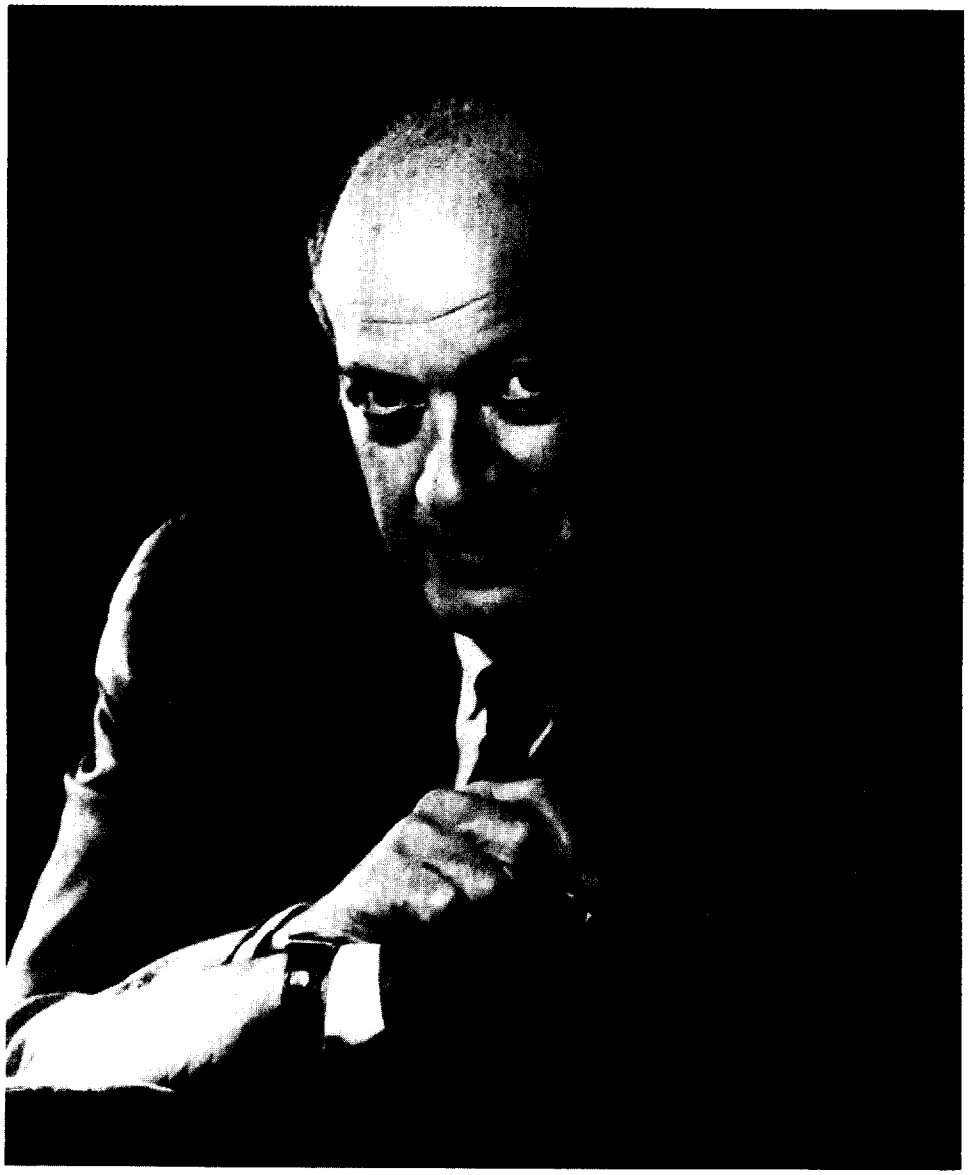
PHILIP HANDLER

1917-1981



A TRIBUTE

PHILIP HANDLER

AUGUST 13, 1917-DECEMBER 29, 1981

NATIONAL ACADEMY OF SCIENCES
WASHINGTON, D. C.

FEBRUARY 8, 1982

THE MUSIC

PRELUDE

Quartet No. 6 in F major, Op. 96 (The "American")
Lento
Anton Dvořák

Quartet in A minor, D. 804
Andante
Franz Schubert

PROGRAM

Quartet in D major, Op. 64, No. 5
Adagio Cantabile
Franz Joseph Haydn

Air from Suite in D major, B.W.V. 1068
Johann Sebastian Bach

Lily Kramer, First Violin
David Rajnes, Second Violin
David Basch, Viola
Evelyn Elsing, Cello

Kaddisch (Hebrew Memorial Prayer)
Maurice Ravel

THE SPEAKERS

Frank Press
President, National Academy of Sciences

The Honorable George Keyworth
Science Adviser to President Reagan

The Honorable David L. Bazelon
Senior Circuit Judge
U.S. Court of Appeals for the District of Columbia Circuit

Frederick Seitz
President Emeritus, Rockefeller University

Emil L. Smith
Emeritus Professor of Biological Chemistry
School of Medicine, University of California at Los Angeles

Lewis M. Branscomb
Vice President and Chief Scientist, IBM Corporation
Chairman, National Science Board

Emilio Q. Daddario, Esq.
Hedrick and Lane

Frank Press

WE GATHER TOGETHER this morning to pay tribute to the memory of Philip Handler. Assembled in this auditorium, which Phil loved so dearly, are his friends and colleagues from all over the country, from all sectors, universities, industry, the Executive Branch, Congress, representatives of other nations, and members of the Academy staff who served Phil with affection and loyalty during his twelve-year term as President of the National Academy of Sciences.

At a moment like this, each of us recalls in a highly personal way how we came to know Phil, how we interacted with him, perhaps as a companion, scientific collaborator, perhaps as one who sought his wise advice. Some of you shared the good battles with Phil on human rights, on bringing good sense to science policymaking, on building this institution and enhancing its ability to contribute to the community, the nation, the world.

Some of you knew Phil from a distance, through his eloquent speeches, his compelling prose, his good works. We have asked five people to speak about Philip Handler, to portray him through personal reminiscences and to say something of his special contributions in a few of the many areas where Phil left an indelible mark.

The Honorable David Bazelon, Senior Judge of the U.S. Court of Appeals for the District of Columbia, will speak about Phil's contributions to human rights and human affairs.

Dr. Frederick Seitz, President Emeritus of Rockefeller University and former President of the National Academy of Sciences, will speak of Phil's role in the context of the history of this institution.

