The following statement, made on October 27, 1952 by the director of the National Science Foundation, forms a part of the testimony gathered by the Commission on Immigration and Naturalization which was appointed by former President Truman.

some thoughts on INTERNATIONAL

By Alan T. Waterman

YOUR INVITATION to the National Science Foundation was to testify concerning the impact of the immigration laws upon science. For the most part the effect of the immigration laws upon science is not substantially different from the effect upon other professional and scholarly activities. In the matters concerning the admission of foreign scientists as visitors, however, experience has demonstrated the existence of a problem of special concern to science and one in which the stake of this country is large. It is, therefore, to this special problem that I shall speak.

I should like to place my remarks in perspective by indicating the nature of the interest and the competence of the National Science Foundation in this field. The creation of the National Science Foundation by Congress in 1950 was itself recognition of a fact to which the national and international events in the first half of this century bear witness: the emergence of science and technology as a crucial and sometimes decisive factor in the rise and fall of nations and the personal destinies of all men. The nations of the free world are now engaged in a grim and seemingly endless struggle to maintain the precarious balance for peace and security. In this struggle, the decisive edge in military strength or, if our hopes are realized, in the peaceful development of the economic resources of our world is likely to go to that nation or group of nations which most successfully supports and develops its scientific and technological strength.

Since the late 1930's, when the magnitude of this country's stake in vigorous scientific research and development began to be apparent, the resources of the Government have been marshalled in support of science. Today the Federal Government's annual budget for scientific research and development is in the order of two billion dollars, to which private enterprise and the universities add perhaps fifty percent more. Nine Federal agencies, in addition to the Foundation, pursue major research programs covering widely the scientific fields known to man. The National Science Foundation, however, was devised in the years following the end of World War II, "as a much-needed keystone in the structure of the national research program," to use the words of the President in transmitting the Foundation's first annual report to the Congress. One of its principal tasks is to appraise the rapid growth of research activity, both public and private, and to recommend the broad goals toward which this effort should be channeled. The Foundation is also directed by the National Science Foundation Act to cooperate in international research activities. It is principally in these capacities, then, as the adviser to the Government on national policy with respect to scientific research, and as a principal agency concerned with international cooperation in scientific research, that the Foundation has approached the problem of foreign scientific visitors under the immigration laws.

In assessing the problem of the Federal Government, the Foundation has drawn upon the experience of other Government agencies and, through the wide contacts of the Foundation with the scientific community in this country, upon the experience of scientists themselves. Upon the basis of information available to the Foundation through these channels, it is clear that the provisions of the present immigration laws governing the temporary admission of aliens to this country, and the administration of these laws, have created a problem. If the solution to this problem is long delayed a seriously detrimental effect on the strength of science in this country may be expected. Any such handicap to our progress in science will in turn unquestionably react adversely on our welfare and security in the years ahead. A further consequence would be a weakening of cooperative relationships with friendly countries in an important component of our common defense, namely, scientific research and development.

The problem arises in the restrictions on temporary admission of an alien visitor, now stated in Section 137 of the 1950 law and retained in the law which will become effective in December this year. Since these restrictions have been in effect since 1950 we have had an opportunity to observe their consequences for science. Opinion among scientists is practically unanimous that they have brought about deterioration in the relationships of American scientists with their opposite numbers in countries friendly to the United States, particularly in the United Kingdom and Western Europe.

Effective scientific research calls for creative ability of an outstanding order. Such ability is no respecter of national boundaries. At a given time in a given field of science the leaders in the field are usually found in at least several countries in the world and the researchers in the field in practically all. Much of the progress in science is achieved through the inspiration and guidance of the few individuals of outstanding competence and experience. For progress on the frontiers of science it is especially necessary that these leaders have opportunities to discuss their ideas and plans with each other and with the large group of research workers who are

A physicist and an experienced research administrator, Dr. Waterman has directed NSF since his appointment in March 1951.

SCIENTIFIC COMMUNICATION

providing the body of research which comprises that field of science. Observations and conclusions reached by competent scientists in any one country are invaluable to the research of scientists in other countries working on the same or similar problems. While I am speaking here primarily of basic or fundamental research, i.e., research on a frontier of science, the importance of this exchange of information is no less for our applied research and technology. There is overwhelming evidence on this score. Until well into the twentieth century this country advanced its technology and standard of living to the highest level the world has seen. Yet it is universally admitted that in so doing we drew heavily on the findings and accomplishments in pure science abroad. Without ready access to this foreign stockpile of scientific information this progress would have been impossible.

