices: *The way mathematics is funded by the federal government in Canada is very different from how it's done in the United States. Can you explain the difference?*

Arthur: Yes. I don't know the figures about total funding per mathematician. I imagine they might be comparable, or maybe a little higher in Canada. I think the main difference, as far as mathematicians are concerned, is that there is no summer money in Canada. The size of the grants is variable, and the money is used for postdoctoral fellows and graduate students.

Notices: *Do most Canadian mathematicians have grants?*

Arthur: I think most active ones have a grant. That suggests there are more grants in Canada per capita than in the United States.

Notices: *Are the grants perceived the same way as they are in the US? Here an NSF grant is a big validation, and mathematics departments take it seriously in tenure decisions. Is that also true in Canada?*

Arthur: Yes. Of course, the size of the grant is relevant also, because there are some small grants in Canada. But it's taken very seriously. There are of course good sides and bad sides to that. If a person receives a disappointing decision from the granting agency, it can be harmful psychologically. On the other hand, the work of granting committees in both countries is very careful, and I think we would not have that kind of careful, informed analysis of a person's work and of what a person proposes to do if the analysis were done by university administrators who are not mathematicians. So in that sense I think the granting process is on the whole helpful to how mathematics operates and how it is organized in universities. The

problem is that in the United States, relatively few people are funded.

Notices: *Do you have thoughts on the NSF-funded VIGRE program?*

Arthur: The idea is very good. It really helped build up graduate programs at some universities. It must be a little bit capricious as to which department gets a VIGRE grant and which one doesn't. And there is always the danger that a department might be worse off in the long run if it becomes dependent on a program that is not of infinite duration. On the other hand, I think VIGRE probably has been very helpful to departments in attracting good graduate students. It's really hard to get good graduate students. This is something that I would hope the AMS tries to affect in one way or another. We want the people who are best at mathematics as undergraduate or high school students to think very seriously about going into a career in mathematics. These are talented people, and they might well be good at other things. If society does not implicitly send them the message that mathematics is important, for example by providing good funding for graduate school, they might well think of other things to do.

Notices: *In your election statement you noted that mathematics has been the beneficiary of much greater interest on the part of the public in recent years. Why did that happen?*

Arthur: Well, it is quite remarkable. I am not sure, but you can point to some obvious things. Andrew Wiles's proof of Fermat's Last Theorem, in a way that we would not have expected, caught people's imagination. Books like the one on John Nash, *A Beautiful Mind*, have also brought a good deal of attention to mathematics. And of course in movies, mathematics has been chic in the last five or ten years. There is a sympathetic curiosity about mathematics. People don't know what mathematicians do, but they somehow have the feeling that mathematics has mystery, power, and beauty. I think people who are not mathematicians have a sense of that. We should stoke their curiosity. We already do so, but I think we can do more.

This is probably the most important aspect of strengthening mathematics in the United States and around the world. To have public sympathy and interest in mathematics would help just about everything that concerns us as mathematicians. It would persuade more talented young people to go into mathematics, because mathematics would be regarded with interest, and maybe even awe, by their parents and their friends, and would seem to be a worthy cause to spend one's life pursuing. It would help funding for mathematics, because voters would have a sympathy for it. Also, public appreciation of the beauty of mathematics would help encourage good people to become high school teachers.

At the undergraduate level, mathematicians have been criticized for not being good teachers. The calculus sequence has of course been one of the prime examples. But we have to remember that a greater proportion of students are taking calculus now than have done so in the past. In teaching calculus we are being asked to be the gatekeepers for other academic programs. That makes for an adversarial relationship. Probably we as mathematicians are better teachers than we give ourselves credit for being. We need to remember that, and we need to tell people in our universities.

James Arthur

Notices: *People say that in recent years math departments and mathematicians are much more concerned about the quality of their teaching than they were ten or fifteen years ago. Is that your sense?*

Arthur: Oh, absolutely. Part of it is that young mathematicians simply cannot survive if they are not competent teachers. That's taken very seriously by search committees. So most young mathematicians who are hired by universities are pretty good teachers. That puts pressure on everybody to become better teachers—if you are an older mathematician, you don't want to be shown up by the instructor or assistant professor you have just hired!