Dr. Emil Smith, Professor of Biological Chemistry at UCLA, will speak of Phil's scientific contributions to the field of biochemistry.

Lewis Branscomb, Vice President and Chief Scientist of IBM and Chairman of the National Science Board, will speak of Phil's role in national and international affairs.

And Emilio Daddario, former member of Congress, will talk about Phil in the context of the Washington community.

But, first, I would like to introduce Dr. George Keyworth, Science Adviser to President Ronald Reagan.

George Keyworth

WHEN I CAME TO WASHINGTON last year to assume my new position as the President's Science Adviser, I was a relative newcomer to this city's science community and to the world of science policy.

Almost immediately upon my arrival, however, I received the welcome, the friendship, and the good counsel of two distinguished men of science here in the nation's capital. They were Frank Press and Philip Handler. I can assure you that this meant a great deal to me. Not only was it personally gratifying, but I think it was symbolic of the science community's unity, integrity, and dedication to the advancement of science in the service of our country and of people everywhere.

Philip Handler, I believe, devoted his life to these goals. I feel honored to have known him even briefly and to join you in this expression of tribute to him.

As I think today's tribute will demonstrate, Dr. Handler will long be remembered not only by the scientific community, which he served so well, but by numerous other people in this country and abroad who benefitted by his life of productive and distinguished service as an educator, a researcher, and a statesman of science.

In recognition of these contributions and qualities it was a privilege and an honor for me to join with Frank Press in presenting the National Medal of Science, the nation's highest scientific honor, to Philip Handler last October 8. This award by President Reagan recognized Dr. Handler's outstanding contributions to biochemical research and cited his national leadership in furthering the state of American science.

Several of Phil Handler's good friends and colleagues will speak to you this morning. If I may, I would just like to bring you these thoughts by the President of the United States upon learning that Philip Handler had passed away.

"Dr. Handler was an outstanding American scientist and leader among the American scientific community. His loss touches many who held the utmost esteem and admiration for his integrity and commitment to progress in science.

"As President of our National Academy of Sciences during turbulent times for science and for our country, he served his country and his profession as an eloquent spokesman for the ideals of truth and intellectual freedom."

I believe those thoughts by President Reagan are shared by all of us here today. I am told that in recent years, during a rather controversial public meeting in this auditorium, debate was interrupted by a degrading demonstration. At this point Phil Handler arose from his seat in the back of the hall and reminded all present that this was a house of science and those who entered were to conduct themselves accordingly. Decorum was restored; the debate continued. It was a memorable moment.

I am sure that it will be difficult for many who heard Phil Handler then and at other times to gather in this house of science without hearing the echo of that strong but warm and understanding voice.

David L. Bazelon

PHILIP HANDLER was a man of vision and conviction, of warmth and wisdom, and of great inner strength. He was a renowned research scientist and a profoundly influential leader of the scientific community. He shared a marriage in which both partners gave each other strength and support and unending devotion. He was also for me a rare and intimate friend. In the more than a decade that I knew him, we would regularly spend hours together sharing our hopes and our anxieties. We pondered our quite different but mutually illuminating enterprises.

One of the subjects that naturally filled my conversations with Phil was the search for human dignity in this nation and in the world. I want to focus on Phil's work on behalf of human rights, not only for its importance to his list of achievements, but also for the story it tells of his character and his values.

Phil was long interested in international human rights, but his most active involvement confronting this issue naturally began when he undertook the presidency of this Academy. In that role Phil was in charge of the oldest and most visible scientific exchange programs with the nations of Eastern Europe and of the Soviet Union.

When Soviet oppression of dissident scientists and others intensified in 1973, Phil pointedly threatened a suspension of those bilateral programs. That threat is credited by many with keeping Andrei Sakharov out of prison. In 1977, as the trial of Anatoly Scharansky was about to start, Phil, on behalf of the Academy, cabled Leonid Brezhnev requesting permission to send American legal observers to Scharansky's trial. Again, Phil emphasized the impact of

Soviet behavior on the future of scientific relations between the two countries. Unfortunately, the Soviets did not honor his request.

Phil's statements, at those and at other times, were heartfelt and forceful. Yet it would be a mistake to call him a single-minded crusader. He regretted that Soviet-American relations could not be more tranquil. More important, he regretted that the scientific enterprise should be tainted by political imperatives.

Phil said, only last year, that "Communication and cooperation among scientists is a tradition of five centuries; indeed, it is the very essence of science. Because without communication, science is essentially pointless; science really knows no international boundaries."

Phil felt strongly that to actually use scientific exchange as a weapon in the battle for human rights would injure the progress of both nations and, more important, would injure the cause of science itself. Yet, he also knew that the nobility of science was inextricably linked with the nobility of man and that there could come a point when continued cooperation could turn into unwilling complicity.

Phil's ambivalence about the use of scientific exchange as a political weapon paralleled a more general ambivalence about the relationship of science to society. On the one hand, Phil felt that the pursuit of pure science was a glorious venture that, like poetry and art, was most honestly and joyously pursued for its own sake. On the other hand, Phil recognized that science, especially through its technological offspring, had a practical effect on human welfare. He was convinced that, in the long run, this effect was supremely positive. He was, therefore, always eager to defend science, even on purely instrumental terms. But he agonized over the dangers of the short run and called for the exercise of "grace and charity and wisdom." Moreover, he knew that in that very warning some portion of the pure joy of science would forever be lost.

All this gives a special poignance to the events of early 1980, when the Soviet Union sent Andrei Sakharov into internal exile. Phil sent an urgent cable of protest on behalf of the Academy, in which he characterized the Soviet action as a "challenge to further cooperation and an act of deliberate ill will." In February 1980, scientists from the thirty-five nations that signed the Helsinki Accords met in Hamburg to discuss ways of promoting scientific exchange and cooperation under the Accords. Phil led the American delegation and he was able, in a series of remarkable late night sessions, to get the meeting to include in its final document a number of concrete expressions that scientific freedom was necessary for scientific progress and that respect for human rights was

necessary for improved scientific cooperation.

But these declarations, however significant, could not be enough. Phil agonized profoundly and finally came to a resolution. In the same month as the Hamburg meeting, the Academy's Council, with Phil's participation and approval, suspended a series of bilateral symposia between the Academy and its Soviet counterpart and tied their resumption to Sakharov's freedom and safety. In late 1980, Phil was part of a delegation to a plenary meeting of Helsinki nations held in Madrid. In addressing that meeting Phil said, "We perceive no essential distinction between pursuit of truth about the nature of man or of the physical universe and pursuit of truth about the human condition in the societies in which we live. We will continue to speak out for those whose rights have been denied, for the cost of silence is the abandonment of human rights and that is a price we will not pay."