Now that we are among those in the forefront of progress in basic scientific research, it is common sense and in the interest of economy to insure that loss of critical time and needless duplication do not arise through failure of ready communication. Without opportunity for exchange of views and information delay and unnecessary duplication will inevitably occur. It is for this reason that from the very beginnings of science scientists have put a very high value on good channels of communication. The value of direct communication in speed, in dollars, and in ultimate accomplishment is great.

The bulk of international scientific communication is carried out continuously through written media. It is common knowledge, however, that there are limitations on the capacity of the written word to convey complete information which can be useful to cooperative effort or to the work of an individual which requires an intimate knowledge of the work of others. It is hard to imagine this Commission or a legislative body attempting to draft legislation by correspondence, or a court reaching a just and impartial decision without having seen or heard the opposing witnesses in person. As in all human affairs, there is no substitute for informal discussion face to face.

This is exemplified in a more formal manner by the existence of a large number of international professional organizations, concerned with particular scientific fields or subjects, and comprised of the leaders in these fields. These organizations periodically bring together outstanding scientists for exchange of ideas, mutual criticism and marking out new lines of research along the frontiers of science. Much is owed to them for continued work on such great worldwide problems as tidal waves, sea level and its variation, maintenance of international standards of measurement, long-range radio transmission, epidemic control, health and disease, sanitary engineering, meteorology, and hundreds of other matters of concern to modern civilization and to our national defense. Agencies of this Government have also recognized the value to this country of direct, personal interchange of scientific information by convening special *ad hoc* conferences to focus the best minds in science on a problem of particular significance.

Of at least equal importance are the contributions of individual foreign scientists to the progress of science in this country through visits to laboratories for periods of research and to universities for lectures or seminars.

Estimates of the number of scientists coming to international meetings or to laboratories and universities in the United States are difficult to make. Compared to the stream of visitors to this country for all similar purposes, including pleasure, which in the fiscal year 1951 comprised more than 300,000 persons, the number of scientific visitors (excluding students) is small, perhaps less than 3,000, or one percent, each year. But the scientists who do come here are important to our scientific strength out of all proportion to their number, for they consist, generally speaking, of the best scientific minds of the free world outside this country.

I should point out that the exchange of scientific information with which we are here concerned does not include classified security information. No one questions the necessity of safeguarding such information. Classified research necessarily proceeds without the full benefit of communication in this manner. From the standpoint of progress alone there is no question that this is a handicap, but one agreed to be necessary.

The difficulty with the present system of visitor control has been aptly summarized in a recent periodical * in the following terms:

> "In the past few years a very large number of distinguished European scientists, almost all of them anti-communists and deeply devoted to the freedom in which scientific truth is sought and discovered, have been frustrated in their efforts to come to the U.S. to share their knowledge with their American colleagues. Their applications for visas have in many cases been refused, usually after long delay; in other cases the visas have been finally granted, but only after delays so long that scientific meetings to which they had been invited had taken place, or the teaching appointments for which they had been engaged had lapsed through their failure to arrive in time to fulfill them."

* *Bulletin of the Atomic Scientists*, vol. 8, October 1952, p. 210.

It has been estimated that under the existing statutes at least fifty percent of all foreign scientists who apply to enter the U.S. meet difficulties or serious delays. This does not imply that the number of actual refusals to foreign scientists of permission to enter is very great. The principal damage appears to occur in a small number of cases involving seemingly unjustified refusals to outstanding persons, coupled with the tedious, cumbersome and uncertain process experienced by those who do pass through the screen. The Foundation is, of course, in no position to conclude that in any particular case the decision has been unwarranted. In some cases it is difficult to understand, from the public record, why admission has been refused. However, it is not so much the final outcome in any one case as it is the total effect of the system on our science and upon our scientific relations abroad which is harmful.

The impact of the present situation on the opinion of scientists is evidenced in editorials from leading periodicals in this country and abroad, as well as in published correspondence. A brief bibliography sampling these materials is appended to this statement for the convenience of the Commission.

This and other evidence demonstrates widespread opinion that the system operates in so cumbersome and hostile a manner that many foreign scientists would prefer not to become involved with it. To the degree that this opinion spreads and becomes confirmed, U.S. science is cut off progressively from the contributions of British and western European scientists and those of other friendly foreign countries. These have, many times in the past, been of great value to progress in scientific fields important as the basis of our progress and security.

