John F. Kennedy: A Remembrance

His respect for science as an instrument of good was one of the Chief Executive's distinctive qualities.

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The following was written especially for Science *by the late President's special assistant for science and technology.*

Never have I been given a more difficult task. To put into words the true spirit and charm and intelligence of John F. Kennedy would be impossible even for a writer far more gifted than I. It would take the telling of many tales, a description of his handling of problems large and small, a detailed history of his three brief years as a world leader, to show his true greatness.

I have just returned from Arlington National Cemetery where thousands of people from all over the world paid their last respects to the man who had given them so much hope. It was a beautiful, cold, sunshiny day, the kind he loved. One could almost call it a New England day. The day was like the President, radiant and crisp. He added something indescribable to every occasion; his smile brightened it, his humor livened it. He had a quick and often sardonic humor and a quick mind. To these he added an optimism about the future and a determination to bring out the maximum capabilities of our people, and, indeed, of all mankind. He was an intelligent, educated man. He was a kindly man. I never knew him to do a mean thing to any person. He was never too busy for a word of greeting. He had a strong temper but one that subsided quickly. Challenged, he responded firmly. Big problems were never allowed to submerge the small, today's problems to obscure tomorrow's. At the height of the great crises of his tenure—the Bay of Pigs disaster, the resumption of nuclear testing by the Soviet Union, Mississippi, Birmingham, the confrontation with the Soviet Union over the missile installations in Cuba—he still talked about the future. He retained his monumental interest in the details of the ongoing business of Government. He read an amazing amount, and seemingly remembered it all. He often asked about obscure stories concerning science buried in the New York *Times* or the London *Observer* or any one of the dozens of papers and periodicals he somehow found time to read.

Vision and Outlook

I met Jack Kennedy while he was a senator from my home state of Massachusetts. He needed advice on technical matters, particularly military technology and nuclear test ban, issues then occupying much of my time. I agreed to help largely because friends asked me to and because he was my senator. I heard from him only infrequently at first and saw him even less. But even those brief contacts caused me to admire him, so that I readily agreed to join up and provide what little help I could when he became the Democratic candidate for the Presidency. Many things impressed me then and drew me to him. There was, of course, his charm but there was much more. I was most impressed by his quick, almost instinctive understanding of problems once he was given the facts. His background ill prepared him for an interest in scientific matters, yet his interest was lively. He was, in fact, then a member of the Harvard University visiting committee. Obviously unprepared to understand the theory of scientific subjects, he tried to get a physical feel of the matter. For example, he was forever trying to get someone to explain electromagnetic propagation comprehensibly. He didn't call it that. He wanted to know how radio worked. But when one tried to answer, one learned that the question was not about electron tubes or transistors or coils—these were man-made things which he could believe—but why and how did nature really allow energy to be sent through space.

Someone called him a truly modern man, this first American President to be born in the 20th century. And he was that. He had confidence in and used the modern tools. In a real sense technological marvels gave him his chance to be President. Without the airplane and television, he would not have been able to wage his successful campaign in 1960. And he never forgot this. His vision and outlook made it easy for him to understand other products of technology. President Kennedy, better than any political figure I have known, understood the social significance of modern science and technology.

As I try to remember the things that impressed me most about the President, four qualities stand out: his intelligence, his hopefulness, his sense of history, his striving for excellence. All of us who worked with him were proud of him. His very appearance, his composure, his sensitivity for every situation led us to an ever-growing admiration. He was the President from the very beginning, and as he was tested in his terrible job, he grew.

His vision and perfectionism may best be seen in his speeches. He had a vision of what he thought the world could be, and he projected this in his poetic prose. His Inaugural Address set the plan for his administration, and he strove consistently to reach the goals he set then. He said, "To those peoples in the huts and villages of half the globe struggling to break the bonds of mass misery, we pledge our best efforts to help them help them-

selves, for whatever period is required —not because the communists may be doing it, not because we seek their votes, but because it is right. If a free society cannot help the many who are poor, it cannot save the few who are rich."