Those words were clearly true; yet how it pained Phil that they would have had to be true. Just as significant, he was not willing to cover his pain with empty rationalizations.

In speaking about science and the society, Phil often quoted Robert Oppenheimer's comment after Hiroshima that "for the first time the scientist has known sin." Phil generally used the quotation to introduce a discourse about the ambiguities of the pure scientist's responsibility for the technological fruits of his or her work. In a speech, just last year, honoring Andrei Sakharov, however, Phil employed the Oppenheimer quotation to make a very different point. In speaking of the Academy's suspension of symposia dealings with the Soviets, Phil said that he could not help sharing Oppenheimer's sensation. "Deliberately to limit communications between members of the scientific community is a moral sin," Phil said. He described the Academy's action as "painful and deeply repugnant" and "an ugly precedent." But he also said that it was "the smallest clear signal of the depth of our distress that we could devise" and was therefore morally imperative.

Phil regretted but understood that the world was so structured that the scientific community could be true to itself only by eating from the tree of good and evil, even if that meant falling from a state of grace.

Phil's dear wife, Lucy, his sons, Mark and Eric, and his family have had wrenched from them a man whose love and devotion were inexhaustible. The scientific community has lost a great leader and spokesman. I have lost a cherished friend. And all of us have lost that rarest of individuals—a man who had the wisdom to identify sin, the discipline not to fall into its clutches, and the courage, at the right time, to commit it.

Frederick Seitz

AT THE RETIREMENT DINNER for Phil Handler at the end of June, all of us expected to see him enter into a new productive phase of his very fruitful life, as a senior statesman-scientist who could speak eloquently on public issues concerning science, from a position well above the turbulence that normally influences a harried scientist. His premature death is a great loss, not only to those of us immediately associated with the Academy, as well as his family, but to the international world of science as a whole.

At the dinner at which he was honored so warmly last June, several individuals commented quite correctly on the very special position Phil held among the various Presidents that the Academy has had in its almost 120-year history. I would like to take this opportunity to reflect on this matter in the light of some of the things we know about the history of the Academy and the individuals who served it as President.

I might say that soon after taking office in 1962, with the help of the staff, I collected all the material I could on our history and tried to become something in the nature of an amateur expert.

Two things emerged from this endeavor. First, I learned that the Academy had its periodic ups and downs. Indeed, some of the down turns were really quite dismal. Second, prior to that time, all of the upswings had been associated with periods in which we not only had good leadership, but in which the government and the people it represented had a very strong sense of unity. Six of the upbeat periods were associated with the following Presidents.

First was Alexander Bache, who served us between 1863 and 1867. He was a founding member of the Academy, its first President, and a great-grandson of Benjamin Franklin. As head of the U.S. Coastal Survey and one deeply involved in national scientific affairs, he had long seen the need for a national academy and had worked with others to take advantage of the special climate that developed in the early days of the Civil War to create our Academy and make it useful to our country.

Apparently, Bache drove himself beyond the limits of his health during the Civil War, had a severe breakdown, and died soon after it ended, leaving the Academy in the hands of Joseph Henry, who was then the Vice President.

Joseph Henry served from 1868 to 1878. As I said, he took over immediately

after the Civil War when the original war-related goals of the Academy had vanished. He gave it a home in the Smithsonian Institution, made certain that it maintained its unity, and did those things in support of basic science that were most appropriate for our country in a period when we were starting a final westward push, a final resolution of our frontier to the west. That period was marked by the spirit of progress and relative national calm that followed the Civil War.

Next, I should mention Ira Remsen, who served between 1907 and 1913. He was appointed the first Professor of Chemistry of the Johns Hopkins University when it was founded in 1876 and presided over the Academy at the time of our fiftieth anniversary. This was a period in which scientific research, particularly that in the field of chemistry, was gaining wide acceptance as an important asset in our country.

Remsen was a practical man, as well as an outstanding chemist, and did a great deal to make appropriate industrial organizations conscious of the fact that we did have an Academy. Among many other things, he and his colleagues were the discoverers of saccharin.

Next, I should mention Charles Doolittle Walcott, who served us between 1917 and 1923. In many ways he was one of the most remarkable Presidents the Academy ever had, being an institution builder in the strongest and best sense. He took over in 1917, when Dr. William Welsh, who had been elected President a few years earlier, decided to go into uniform in order to serve in the Medical Corps. Walcott served with great dexterity and accomplished a great deal in the next six years. He had an excellent research career as a geologist/paleontologist working at the Cambrian level. He rescued the Geological Survey from the disasters that befell it during Powell's regime and later served as head of the Smithsonian. He did an enormous amount to enhance the grandeur and scope of the Smithsonian and, yet, worked quietly and efficiently without the use of a megaphone. His accomplishments were really awesome.

It was during Walcott's period in office, and I believe substantially through his skill, that the Academy acquired this plot of land and built the main building—the one in which we are at the present time—in order to give us a permanent home. As I am sure Dr. Press has discovered, the process of housing the Academy is a never ending one, and we are still in that process of up-building.

I next should mention Dr. Frank Jewett, who served us from 1939 to 1947. Jewett came from the Bell Laboratories, where he had been Director, to rescue the Academy from one of its very deep troughs and put it and himself to work

in full force in connection with World War II.

Jewett had the gift of understanding both pure and applied science and did many wonderful things for the Academy. Not least, he established a tradition of having a strong business office without which we would never survive the intervening years. Moreover, at the end of the war, when he strongly desired that the Academy do its best for basic science, since it had done so much for applied work, he selected Detlev Bronk to run the National Research Council, which at that time was somewhat loosely tied to the Academy.

Finally, let me mention Detlev Bronk, who served us from 1950 to 1962. We all know Det's marvelous effectiveness in the particular upbeat period of our society in which he served, so it is not necessary to expand on it here.

He and Phil were very, very close friends; they were strongly supportive of one another until Det's death in 1975. As many of you know, they had a common birthday and enjoyed celebrating it together with great joy at Woods Hole each August.

The period from 1969 to the present could easily have been a disastrous one for the Academy. The sense of unity among scientists in general and the Academy members in particular that Det and I had enjoyed had not only dissipated, but, to a certain degree, became unpopular. Alongside of this, of course, the country became highly disunified, and both science and scientists came under attack from many sides.