We must not imagine that America does not need information and inspiration, and cooperation, from outstanding scientists in friendly foreign countries. We do not have any monopoly on scientific talent or the emergence of new discoveries in science. As I have stated, we benefited perhaps more than any other world power from scientific discoveries made elsewhere. The development of some of the most vital weapons in our armament stems from open, unclassified fundamental scientific research abroad. Radar, the atomic bomb, jet aircraft, and penicillin were perfected in the United States on the basis of discoveries and research in foreign countries to which we were given ready access.

The extent to which the United States needs to draw scientific knowledge from abroad is indicated by an analysis of the nationality of scientists awarded the Nobel Prize. During the first 20 years of this award, 1901–20, a total of 43 awards were made in physical sciences, 15 to Germany, 26 to other European nations, and only 2 to Americans. None of the 17 awards in medicine and physiology went to Americans. Of the 60 awards in the physical sciences in the years 1921–49, 44 went to European scientists, 2 to Asian scientists, and 14 to Americans. Although a considerable number of American scientists have received Nobel Prizes the fact remains that to date 3 out of 4 of these awards in science have gone to scientists outside the United States.

I am sure that it was not the intention of the Congress, in refining and redefining the security provisions of the immigration and naturalization laws, to impede the progress of science or decrease the military security of this country by adversely affecting scientific research programs. I am just as confident that, once the special problem of science is made known, constructive changes can be expected. I also do not wish to claim that the difficulties which we have experienced have been or are likely to be catastrophic in their effect on the progress of science in this country, though this is a possibility. My judgment is, however, that the effects of the present policy, if continued for long, can be substantial in slowing down the progress of this country on many important scientific frontiers. The implications, for international relations generally, of alienating a substantial number of the distinguished citizens of friendly foreign countries I leave to those more experienced in political affairs than I. I can say, however, that the implications for science in this country of alienating the foremost scientists and the leaders in scientific thought in friendly countries are indeed serious. What has happened, thus, is sufficiently important to the research effort of this country to merit the attention of this Commission and, I hope, eventually of the Congress.

What should be done?

Our survey of the problem, though not an exhaustive one, indicates that there is room for improvement both in the law and in its administration. We are encouraged by the fact, of which we have been informally advised, that the Department of State has been actively investigating all aspects of the visitor visa problem. It seems likely that a satisfactory solution from the point of view of science will require not only improvement in administration by the State and Justice Departments but also some revision of the law. For specific constructive recommendations in this field the Foundation looks with confidence to the work of this Commission and, ultimately, the Congress. We would like, therefore, to suggest some approaches for consideration.

First, let it be said that the Foundation recognizes that rigorous and effective security measures are required under present world conditions to preserve the integrity of our Government and our country. We must be protected by adequate safeguards against admittance of undesirable or dangerous individuals on either a permanent or a temporary basis. The Foundation believes at the same time that our people can understand that overemphasis on the mechanics of measures for security can seriously compromise security when it cuts us off from access to information vital to our strength. The question is frankly one of proper balance between security by isolation and security by technological achievement.

An important first step toward this end could be taken by making a distinction in the statute between requirements for temporary admission of a nonimmigrant alien and requirements for admission of an alien who intends to become a permanent resident of the

United States. Complicated administrative procedures, extensive security checks, exhaustive questionnaires and careful interrogations should be acceptable as part of an application for permanent entrance and ultimate citizenship in the U.S. The same administrative procedures and criteria are not easily understood or accepted in the case of an application for a visit of a few weeks or months. It is implicit in this suggestion, of course, that strict measures be employed for screening out foreign agents, saboteurs, and secret couriers.

The next suggestion is that the criterion requiring exclusion of an alien visitor might rationally become *present, sympathetic* association with a foreign subversive organization rather than, as now, affiliation, in an extremely broad sense of the word, at any time in the past with such an organization. It is encouraging that the Congress has already taken a step in this direction by providing exceptions for persons who in the past were so affiliated but who have terminated such affiliation and for five years prior to the date of application for a visa have been actively opposed to the program of the subversive organization. The change from past to present association might be coupled with a requirement that there be developed a definitive listing, similar to the Attorney General's list under the Federal Employees Loyalty Program, of subversive organizations whose character as such has been publicly identified by an authoritative body or officer after due investigation. This would do much, the Foundation believes, to assist administrative officers in evaluating the nature of organizations with whom foreign scientists have been associated in one manner or another during the confused and troubled years of the last two decades in Europe.