Notices: *What about minority students in mathematics? There are so few, for example, black people getting Ph.D.'s in mathematics. What can be done about that? It's a difficult question.*

Arthur: It is, and I don't think there is any magic way to do it. It's the question of role models. As a white male, when I was beginning in mathematics, I certainly did not understand the importance that role models played for me. When I think back now, it was just something I took for granted. There were people who were like me but twenty years older than me, and they were mathematicians. It's hard to imagine what it would have been like if no such people existed. For black students, there are few role models as mathematicians. These are obvious things to say, but the AMS should do what it can to increase the visibility and the prominence of mathematicians who belong to minorities. One obvious way is through membership on its committees. The AMS committees do wonderful work supporting the many different objectives of the Society. They also lend a certain prominence to the people who are on the committees. I think we

already work very hard on this, and when I am president, I hope we can find overlooked minority mathematicians and women mathematicians and make them more visible as role models. My predecessor David Eisenbud has done a very good job on this.

It's a little sobering to be taking over this presidency! I look back at the past four or five presidents, and while they perhaps had different interests, they were all very impressive in the things they did. The AMS, in its professional operations, does many different things. From the executive director down, it's an extraordinary organization. The AMS publication operation is really very important. I don't want to get into trouble with commercial publishers, but they are making it difficult for mathematics and other subjects because the fees that they charge are enormous. Just look at what the AMS does. We have the *Journal of the AMS*, and it's one of the best three or four journals in mathematics. I doubt that other professional societies have such outstanding journals. Mathematicians look forward with anticipation to the monthly *Notices of the AMS*. We also have MathSciNet, with its unequaled mathematical database.

One thing we have to be concerned about is the lack of AMS membership among younger mathematicians. I think that's extremely important, and I hope to try to think of ways in which we can increase membership. It is not a question of the dues—dues are not a large part of our budget. What is much more important is to have as many people participating in the AMS as possible. It increases our strength as a community. We need to emphasize that we are part of a common enterprise that is a source of strength and energy for all of us.

Notices: *Are there other things that you want to try to address as president?*

Arthur: I haven't completely formulated in my own mind what things I will try to do. So many things are working well in the AMS that one has to be a little bit conservative. But I will try to change or add to things where I think I can accomplish something. Perhaps the area where one could try to make the greatest difference is in, as I already said, the public understanding of mathematics. I think we should consider sponsoring more public lectures and more publications that are directed at the general public.

For public lectures, there are two aspects. We would first of all have to do the mechanics of advertising it, getting people to come to it—then we've got to deliver the goods! We would not regard giving a public lecture as a reward for being a good mathematician. We would instead have to make sure we find the people who do it best. I am told that other organizations actually script their public lectures. Before the talk they have a practice session, in which the speaker is given friendly advice: "No, this is not going to work, you will have to polish up on that." I don't know if we mathematicians would stand for it!

In September I went to a Congressional briefing organized by the AMS Washington Office. Fred Roberts [director of DIMACS] spoke on how mathematics can help with emergency preparedness, disaster prevention, and related security matters. I don't think Fred would mind me saying that he didn't speak about anything particularly deep in mathematics on this occasion. It was a very charming talk, and there were all kinds of questions at the end. One person, who appeared to be a Congressional aide, asked "What's it like to be a mathematician? What does a mathematician's typical day consist of?" It was quite amazing, they were really curious. There was something about the way Fred talked that invited this—you felt that he was conversing with you.

In calculus courses, we have the potential to influence a huge number of university students, some of whom are going to be the leaders of tomorrow. And we somehow forget that. We can't make every calculus student happy, but nevertheless we can try to communicate to them that mathematics is interesting, even if they themselves don't want to do it in the long term.

About ten years ago, a former University of Toronto student endowed a chair in mathematics. He was a person who had gone to New York and had done very well in investment banking. He took first-year calculus in 1980 or 1981 at the University of Toronto, and then did not continue in mathematics. He so liked his experience in calculus that ten years later he came back to the university and endowed a chair in mathematics. This is really quite scary, when you think of all those students in your calculus classes! Calculus is very pretty, and we forget how remarkable it is. Perhaps we can sometimes try to indicate to students that calculus is the starting point for much of mathematics. I think there is a lot of good will that we don't tend to see on the part of the students. What we see perhaps is their resentment at having to take calculus when they don't want to take it, and also the stress they have in learning and passing the exams in what is quite frankly a difficult subject, compared to the other first-year courses that they might take. But we forget that, underneath, a lot of them have a good will towards mathematics. Not all of them, but a significant number have an interest and an appreciation, even if they are not going to go on in the subject. We need to stimulate it.

I am very honored to be president of the Society. It has had a wonderful history, and I have some very distinguished predecessors that I can try to live up to! I am very much looking forward to starting my term.