Fortunately, it does appear that that mood is abating. We are much too close to the present to know what the consequences are. Phil's keen sense of leadership, his deep appreciation of science, and his eloquence made all the difference. I seriously doubt if any of the six individuals I have mentioned previously could have been nearly as effective under the circumstances that prevailed, although it is quite possible that Walcott might have been an exception, since he did have the ability to deal skillfully with adverse conditions, often turning them to advantage the institutions he served, much as Phil did for us.

Along with his other remarkable qualities, Phil had the greatness to broaden and mature continuously in his post. I was told by Harry Eagle that when the nominating committee offered him the presidency in 1968, he wondered if there would be enough honest work and challenge to justify turning aside from the research and educational activities that he enjoyed so much.

When he left office, he had become one of the outstanding spokesman for scientific and human values in the Free World, as was clear, for example, from the roles he played in the Hamburg and Madrid meetings to which Judge Bazelon referred.

His sense of partisanship in human affairs ultimately transcended the normal political, social, or economic divisions that occur in our society and focused on the most basic issues essential to the preservation and, indeed, the advancement of the best features of our heritage of free men and women.

We have, indeed, lost a great and lucid colleague and leader.

Emil L. Smith

YOU HAVE ALREADY HEARD some accounts of the life and activities of the unique, multifaceted personality of Philip Handler. Although Phil had a vast range of talents, abilities, and interests, it should not be forgotten that first and foremost of his intellectual loves was biochemistry in all of its aspects. His other loves—for Lucy, for his family, and for his friends—were of another kind.

In my remarks today, I admit that I cannot be objective. I can only express my own feelings and give you a very subjective view of how I came to know Phil, and of our long friendship and collaboration.

I don't recall exactly when I first became aware of Phil's research activities as a biochemist, but it was sometime around 1947. I do remember, however, how we first met. In April 1949 I was entering a taxi in front of a hotel in Detroit when a voice behind me asked whether he could join me in going to the hall where the biochemists were meeting. So, our first common bond was our impatience at waiting for a bus.

Soon, we discovered many others. In December 1949, after a meeting of the now long-defunct Committee on Growth of the National Research Council at what was then the Statler Hotel here in Washington, the late Abraham White brought together Phil, DeWitt Stetten, and me to plan a new textbook of biochemistry. Phil was then thirty-two years of age. For the next thirty-two years, or half of Phil's short sixty-four years of life, we shared in deep harmony and friendship the work of recounting progress in biochemistry. But more of this later.

Phil was an early starter, and his career in biochemistry was meteoric. He obtained his bachelor's degree before he was nineteen at the City College of New York and his Ph.D. three years later at Illinois, under the tutelage of Herbert Carter. If I am not mistaken, he was Herb's first Ph.D. student. He then went to Duke University, where he became Chairman of the Biochemistry

Department in 1950 at the age of thirty-three and where he remained until he came to Washington full time as President in 1969.

In an age of specialization, Phil's research work in biochemistry had immense breadth and versatility. In the first decade after his Ph.D., he was involved in studies on amino acid metabolism, sulfur metabolism, endocrinology, nutrition with special attention to pellagra, electrolyte balance and kidney function, other studies of intermediary metabolism, and a number of collaborative studies with his clinical colleagues on biochemical aspects of disease. Thus, his range of interests was from the isolated enzyme reaction in the test tube to studies on whole animals and the diseases of human beings. To each of these fields he made significant and lasting contributions.

Later, his studies became focused on the study of enzyme catalyzed reactions in intermediary metabolism, particularly those concerned with carbohydrates, metabolism of sulfur compounds, the formation of the coenzymes containing niacin, an outgrowth of his earlier work on the metabolic disorders in pellagra, and the metabolic fate of purines. This is still a broad array of topics, but just a little less diverse than earlier. There is not the time and this is not the occasion for accounting the details of these investigations.

It should be noted that during this period in the 1950s and 1960s, Phil was already heavily engaged in outside activities—those involving the American Society of Biological Chemists, the National Institutes of Health, the National Science Foundation, and later, the Academy, to mention only some.

Yet, there was no diminution of his research activities nor his attendance at scientific meetings. I can bear witness that he did his share in writing the second, third, fourth, and fifth editions of the *Principles of Biochemistry*, which Abe White, Phil, and I did alone. I should note that the fifth and sixth editions were done while Phil was already full time in Washington.

It may be difficult for our nonbiochemist friends and colleagues to realize that while he was fully occupied as President of this Academy, he still found time to keep up with progress in biochemistry and to do his part in the writing, rewriting, proofreading, and the other tasks involved in preparing a book on schedule.

How did he do it? By working day and night as he alway did, and always against deadlines, and always somehow meeting them. Yet, he also found time to talk, as he loved doing, and as he did so well.

Last spring at the annual meeting of the Academy, I was given the privilege of organizing and chairing a symposium in honor of "Philip Handler, biochemist." I could think of no better way to do this than to ask four of Phil's

former students and coworkers to present a summary of their latest studies. As I said at the time, "I don't believe that I take anything away from each of them and their later distinguished and important accomplishments by indicating that Phil was the initiator and inspiration for at least some of their current biochemical work. . . . For the Academy it is our way of telling you what Phil Handler might have been doing if he had not moved to Washington."

I should like to mention just two of the discoveries presented by Phil's former coworkers and how they came about. Years earlier, Phil had begun to study with his students some of the most complex oxidative reactions known, the oxidation of sulfite to sulfate and the oxidation of hypoxanthine to uric acid. Both reactions were known to involve multiple electron transfers, ultimately to molecular oxygen, and both of the enzymes had only partially known cofactors.

Last year, K. V. Rajagopalan reported at the symposium held in this auditorium the discovery of a new coenzyme present in both sulfite oxidase and xanthine oxidase, a new pteridine linked to molybdenum. New coenzymes are discovered only rarely nowadays. This was a direct outgrowth of Phil's earlier work. Many years earlier, Fridovich and Handler postulated that in both of these enzyme reactions a one-electron transfer must take place to molecular oxygen and that the new molecule had to be an oxygen anion, which they called superoxide anion.

Experts claimed that this could not be; such a substance would be too unstable. Indeed, Fridovich and Handler had difficulty getting their views into print, but finally did so. Needless to say, they were correct. Oxygen anion or superoxide anion does exist and is one of the most toxic substances known.