The Foundation's third suggestion grows out of recognition that our Government has been accumulating a wealth of experience with security programs in which a balance must be struck between security by isolation and security by technological achievement. In order to insure that this balance be safeguarded and maintained it is suggested that consideration be given to providing for selective audit from time to time of applications for temporary admission, by a competent, reliable and disinterested group with apropriate experience both *inside and outside of Government.*

There is one further possibility that should be considered, particularly if the other suggestions prove to be impracticable. It is a possibility that the Foundation advances with some reluctance because it appears to set apart from other alien visitors a separate class,—one having outstanding records of achievement in the professions, such as science, scholarship and technology, and to accord to this class of persons special treatment. The suggestion seems worthy of consideration because it is among this class that the stake of this country in granting prompt admission is often demonstrably the greatest. I have in mind a separate section of the immigration law which, if established, would create a much-simplified and expeditious system for admitting such persons, perhaps *defined in terms of those eligible for* reciprocal exchange under the Smith-Mundt Act—"students, trainees, teachers, guest researchers, professors and leaders in fields of specialized knowledge or skill," —who have applied for admission to this country for a purpose directly related to the activities of a Government agency, an accredited institution of higher learning or a scheduled meeting of an accredited international professional organization.

While, in giving you my views, I speak for the Foundation, as Director, I should note that it has not been possible for me, within the limits of the time available, to obtain from the twenty-four members of the National Science Board a direct expression of their opinions. I feel confident, however, that my position is shared substantially by all members of the Board.

The Foundation is grateful to the Commission for the invitation to present its comments and would welcome an opportunity to work with you further, if desired. We must never lose sight of the critical importance of a far-ranging and vigorous scientific research program to the security and great destiny of our country.

Appendix

Sample Editorial, News, and Letter Comment Indicating Impact of United States Visa Policy on the Views of Scientists

Bulletin of the Atomic Scientists, vol. 8, October, 1952:
Shils, Edward A., "America's Paper Curtain," (editorial), pp. 210–217.
"Eminent American Scientists Give Their Views on American Visa Policy," (views of Albert Einstein, Hans A. Bethe, Harold C. Urey, James Franck, Samuel Goudsmit, Cyril S. Smith, Arthur H. Compton and William P. Murphy), pp. 217–220.
Weisskopf, Victor F., "Report on the Visa Situation," pp. 221–222.
"Some British Experiences," (views of Michael Polanyi, R. E. Peierle, M. L. Oliphant, Paul Erdos, V. R. E. Davies, E. A. Guggenheim and E. A. Pringsheim), pp. 223–232.
Cunliffe, Marcus, "The British Reactions to the McCarran Acts," pp. 233, 256.
Aron, Raymond, "American Visa Policy," pp. 234–235.
"Some French Experiences," (views of Jacques Monod, Jean Leray, Lawrence Schwartz, Daniel Chalonge, Jacques Hadamard, J. Wyart, J. Coulomb, Charles Bruneau, Eugenie Cotton, Alfred Kastler, Charles Sadron and Georges Friedmann), pp. 236–246.
Leprince Ringuet, M. Louis, "French Physicists and U. S. Visas," p. 247.
"Some Other European Experiences," (views of Bruno Ferretti, Italy, F. E. Borghis, Switzerland and M. Minnaert, the Netherlands), pp. 247–249, 261.
"The Treatment of Good Neighbors," (views of Manuel Sandoval Vallarta, Mexico, Juan de Oyarzabal, Mexico, Marcos Moshinsky, Mexico, and Leonardo Guzman, Chile), pp. 250–252, 258.
"Banning Science," (anonymous letter), *Washington Post*, May 10, 1952.
"Banning Science," (editorial), *Washington Post*, May 5, 1952.
"Curbs on Freedom Disturb Scientists," (news item on comments of distinguished British scientists), *New York Times*, September 9, 1951.
Editorial, *Boston Traveler*, May 23, 1952.
Friendly, Alfred, "Visa Barrier—Scientists Attack Exclusion Policy," *Washington Post*, October 13, 1952.
Inman, Samuel Guy, "Refusal of Visas Queried," (letter), *New York Times*, December 19, 1951.
"Scientific Freedom and Security," (editorial), *Nature*, vol. 170, pp. 215–218. (This is an expression of opinion in the leading British scientific journal.)
"The Scientists Speak Out," (editorial), *New York Times*, October 13, 1952.
Wylie, Lawrence, "Visa Refusal Cited," (letter), *New York Times*, January 6, 1952.