And about the arms race, "Finally, to those nations who would make themselves our adversary, we offer not a pledge but a request: that both sides begin anew the quest for peace, before the dark powers of destruction unleashed by science engulf all humanity in planned or accidental self-destruction. . . . Let both sides explore what problems unite us instead of belaboring those problems which divide us. Let both sides, for the first time, formulate serious and precise proposals for the inspection and control of arms—and bring the absolute power to destroy other nations under the absolute control of all nations."

Much of President Kennedy's hopefulness was derived from his conviction that science provided our nation with vast powers for good. In the Inaugural speech, he summed this up with, "Let both sides seek to invoke the wonders of science instead of its terrors. Together let us explore the stars, conquer the deserts, eradicate disease, tap the ocean depths and encourage the arts and commerce." He was ever pressing to put technology to work. In foreign affairs, for helping other nations, for insuring our security, in seeking solutions to our domestic problems, he looked to science for the clues.

National Academy Speeches

Twice he responded to invitations to speak before the National Academy of Sciences, and, as far as I know, set a precedent for Presidential attendance at Academy functions.

On April 25, 1961, the President, in dedicating the new wing of the Academy, disregarded his prepared text and in an eloquent extemporaneous talk revealed his sensitive understanding of the necessary cooperation between the Government and the scientific community. In calling upon the Academy and the scientific community, the President remarked:

"This country must move forward, and most of the areas where we must move forward involve most sophisticated problems which your experience and training can help us to solve. One of the problems, it seems to me, of a free society is the fact that all of the questions which we must decide now are extremely sophisticated questions. It is difficult enough for those who hold office, either in the Administration or in the Congress, to attempt to make a determination between alternate courses of action—fiscal policy, monetary policy, agricultural policy, international policy, disarmament, arms control, all the rest, all of these involve questions to confound the experts. For those of us who are not expert and yet must be called upon to make decisions which involve the security of our country, which involve the expenditures of hundreds of millions of billions of dollars, we must turn, in the last resort, to objective, disinterested scientists who bring a strong sense of public responsibility and public obligation. So this Academy is most important."

Again, on October 22, 1963, a month to the day before the tragic events in Texas, the President appeared befor the Academy on the occasion of its Anniversary Convocation and he emphasized the importance of basic scientific investigations, the contributions that science can make to international objectives, and the interdisciplinary and intercultural aspects of science in playing its role in modern society. He also dwelt on a theme that he many times expressed, the need for applying the results of scientific and technological advances to the conservation and development of natural resources. During his relatively brief stay in office he gave physical meaning to these objectives.

On the subject of basic scientific research, the President said in his last Academy speech:

"But if basic research is to be properly regarded, it must be better understood. I ask you to reflect on this problem and on the means by which, in the years to come, our society can assure continuing backing to fundamental research in the life sciences, the physical sciences, the social sciences, on natural resources, on agriculture, on protection against pollution and erosion. Together, the scientific community, the government, industry, and education must work out the way to nourish American science in all its power and vitality."

President Kennedy regarded international scientific cooperative activities and scientific exchanges as one of the strongest bridges to other nations, and at the academy celebration he expanded on this view. "I would suggest that science is already moving to enlarge its influence in three general ways: in the interdisciplinary area, in the international area, and in the intercultural area. For science is the most powerful means we have for the unification of knowledge, and a main obligation of its future must be to deal with problems which cut across boundaries, whether boundaries between the sciences, boundaries between nations, or boundaries between man's scientific and his humane concerns."

He closed his talk with an anecdote that revealed the strength of his conviction about the importance of basic research to the country's future when he remarked, "the great French Marshal Lyautey once said to his gardener: 'Plant a tree tomorrow.' And the gardener said, 'It won't bear fruit for a hundred years.' 'In that case,' said Lyautey to the gardener, 'plant it this afternoon.' " "That is how I feel about your work," said the President.