Irwin Fridovich went on later to discover the enzyme, superoxide dismutase, which catalyzes destruction of the superoxide anion. This is the enzyme that protects us and all other living forms on this earth that use molecular oxygen. Indeed, this enzyme made possible the evolution of all higher forms of life on our planet.

Phil took enormous pleasure last spring at the election to this Academy of his former student, Irwin Fridovich.

Phil did a lot of soul-searching before he accepted the nomination to the presidency of this Academy. It was not easy for him to forego his activities as an investigator and teacher. I know. We talked about it for hours late one night in the Cosmos Club.

Nonetheless, he did decide to accept the nomination, but he did hold on to one thread of his life as a biochemist. Harrison Brown, then foreign secretary and a member of the committee that negotiated the terms of Phil's presidency,

told me much later that one of Phil's major stipulations was that it be understood that he be free to continue his participation in writing revisions of the *Principles of Biochemistry*. He told Harrison that this was too important to him to give up under any circumstance.

How Phil felt about this was not expressed to me until many years later. At the end of June 1979, my colleagues asked Phil to speak at the dinner given on my retirement at UCLA. Among other remarks, Phil noted that our collaboration on the *Principles of Biochemistry* was, in his words, "as rich an experience as one could possibly ask. We have had the enormous joy of a relaxed, harmonious yet intense working relationship conducted with mutual respect and affection. Little more than acquaintances when we began, our ever-deepening friendship has surely been among the best things that happened to any of us."

In these words Phil expressed better than I can on this occasion the feelings of the late Abraham White, our younger colleagues who joined us later, Robert Hill, Robert Lehman, Robert Lefkowitz, and myself.

This collaboration also gave me the advantage of seeing Phil at his most relaxed, the times when he came through as the enthusiastic and perceptive scientist that he was. During the course of doing several of the revisions of our book, we always had at least one major session of a week or so when we went into retreat, somewhere where the phone could not easily reach us. During these sessions, Phil, Abe White, and I would sit and think aloud about each facet of biochemistry, new and old, and how to present and organize the material. Phil would chortle with glee at each new, important discovery in biochemistry. His enthusiasm was contagious. His quickness of mind and expressiveness were those of a scientist and scholar to the depths of his being.

After our long working sessions we and our wives would gather for dinner and relaxation and talk about everything in the universe, sometimes in serious vein, but more often in the relaxed way that comes so easily among friends. Phil was at his best. The responsibilities and the dignity that had to mask a part of Philip Handler, President of the National Academy, could be shed for a brief time before he had to return to his other self, as a statesman of and for science.

While all of us are grateful for the immense contributions that Phil made here in Washington, I have to treasure also my memories of the other Phil, who, if he had not come to Washington, would surely have continued as one of our most productive, versatile, and original scientific minds. Who knows what he would have discovered next?

Today, we have heard something and we will hear more of Phil's gifts,

accomplishments, and virtues. He had his faults, but I count them among his virtues—among his most striking being his outspoken and fierce honesty. In all the years of our close association, the only time we ever lied to each other was just a few weeks before the end when I visited him at the hospital in Boston. We both maintained the fiction that he would soon return to a normal, active life. Sadly for all of us, it was not to be.

Lewis M. Branscomb

PHILIP HANDLER'S ELOQUENCE and consistent faithfulness to his own ideals made him a consumate citizen, leader, and diplomat. Judge Bazelon has reminded us of Phil's remarkable achievement in Hamburg and Madrid. This constituted a splash of sunshine in the gloomy climate of cynicism surrounding the Helsinki Accords. It also demonstrates the unique value that citizen-statesmen scientists have brought to our democracy's international affairs since the time of Benjamin Franklin.

Secretary of State Cyrus Vance recognized this achievement in his letter to Phil on March 24, 1980: ". . . Your negotiating skill and dedication to the achievement of both human rights and scientific cooperation contributed decisively to the successful outcome of the meeting. . . . Your contribution to science is already well known. For your contribution to diplomacy, we all owe you a debt of gratitude." I suspect that Phil took even more satisfaction in the appraisal of his leadership by Patricia Derian, Assistant Secretary of State for Human Rights and Humanitarian Affairs. She wrote Phil, "I knew you would be wonderful, but I didn't know you would be that wonderful."

Those of us who have traveled with Phil, from Beijing to Novosibirsk, knew he was that wonderful. The written record he left behind captures in beautiful language his deep belief that science is an expression of the best of man's true nature, as much a common bond of humanity as a boon for the solution of mankind's problems.

Let Phil tell you his views in his own words, in 1973 testimony to the ninety-one-member Seabed Committee negotiating the Law of the Sea Treaty. "The linkages between basic research and economic payoff are complex and uncertain," he said. "But is it not our task to learn from history? The challenge is to assure equitable use of resources, not to minimize the possibility of their discovery. Scientific oceanography is not a hunt for commercially valuable resources, although all of us hope that such will occasionally be encountered.

. . . The effort to understand the natural world is one of the noblest pursuits of the human mind. Free intellectual inquiry about the oceans should be encouraged, not only because of its importance in understanding our world, but also because of its importance to the human spirit."

"Science," he said, "like many other activities, must also be measured by the contributions it can make to the future benefit of mankind. . . . I oppose restrictions on the conduct of research in the oceans precisely because I believe such restrictions do not serve our happier visions of the future of man."

Phil's use of the Academy's prestige in defense of freedom for individual scientists came from the same philosophy. So did his dedication to the task of building scientific institutions within which the ideal of international science might flourish. He loved the challenge of a new idea that cynics thought could not be negotiated. He was, for example, justifiably proud of his role in launching the International Institute for Applied Systems Analysis in Austria.

Many people were in on the original idea for a Center for the Study of Problems of Advanced Societies, from Aurelio Peccei to Jerman Gvishiani. McGeorge Bundy tells us that President Johnson was personally involved. But Phil's trip to Rome, Vienna, and Moscow in May 1970 laid the groundwork for all that was to follow. It grieved him, as it saddens me, to see our nation now planning to withdraw support from this useful institution at a time when it is needed more than ever as an international forum in which global problems can be addressed through the common language of verified data and systems analysis.

Phil's fertile imagination sometimes enabled him to pull off a diplomatic triumph where the most experienced government officials had failed. In 1970 the United States was quite frustrated at the lack of response from the Soviet Union to our overtures for cooperation in space research activities. The original idea for the Soyuz-Apollo docking mission may not have been his, but history leaves no doubt that his proposal of the idea to the Soviet Academy during the same May 1970 visit to Moscow ignited the fuel that launched U.S.-Soviet relations to this apogee of cooperation.

