Leon Cohen received a Ph.D. from the University of Michigan in 1928, as the first doctoral student of R. L. Wilder. After two years at Princeton, he joined the faculty of the University of Kentucky and later moved to Queens College. In 1953–1958, he served as the second program director for mathematics in the NSF. He then became chairman of the mathematics department at the University of Maryland, while continuing to serve in organizations such as CUPM, CBMS, and NRC. In 1976 the MAA honored him with an Award for Distinguished Service.

Recollections of a Mathematical Innocent in Washington

LEON W. COHEN

Thirty-five years ago, in 1953, I went to Washington as Program Director for Mathematical Sciences in the National Science Foundation, expecting to stay one year. I stayed five. It is an indication of how remote the mathematical community was from the national scene at that time that while I had had no administrative experience, I ended by becoming Executive Director of the Conference Board for the Mathematical Sciences and also Executive Secretary of the Division of Mathematics in the National Research Council, the operative arm of the National Academy of Sciences. During the five-year period it was on-the-scene training. The rapidly rising level of military technology during the two great wars in the first half of the century thrust the mathematicians with the scientists into close governmental contact. In 1950, Congress initiated federal fiscal responsibility for the advancement of science by establishing the National Science Foundation as an independent agency with a government budget. It was not yet clear how important the applications of science were to become in the competitive world of the industrialized nations.

My first year in NSF was marked by an ongoing debate over the manner in which mathematical research would be supported. The received wisdom was to provide support requested by a proposal from a single investigator with the possible addition of a graduate student as a research assistant for a period of one or possibly two years. Alternative requests appeared in proposals for the support of research seminars, consisting of several investigators with

related interests, one or two postdoctoral associates as visitors, and several graduate students as assistants. I urged that NSF policy permit grants on such proposals. After the year of discussion it was decided that only one grant be made in the Program. It was for $30,000 to support a small seminar. It was also decided that no future seminar proposal would be accepted for a grant.

That there was no budget for the Program was characteristic of NSF procedure. Each year proposals for grants came to the Program. They were refereed and evaluated at the annual meeting of the Program Advisory Committee. Based on that advice, I submitted requests for grants. Near the end of the year the National Science Board authorized grants to the extent allowed by the NSF budget.

It should be noted that in 1952 during the term of my predecessor, Professor W. L. Duren, Jr., the Division of Education in the Sciences successfully recommended a grant of $20,000 to the American Mathematical Society for the support of 29 mathematicians at a Summer Institute on Lie Theory.

The restrictions on research grants noted above were subsequently removed. Now NSF supports at least two mathematical institutes — much more elaborate than seminars — attached to universities.

Another problem arose from the reluctance of the mathematical societies to deal with nonmathematical institutions, e.g., government agencies. Professor G. Baley Price, anticipating the future interaction between the mathematical community and the institutions of government and industry, founded the Conference Board of the Mathematical Sciences (CBMS), as an institution whose members would be the several mathematical societies, among them the American Mathematical Society (AMS), the National Council of Teachers of Mathematics (NCTM), the Mathematical Association of America (MAA), and the Society for Industrial and Applied Mathematics (SIAM). CBMS was to have an office in Washington and was to provide liaison between the mathematical community and agencies of government and industry. CBMS originally administered a grant to Professor J. Sutherland Frame to study the needs of mathematics for buildings and facilities which at that time were insufficient for the rate at which mathematics had been developing during the wars. The unwillingness of the mathematicians to come to grips with nonmathematical problems involving the mathematical community is represented by the fact that the meetings of CBMS were paralyzed; nothing was done and I was told, perhaps humorously, by one of the representatives of the member organizations that his instructions were to vote positively on only one motion, namely, approval of the minutes of the last meeting.

These conditions have changed considerably, of course. Now the *Notices of the American Mathematical Society* prints a regular column edited by a distinguished colleague reporting on political activities in the national Capital; also, a Fellow is supported as liaison with the staff and members of the

Congress, representing the needs and purposes of the mathematical community. The staff of NSF has of course grown appreciably, as has its budget for mathematical research. One of the difficulties which occurred during my tenure in NSF was the organizational separation of research and education — or as it was called in NSF — Education in the Sciences. There was a steady conflict over what is called "turf," in the language of the gangs, between the two offices and, as a result, the necessary relationship between research and education in mathematics was not advanced as efficiently as it should have been.