Basic Research and Manpower

Under the President's leadership there has been a substantial strengthening of the basic research grants of the National Science Foundation in recognition not only of the need for the results of such research, but also of the essential role of basic research in the training of new scientists. In a news conference on January 15, 1962, the President expressed his concern about the future adequacy of our scientific and technical manpower in referring to a study of Soviet technical manpower that had just been published by the National Science Foundation. He said, "This has been a matter of some concern to me for some time because one of the most critical problems facing this Nation is the inadequacy of the supply of scientific and technical manpower, to satisfy the expanding requirements of this country's research and development efforts in the near future." He called upon the President's Science Advisory Committee, in cooperation with the Federal Council for Science

and Technology, to report as quickly as possible on the specific measures that could be taken to develop the necessary, well-qualified scientists and engineers, and he reinforced his personal concern with the words, "To all those who may be within the sound of my voice or who may follow your stories in the papers, I want to emphasize the great new and exciting field of the sciences. . . ." Following submission of the Science Advisory Committee report of December 1962 on needs for graduate training in engineering, mathematics, and physical sciences, the President's 1964 budget for the National Science Foundation reflected his acceptance of the PSAC judgment of the importance of increased support for graduate education. This is also reflected in his proposed legislation to increase the number of fellowships under the National Defense Education Act, and in his extemporaneous remarks at the National Academy celebration he expressed his deep disappointment in the failure of the Congress to support this program.

Space Program

During his administration he made persistent efforts to strengthen the U.S. space program. He saw in it the opportunity to serve many national needs. He was firmly convinced that Soviet space supremacy had greatly weakened the United States in its foreign affairs. He saw military hazards in a lagging space capability. He saw the exploration of space as one of the great human adventures of this century, and he appreciated the important scientific possibilities of space exploration. He dedicated this nation to a massive space program with a firm target of a manned lunar landing in this decade. This is a costly program and his decision to undertake it was not made lightly. He talked to hundreds of people in the process of making his decision and he weighed the costs with real concern. In the end he became convinced that the U.S. could not remain second in this important field. Despite continual review, he remained convinced of the correctness of this course.

Yet with the closing of the gap between U.S. and U.S.S.R. outer space capabilities, he followed through his Inaugural theme with the proposal to the U.S.S.R. for a joint moon venture.

He also followed through on his Inaugural hopes of conquering the deserts, and the national efforts at desalinization were greatly reinforced, along with a stepped-up program of underlying basic and applied research to overcome the barriers to economic desalinization.

Natural Resources

In the field of natural resources, the President early in his administration took steps to accelerate the pace of the national program in oceanography, and at the same time provided leadership and backing both for congressional support and for a coordinated, balanced, and imaginative interagency approach to oceanographic research. An old sailor, he had a special interest in this research. He got a particular pleasure when the Presidential yacht *Williamsburg* was converted into an oceanographic research vessel. For a film on oceanographic research just completed, the President provided the opening and closing lines. Recently, after I had recovered from the consequences of a sailing accident, inaccurately reported, he offered to give me lessons in sailing and press relations. He called upon both the National Academy of Sciences and the Federal Council for Science and Technology to study and make recommendations for strengthening the federal efforts across the broad horizons of natural resources in the land, sea, and air so that they can better serve the needs of the American people.

Early in his administration, too, the President lent substance to his desire to encourage commerce through science and technology by initiating a national program to strengthen civilian technology, including the appointment of an Assistant Secretary of Commerce for Science and Technology. In remarks prepared for delivery in Dallas, never given, the President pointed out that communities possessing the best in research and graduate facilities tend to attract the new and growing industries. He congratulated those who recognized the relationship between leadership and learning and the need for community support for the advancement of learning underlying the creation of the forward-looking Graduate Research Center of the South West.

President Kennedy's interest in international aspects of science was again highlighted in his September 20, 1963, address to the United Nations, where he urged a world center for health communications to warn of epidemics and the adverse effects of certain drugs; regional research centers to advance common medical knowledge and train new scientists and doctors for new nations; and a cooperative system of satellites to provide communication and weather information on a world-wide basis. As a result of his initiative, work has already begun in the World Meteorological Organization to develop the outlines of a world weather system and to strengthen basic research in atmospheric sciences on an international basis.

In connection with technical assistance to newly developing countries, the President was instrumental in bringing about closer attention to the need for research underlying the planning and execution of the AID program. This was reflected in the formulation of his Alliance for Progress program with its emphasis on science education, and in the establishment of the Office of Human Resources and Social Development in the Agency for International Development.