Phil told the Russians about an American movie entitled *Marooned,* which featured a dramatic rescue by Russian cosmonauts of an American astronaut. An editor of the *Daily Telegraph Magazine* gives us Phil's recollection five years later: "That an American film should portray a Soviet cosmonaut as the hero who saves an American's life came to the Russians as a visible and distinct shock," Dr. Handler remembered. Two years later, at a dinner in Moscow, [Soviet Academy President] Keldysh confided that until [he and Handler] had

met he had thought, "All Americans have horns." Phil's proposal caught the imagination of the younger Soviet scientists as a daring idea with positive humanitarian appeal. He gave us all a glimmer of what international trust could be for humanity.

Phil would want us to recall with him many other adventures in the service of our country's good relations with others. As President of the Academy, he was proud of the groundwork laid by the Committee on Scholarly Communications with the People's Republic of China a decade before diplomatic relations were reestablished. He gave the Committee and its staff strong support. His first negotiating mission to China preceded the political watershed of the "Gang of Four" denunciation by only a few months. It was a tense and frustrating situation. But not long after, Phil had the satisfaction of participating in the establishment of diplomatic relations and the signing of agreements of scholarly exchange and collaborative research.

He had the patience and the sense of history that sustained him when times were hard and politics looked inward or backward. He delighted in the warm fellowship that attended successful agreements.

May 22 last, I invited Phil, as retiring President of our Academy and former Chairman of the National Science Board, to address the Board on the subject of international relations in science. He looked back over his nineteen years since joining the Science Board and observed how the world had changed. Our nation dominated world science then, as our level of effort was about two-thirds of the world total. Now it is only a third, as other nations, both democratic and socialist, base their nations' development strategies on a rigorous mathematics and science education for their children and a strengthened scientific enterprise in order to challenge our technological leadership.

Phil looked to the future and saw the next stage as planning for science on the global scale. He saw the need for international institutions, like the IGY, to provide scientists of all countries access to nature's global data bases. He saw the need to extend the precedent of the Antarctic Treaty to ensure the universality of access to the planet's least accessible places. Most important, he warned of our neglect of the poor nations. "Let us find a mechanism," he said, "to support the indigenous personnel in . . . [developing] countries who know something about the problems there and let us get the money to them and let us help them do the work they ought to be doing there."

Finally, Phil turned to scientific activities that might advance the cause of peace. The threat of nuclear holocaust was never far from his mind. He believed in detente as a means for achieving both human freedom and international

peace and security. But he saw detente as a two-way street. He referred to his work toward East-West cooperation in science, in his September 1973 cable to Academician Keldysh, in these words: "We have done so in the belief that such a course would bring significant social and economic benefits to our people and generate opportunity for alleviation of that division of mankind which threatens its destruction by nuclear holocaust."

"Unhappily," he continued, "as Sakharov and others have noted, application of scientific understanding has also generated the means for deliberate annihilation of human beings on an unprecedented scale. . . . If the benefits of science are to be realized, if the dangers now recognized are to be averted, and if the full life which can be made possible by science is to be worth living, then, in the words of Academician Sakharov, 'Intellectual freedom is essential to human society—freedom to obtain and distribute information, freedom for open-minded and unfearing debate and freedom from pressure by officialdom and prejudice.' Scientists will recognize this description of a vital, functioning society as a restatement of the ethos of science itself," Phil Handler concluded.

Philip Handler left us at a time when many of his most cherished ideals are again under attack. Some who applaud his castigation of those who deprive Academician Sakharov of his scientific freedom are nonetheless mistrustful of sharing with foreign students basic scientific knowledge in our universities. Some who insist that our national security requires a dominant military capability fail to see danger in the uncompetitive state of mathematics and science teaching in most of our public schools. Some who feel most threatened by massive stockpiles of nuclear weapons seem least committed to arms control negotiations. Phil would not have lost heart. And he would not have remained silent.

As we cherish the memory of this fine scientist and distinguished American, let us emulate not only his patience and unfailing courtesy, but also his tenacity to his ideals and his dedication to improving the human condition.

Emilio Q. Daddario

ONE SUNDAY when Phil Handler and I were walking along the Virginia side of the Potomac River, I asked him what he missed the most about leaving his university for the presidency of the National Academy of Sciences.

"My students," he said, "I miss most the teaching of my students."

There is obviously something magical that takes place in the relationship between a good teacher and a good student. When Herb Carter, who taught Phil Handler at the University of Illinois, says that "Phil was my first graduate student," he is noticeably and justifiably proud.

We will never know how many students Phil Handler may have motivated toward higher achievement during these past twelve years, but by foregoing the few he, in fact, taught the many. For as the major spokesman for the Academy his campus included the American public, the various branches of government, and just about every country in the world community.

I can remember having dinner with Phil in Paris some years ago and asking him what he was doing there.

"I have just finished giving some lectures," he said.

"In English?" I asked.

"No," he said, "in French."

"In French, Phil? How did you do that?"

"In the present tense," he said.

He was not, however, so ordinarily constrained. Called upon to give testimony before numerous of the congressional committees, he became a well-recognized Washington figure with a reputation for both wit and veracity. Beyond that he had the courage to cast aside a carefully prepared script and the temerity to extend into extemporaneous remarks superlative and spell-binding arguments. As one of the early "Handler watchers," I had the chance to see him come into the Washington scene and by a combination of consistency and brilliance become the major spokesman for science. When his dear friend Leland Haworth, the Director of the National Science Foundation, introduced Phil Handler at the beginning of the first congressional authorization hearings of the Foundation on March 17, 1969, he said ". . . as far as I am concerned Dr. Handler has been a very brilliant Chairman of the National Science Board, he will be a brilliant President of the National Academy, just as he has been a brilliant professor of biochemistry."

In a quite casual way Phil began his testimony by saying, "I would like to take you on a brief tour of American science, discipline by discipline, and tell you how things go, as seen through the eyes of one who is himself a biochemist." That testimony was in fact a matriculation lecture, and was followed by years of unmatched combinations of well-chosen words and impeccable logic.

This room is filled with people who know better than anyone how stimulating a communicator he could be, and our personal affection for him was matched

by our admiration for his public qualities. We have lost a great friend and a great man.