In addition to the institutional difficulties which I've outlined, the negative attitude of individual mathematicians toward participation in any form of activity of a not strictly mathematical nature was evident. Two somewhat amusing stories illustrate the general tenor, although both stories represent extreme opinions. The Mathematical Association of America had developed a program to film hour lectures by distinguished mathematicians in the hope of using such films to stimulate interest among high school students in the discipline. At the suggestion of the MAA committee, I put in a phone call to one of our most colorful colleagues in the northeast of the country and when he came to the phone, he scolded me rather vigorously for having the temerity to encroach upon his privacy with an uninvited phone call. I apologized, of course, even though he and I had had pretty good personal relations previously, and got to his secretary, who promptly arranged the matter. The other instance occurred when I visited a southwestern university in the interest of the NSF program and after discussing matters with several of the colleagues, I met one of their prominent members who, when he learned that I represented a federal agency, quite unhumorously, offered to put on the gloves in a boxing match with me. Of course, I wouldn't have accepted that invitation even if I had not known that in his youth this mathematician had some reputation as an amateur boxer.

In the fall of 1957, the Russians surprised us rather shockingly by putting up "Sputnik" into space. There was immediate stirring in the scientific community in the United States and the Science Advisor to the President urged the prompt increase in the output of scientists and engineers at the Ph.D. level. A conference was called with support from NSF, to consider a program in the mathematical sciences. During the meeting of this conference, a sharp difference developed over the effect on the future of mathematics in the United States of the program for the rapid increase in the number of Ph.D. mathematicians and engineers. It was asserted by some of the most important members of the conference that this would actually produce a decrease in the mathematical effectiveness of the country, because it would encourage mediocrity, and the standards of excellence that had been encouraged by the AMS would be neglected. That this was not the conclusion of the conference

was due in large part to the skills of S. S. Wilks (a statistician from Princeton), who was able to convince the members of the conference that a program to double the output of Ph.D. mathematicians in the next five years would not harm the excellent character of mathematical research. The conference finally adopted this view. As a matter of fact, at the end of the five-year period the number of Ph.D.s in mathematics had been doubled, and as we know from the the Fields Medals and other evidences of the excellence of U. S. mathematics, no damage resulted to the level of mathematics in the country.

One of the problems which was faced at that time was the lack of interaction between departments of mathematics and industrial research laboratories in the United States. A retired engineer who had been attached to the automobile industry was in the District and I made his acquaintance. After discussing the problem, he suggested that we go to Detroit where he would introduce me to the directors of the research laboratories of the automobile industries and I could lay my proposal before them. My proposal follows: A member of the research staff of an automobile company should be given a year's leave, be attached to a university department of mathematics to work out a graduate course in problems arising in his research, then he would return to his laboratory, taking with him a graduate student interested in one of the problems for development as a Ph.D. thesis. Thus a connection would be established between the mathematical needs of industrial research and the resources available at the academic center with mutual benefit. The net result was zero. Not a single director of research in any of the three companies showed the least interest in this proposal. And so, perhaps we see one of the reasons why the Japanese were so successful in invading the U.S. automobile market some years later.

When I went to Washington, there was a small number of mathematicians who were of influence in our national affairs. Notably, there were people like Oswald Veblen, Marston Morse, Marshall Stone, Mina Rees, and one or two others. However, there was no infrastructure — there were no second-level people of considerable mathematical tolerance and accomplishment who could provide connections between the academic community and the nonacademic institutions which depended on scientific work. This situation, of course, has been remedied in the meantime and it is hopeful for the future.

I should mention two incidents connected with the National Research Council. The National Research Council, Division of Mathematics, had certain responsibilities in advising the relevant authorities on postdoctoral Fellowships, on the Fulbright program, and other relatively small operations as compared to the needs of the Federal Government. It also had a big role in international affairs, since it was the agency through which American mathematics was connected with the quadrennial International Congress of

Mathematicians. The incidents happened at the end of my stay in Washington. One was a proposal that certain statistical research come under the direction of the National Research Council. This was presented by Professor Kruskal of the University of Chicago. I suggested to Professor Saunders Mac Lane, who was present as a member of the NRC Governing Board, that the project be assigned to the Division of Mathematics. He assented and I made the request. The Division of Biological Sciences also made a strong pitch for this, and it was my one small political achievement in Washington that I managed to beat out the Executive Secretary of the Biological Division and have this statistical program located in the Division of Mathematics. The other and more serious matter was the interest of the National Academy in science policy. The Academy authorized the development of committees on the national level to produce reports outlining the basic philosophy of the discipline, an estimate of its current status and a projection as to its possible future development. At this time, Professor Mark Kac was chairman of the Division, and the committee to handle this assignment in the Division was in the hands of the very vigorous Professor Lipman Bers. Such a report was developed, was approved by the Academy, and now forms the groundwork for the future development of mathematics in the National Research Council.

The National Science Foundation has matured. The mathematical community has learned to work more effectively with the nonmathematical world. There are now a substantial number of mathematicians capable and willing to assume relevant nonmathematical responsibilities. It is gratifying to have had a part at the start of this process.