There are numerous other examples of President Kennedy's interest in promoting the development and application of science on an international basis, ranging from his initiative in establishing the U.S.-Japan Science Committee and his encouragement of the scientists' Pugwash movement, to his request for specific studies from his Science Advisory Committee, including a study of the problem of hoof and mouth disease in Argentina, the problem of water logging in Pakistan, and most recently his initiation of a study of the boll weevil problem in cotton production, a matter of international as well as national concern.

Arms Control

I have already referred to the President's strong conviction about the need for bringing about adequately safeguarded international arms control, a

matter that occupied a very substantial part of his time from the very first days of his administration. The whole world can be thankful for two major accomplishments that flowed from his efforts, two monuments to his labors on the road to peace—the Arms Control and Disarmament Agency and the Nuclear Test Ban Treaty—which can inspire us to persist in the efforts to avoid the nuclear holocaust that so haunted him. One of his first acts was to propose to Congress the creation of the Arms Control and Disarmament Agency, the world's first governmental activity dedicated solely to the study of disarmament problems. As a result, the United States Government now has a small cadre of professionals in this extremely complicated and important field.

The signing of the nuclear test ban treaty gave the President enormous satisfaction. For him it proved that meaningful disarmament steps were possible, and it justified the hundreds of hours of debate and study, the deep disappointments along the way. His striving for this treaty, begun in the first days of his administration, weathered many bitter disappointments and was the subject of much unjust criticism. He could hardly have been blamed had he abandoned hope after the Russians resumed nuclear testing in the summer of 1961. Characteristically, though, he continued his attempts to work out an acceptable agreement. The question of the need for further nuclear tests in order to enhance our national security involved highly technical issues and extremely controversial ones as well. So did the capabilities of nuclear test detection systems. The President made himself an expert on these subjects. He listened to many briefings and more debates. He talked to experts with every possible view and finally formed his own conclusions.

In the process he also achieved an understanding of the role of scientific advice in policy matters. In his last National Academy address he said, "As the country had reason to note in recent weeks during the debate on the test ban treaty, scientists do not always unite themselves on their recommendations to makers of policy. This is only partly because of scientific disagreements. It is even more because the big issues so often go beyond the possibilities of exact scientific determination.

"I know few significant questions of public policy which can safely be confided to computers. In the end, the hard decisions inescapably involve imponderables of intuition, prudence, and judgment."

The President called the nuclear test ban treaty a small first step. Since its signing the nations of the world have also responded to his call for a pledge to prohibit the placing of nuclear weapons in orbit. He hoped that these agreements would be followed by many more.

President Kennedy not only understood the need to invest resources for extending our understanding of science and its applications but also saw the need for institutional change to guide and assist the mounting governmental involvement in science and technology to serve national objectives. He shared the view that the federal scientific enterprise would be best served by strengthening the individual agencies whose missions required the exploitation of science, rather than by the creation of an all-encompassing department of science. Toward this end he sought the inclusion of a technically educated individual at the policy level in each department which is heavily dependent upon science for the accomplishment of its mission. The evolution of the Office of Science and Technology also reflects this policy of building strength in the individual agencies. On March 29, 1962, after much discussion, he sent a message to the Congress providing for reorganization in the field of science and technology. He pointed out that the ever-growing significance and complexity of federal programs had earlier necessitated several steps for improving the organizational arrangements of the Executive Branch. The President believed that the creation of the Office of Science and Technology would facilitate communication between the Executive Branch and the Congress. The wisdom of the President in making this proposal is being increasingly realized through the activities of its director, in its close collaboration with the Bureau of the Budget, its presentations to congressional committees, and through its leadership in initiating long-range planning of research and development within the federal agencies. To assist this work, the National Science Foundation has created an Office of Resources Planning, and closer ties with the National Academy of Sciences have been established through its newly created Committee on Science and Public Affairs.

These are only the highlights of President Kennedy's broad interest in science and technology and the tangible forms they have taken. Although much progress has been made, much more needs to be done. But because of his interest and support we have a stronger base upon which to extend the already impressive contributions of American science and technology.