He burst into my consciousness with a spirit of rhetoric and syllogism that was so broadly colorful, and yet so sharply focused, that I have constantly referred back to it. The time was right after he had been elected to the Academy's presidency and when he was still Chairman of the National Science Board. Let me quote just two sentences.

"The Federal Government is today the principal patron of science and science education in the United States. This situation stems from the fact that science is useful rather than from the fact that the intellectual structure of science, largely erected within our lifetimes, is a magnificent heritage, which we shall leave for succeeding generations, entirely analogous to the gift of cathedrals of the Middle Ages or the great art of the Renaissance."

Phil Handler could immediately captivate and convince even the most reluctant listener, and with a few well-remembered and chaotic exceptions, do it with a special charm. On occasion, he could quite righteously declare, "That's not the way good science is done," and though he did not really believe that the Academy was perfect, defend it vigorously from every attack. The scientist we knew was quite a street fighter as well.

Phil Handler believed that this building should be a place for artists as well as a scientific house. Although he was proud of the permanent pieces that now belong here, he was even more proud of the music and the works that flowed through on exhibition, and that gave opportunity and acclaim to an untold number of artists.

He wasn't sure whether posterity would give them a thought, or if their genius was worthy of recognition, but he knew the hard path they had chosen and though few would find their way to fame, that some might be brought out of the shadows of obscurity.

"Besides," he was fond of saying, "it is all Lucy's doing. She is the one who cultivates and refines my taste." Whether it was his own idea or not, we can only admire him for what he has done in the way of art through the Academy, and, for listening to Lucy.

And Phil loved Lucy. She was his best friend, his most affectionate critic. Lucy could make him laugh—she was his love.

The presidency of the Academy is no small thing. Of all of Phil Handler's honors, it was his richest. He admired his predecessors, but shaped his own course. They were formidable men, some even gigantic, and yet he has added to their stature and especially to that mythical intangible that turns a place into

a worthwhile institution and, as many believe, the National Academy of Sciences into a national treasure.

Such a happening does not occur without great personal sacrifice. And yet the grief that we all feel here today should not be that Phil Handler died before his time. He spent about one-fifth of his life as President of this Academy, and he spent that time with high, unselfish, and consuming intensity. I quote from the Ecclesiastes, chapter 3, verse 22:

"And I have found that nothing is better than for a man to rejoice in his work. And that is his portion. For who shall bring him to know the things that shall be after him?"

Frank Press

THESE BRIEF SKETCHES by way of tribute to Phil Handler portray the man and his work. However, each of us in a highly personal way will recall the way Phil Handler came into our lives and affected our thoughts, our emotions, our very purpose. I will always remember Phil for his companionship, his courage, his dedication, his love of country, his concern for those in trouble, his enormous respect for creative people, and his deep belief that the future of this nation depended upon them.

Above all, I can never forget Phil Handler's love and commitment to this institution. He dedicated his life to the Academy; yet, the Academy enriched his life and gave him much fulfillment.

In a diary note prepared a few days before his term of office ended, Phil wrote, and I quote, "For myself it has been an extraordinarily rich experience that I could not imagine trading for any other within my ken. The greatest joy of all has been this unique opportunity to spend my life in the company of those persons I most admire, whose friendship I would most cherish in any case. . . . Again and again, I had the opportunity to enjoy the processes of their superb minds. How utterly wonderful! . . . It is hard to convey the extent to which, at all times, I felt myself guided by history. The sense of the Academy as continuum is very powerful. The question is not what would Bronk or Seitz or Jewett or Hale do, it is always—would they approve? I hope so. . . ."

And Phil continued, "Who owns the Academy? The only answer is—the American people. . . . We hold it in trust—for the American people. . . . The purposes it serves are not merely some narrowly construed purposes of an

elitist Academy; the purposes are all of the purposes of the American people to which science and its applications can make useful contributions.

"This has been a longer diary note than I had intended. That is because these have been twelve busy, sometimes tension-filled years. I hope that they have really been as constructive as it seems to me, in retrospect this long evening, that they were. Only the passage of a few more years and the opportunity to look back will enable valid judgment."

Lucy, we don't need the passage of time to render a judgment. The verdict is already in. So many people, so many institutions are all the better for Phil's having lived among us and this institution which he loved so dearly will always cherish his memory. Those who follow cannot but be profoundly affected by the knowledge that Phil Handler walked these halls and here did his great deeds.

PHILIP HANDLER was born August 13, 1917. He received his bachelor of science degree at age eighteen from the College of the City of New York and his doctorate from the University of Illinois three years later. Upon completion of his graduate training, he joined the faculty of the Duke University School of Medicine, where he became chairman of the Department of Biochemistry and was later appointed James B. Duke Professor of Biochemistry.

In 1964 Dr. Handler was elected to membership in the National Academy of Sciences. Five years later he was elected the eighteenth president of the Academy, and in 1975 he was reelected for a second six-year term.

Dr. Handler distinguished himself in several careers. As a biochemist, he published more than 200 papers in important professional journals and was coauthor of the widely used textbook *Principles of Biochemistry.* He early recognized the value of metabolic research to human welfare. One of his first major research efforts was on the underlying problems that cause pellagra, a vitamin B deficiency disease. He also made many other fundamental contributions to understanding the mechanisms by which enzyme proteins carry out their catalytic functions in metabolism.

He was the recipient of numerous awards and twenty-eight honorary doctorates. Among many such honors, he was Annual Orator of the Harvey Cushing Society and of the Welch Foundation, Sigma Xi National Lecturer, and delivered memorial lectures at many scientific institutions in the U. S. and abroad. He served on the boards and visiting committees of more than a dozen scientific institutions and was decorated by the governments of Austria, Belgium, and Poland.

Dr. Handler's major activities in science and public policy began in 1951, when he accepted the first in a series of government advisory appointments. He served for twelve years on the National Science Board, four of these as chairman, and was a member of the President's Science Advisory Committee under two presidents. In 1981, he was awarded the National Medal of Science. A citation signed by President Reagan honored him "for his outstanding contribution to biochemical research, resulting in significant contributions to mankind, including research that led to a clearer understanding of pellagra, and for his national leadership in furthering the state of American science."

Dr. Handler died on December 29, 1981.

I AM COMMITTED to defense of the human rights of all persons, but those of scientists in particular. Not so much because humanity may be denied the fruits of their science, but because they are precious as human beings; because abrogation of their rights is injurious to all mankind; because, as thoughtful intellectuals, scientists not infrequently become involved in the defense of the human rights of others. . . .

From "Science in a Free Society"
The Phi Beta Kappa Bicentennial Lecture
College of William and Mary
December 6, 1976

WE PERCEIVE no essential distinctions between pursuit of truth about the nature of man or of the physical universe and pursuit of truth about the human condition in the societies in which we live. We will continue to speak out for those whose rights have been denied, for the cost of silence is the abandonment of human rights, and that is a price we will not pay.

From a statement presented to the Conference on
Security and Cooperation in Europe
Madrid, Spain
December 3, 1980

WHETHER random event or created in the image of the Almighty, man knows love and beauty; he wrote *Hamlet*, the *Psalms* of David, and the *St. Matthew Passion*, painted the *Night Watch*, built Monticello, the Taj Mahal, and the Lincoln Memorial and breathed life into the stone of Michelangelo's *Moses*. And so, somehow, something more than the sum of his parts, he is worth preserving.

CREATIVE scientific research is one of the very purposes of our society akin to imaginative scholarship in the humanities and innovation in the arts. Surely, no other course available to this civilization is as hopeful as the continuing subtle interplay of science and developing technology.

From "The University in a World in Transition"
The Convocation Address at the One Hundred and
Fiftieth Anniversary of the University of Virginia
October 21, 1969

SCIENCE-BASED technology has eased and enriched the personal lives of billions of humans, albeit in varying degree. No end to that process is in sight. It has been the great technological triumphs . . . that engendered the large-scale public support of science. Our lives are pain-free and rich in experience beyond the imaginings of the past. That technology has also quickened the pace of history—for good and for ill. And it happens before our eyes.

From "The Future of American Science"
The first Admiral Charles A. Davis Lecture
Naval Postgraduate College, Monterey, California
November 6, 1979

THERE IS a growing disenchantment which has led to disturbing losses of contact, separating science from the general social consciousness, a separation which in some instances has become outright alienation. . . . And yet, science . . . is the unique tool fashioned by our civilization to alleviate the condition of man.

From a statement presented at the dedication of the
Medical Center, University of California, San Diego
La Jolla, California
November 26, 1969

DO NOT FEAR CHANGE—help to guide it. Every technology since fire and the wheel confronted humanity simultaneously with the prospect of great benefit—and of considerable hazard, with potential for good and for evil.

From "Science in a Free Society"
A Commencement Ceremony Address
Southwestern at Memphis
May 30, 1977

WE ARE witnessing both a decline in the intellectual competence and scientific literacy of our future leaders and the release from our secondary schools of an unprepared, scientifically illiterate future labor force. . . . With so ill-prepared a labor force, can the nation hope to compete in the world markets? . . . From this current picture emerges a vision of tomorrow in which the division of the "two cultures" becomes ever more vivid — a United States in which there are about 2.5 million

scientists and engineers comfortable with the language of science and technology . . . and 200 million others who neither understand nor appreciate science, who see all of technology as undecipherable black boxes, and who come to reject science and technology, to resent them, and bring that rejection with them into the political sphere. That is an ugly image—yet already it is a half truth that accounts for some of the environmental excesses of the last decade. The only means to prevent or mitigate that prospect is a determined effort to upgrade secondary school education in science—an obligation in which every one of us must share. Quite possibly, it is the most important single thing that can be done to ensure the quality of the national future.

From "Science and the American Future"
A Convocation Address
Northwestern University
June 13, 1981

THERE ARE those who, equating science with an immoral technology and distrusting our societal leadership, would abandon the scientific quest. But that way lies book-burning. If man cannot learn to live not only with this technology, but with his understanding of himself and his universe, surely all is lost. Inquiry is among man's noblest pursuits.

From "Is Science Relevant?"
A lecture presented at Northwestern University
March 4, 1970

THE OBLIGATION of scientists remains clear: to pursue science at its frontiers and to address society's problems, including the national defense, wherever genuinely constructive opportunity affords. Tomorrow, as yesterday, we shall be judged by our success in meeting both sets of challenges. We would be ill-advised to offer guarantees of success—we can guarantee only that those challenges will certainly not be met if we are not permitted to try.

From a statement presented to the Subcommittees on
Energy Research and Production and on Science
Research and Technology
House Committee on Science and Technology
hearing on Destinies for American Research
December 10, 1979

DEEPLY TROUBLING . . . are suggestions that there are questions that should not be asked, that there are fields of research that should be eschewed because mankind cannot live with the answers. *Nonsense!* No such decision can be rational, much less acceptable. Someone will learn, somewhere, sometime. It is both the glory and the curse of the human brain that we must forever live with truth, once it has been gained. Surely, it is far more dangerous to live with ignorance. . . .

From "Science in a Free Society"
The Phi Beta Kappa Bicentennial Lecture
College of William and Mary
December 6, 1976

THOSE OF US who have had the high privilege of doing science, have experienced the exquisite and intrinsically unshareable exhilaration of understanding. The brightest episodes in the history of science, indeed of mankind, are those in which a single intellect has seen through to the heart of a problem and given us a clear statement of a great scientific principle. Ahead still lie great adventure, beautiful new insights and the miracle of discovery, the emotions that, for scientists, make life worthwhile. And with them go the hopes of mankind.

From "The Status of Science"
The Paul Lund Lecture
Northwestern University
May 23, 1977

THE SCIENTIFIC enterprise flourishes, and we may all find joy therein. The nation's awakening technological enterprise has recognized new challenges and opportunities, and we can hope that this lively adventure will indeed expand the economy, improve the public health, secure the national defense, and improve the quality of daily life. The National Research Council, our instrument, is one of the important mechanisms available to the American people to see to it that the fruits of science do indeed ripen and inure to the public weal. The Academy is in good hands, and we may look forward to the future with confidence.

From the President's Annual Report to the Members of
the National Academy of Sciences
April 28, 1981

THE OPPORTUNITY to observe our country's best minds as they perform their functions is something beyond compare. It is for that, more than for anything else, that I now find myself grateful. It is not what I expected was going to happen —I hadn't thought of it in that way at all when it all started, but it is the cream, the richness, this amazing experience that you have permitted me to live through for 12 years. . . . I have had an absolutely glorious time. If the Academy and Research Council are stronger today than when I found them, or at least different and appropriate to the time, I am pleased. . . . Opportunities for service which are at the same time warm, loving, rich experiences are very rare. I have been very fortunate and deeply, highly privileged by all of you. Thank you ever so much.

From remarks at a dinner given in his honor by the Council of the National Academy of Sciences June 27, 1981