The original documents are located in Box C54, folder "Presidential Handwriting, 1/11/1977 (1)" of the Presidential Handwriting File at the Gerald R. Ford Presidential Library.

THE WHITE HOUSE

WASHINGTON

January 11, 1977

ADMINISTRATIVELY CONFIDENTIAL

MEMORANDUM FOR: DR. H. GUYFORD STEVER

FROM: JAMES E. CONNOR JEC

SUBJECT: 1976 Report of the President's Committee on the National Medal of Science and Proposal for Award to Dr. Wernher von Braun

Confirming telephone call this afternoon the President reviewed your memorandum of January 7 on the above subject and made the following decisions:

A. Report of the President's Committee on the National Medal of Science

Refer the 1976 report of the President's Committee on the National Medal of Science to President-elect Carter.

B. Award of the National Medal of Science to Dr. Wernher von Braun

The President approved the award of the Medal to Dr. Wernher von Braun during this Administration.

Regarding award ceremony at the Alexandria Virginia Hospital, the President desires to have medal presented by the Vice President, if possible.

Please follow up with appropriate action.

cc: Dick Cheney
Robert Linder

THE WHITE HOUSE

WASHINGTON

January 10, 1977

MR PRESIDENT:

1976 Report of the President's Committee on the National Medal of Science and Proposal for Award to Dr. Wernher von Braun

Staffing of the attached memorandum prepared by Dr. H. Guyford Stever resulted in the following recommendations:

A. Report of the President's Committee on the National Medal of Science

Refer the 1976 report of the President's Committee on the National Medal of Science to President-elect Carter.

Supported by: Phil Buchen, NSC, Max Friedersdorf and Jim Cannon

Award of the National Medal of Science to the 15 nominees as recommended by the President's Committee on the National Medal of Science.

Supported by: Jack Marsh and Doug Bennett

B. Award of the National Medal of Science to Dr. Wernher von Braun

Award of the Medal to Dr. Wernher von Braun during the Ford Administration.

Supported by: Jack Marsh, Doug Bennett, Phil Buchen, NSC, Max Friedersdorf, Jim Cannon.

Against Award for Dr. von Braun: Bob Hartmann who commented: "No medals for repentant Nazis".

The only recommendation made concerning presentation of the award was from Bill Seidman who recommended that it be presented by Dr. Stever.

OMB had no comments on this subject.

Jim Connor

THE WHITE HOUSE

WASHINGTON

January 7, 1976

MEMORANDUM FOR THE PRESIDENT

SUBJECTS: 1976 Report of the President's Committee on the National Medal of Science and Proposal for Award to Dr. Wernher von Braun

There is transmitted herewith the 1976 report of the President's Committee on the National Medal of Science (TAB A). The Committee recommends the award, for 1976, of the Medal to fifteen outstanding scientists and engineers (TAB B). Each of these candidates has made truly exceptional contributions to science and engineering. The award of the Medal to these nominees would enhance the prestige of the Medal and honor a distinguished group of Americans in the best tradition of this award.

The Committee urges that all fifteen awards be given. However, if a smaller number of scientists and engineers should be honored in 1976, the Committee, based on its deliberations, has rank-ordered the list to assist in the final selection.

In two White House ceremonies - in September 1975 and October 1976 - you awarded the National Medal of Science to twenty-eight scientists and engineers. Through the awards made on these two occasions you have established your strong personal interest in the National Medal of Science. Because of your accomplishments in this area, it would be my recommendation that the final decisions on the 1976 nominations and the arrangements for the award ceremony be deferred until the next Administration. This would provide President-elect Carter an opportunity for a public occasion early in his Administration to address science and engineering and their important contributions in the continuing development of our national strength and well-being.

However, if you would like to take action on these 1976 recommendations of the President's Committee on the National Medal of Science, I will provide specific comments and recommendations for you on the priority listing found at TAB A.

There is one proposal for an award that I would like to bring to your attention for possible action during your Administration: an award of the National Medal of Science to space expert Wernher von Braun. As I believe you are aware, Dr. von Braun is now gravely ill with a life expectancy of only a few months at best. Although he has received many honors and awards including the Distinguished Federal Civilian Service

Award, which was presented by President Eisenhower in 1959, Dr. von Braun has not received the Nation's highest science and engineering award. He has been nominated for the National Medal of Science on several occasions and was recommended for an award by the President's Committee on the National Medal of Science in 1970. No action was taken by former President Nixon.

Both NASA Administrator Jim Fletcher and I believe that it would be desirable to recognize Dr. von Braun's contribution to the Nation's space program. We believe that the National Medal of Science is the appropriate honor. I have discussed this potential action with the Medal of Science Committee Chairman Dr. Nathan Newmark and polled the Committee members by telephone. The Committee Chairman and members endorse this proposal, many enthusiastically, although two tended to focus on his early work on World War II rockets, the V-2, and were not enthusiastic. A career summary and possible award citation is attached (TAB C).

If you concur in this award, to Dr. von Braun, I will make the appropriate arrangements for an announcement and an award ceremony. I expect that the award would be a low key event at the Alexandria, Virginia Hospital with only Dr. von Braun's family, one or two NASA officials, and a few others present.

Concerning the acceptability of the award to the science community and public, I should point out that while most scientists and engineers support von Braun's pivotal contributions in space flight, there are a few who concentrate their attention on his German years. In the Nation more generally there would be similar divisions. Many or most would recall the work at the Redstone Arsenal and White Sands, the dramatic U. S. space recovery following our "sputnik shock", a recovery directly attributable to von Braun and his team, and the Apollo program. Some citizens would focus on the German years exlusively. On balance, I recommend the award.

H. Guyford Stever
Science and Technology Adviser

Attachments:
- TAB A: 1976 Report of the President's Committee on the National Medal of Science
- TAB B: Summary Listing of 1976 Nominees with Citations
- TAB C: Career Summary and Citation, Dr. Wernher von Braun
- TAB D: Biography of Wernher von Braun

cc:
- Mr. Jim Cannon
- Dr. James Connor

DECISIONS:

A. Report of the President's Committee on the National Medal of Science.

.Refer the 1976 report of the President's Committee on the National Medal of Science to President-elect Carter. The Science and Technology Adviser will prepare necessary transitional documentation. (Science and Technology Adviser's recommendation.)

DKS

.Award of the National Medal of Science to the 15 nominees as recommended by the President's Committee on the National Medal of Science (TAB B).

_____

.Award of the National Medal of Science to a limited number from the Committee's 1976 recommendations. Science and Technology Adviser Stever will make recommendations to the President for the awards.

_____

B. Award of the National Medal of Science to Dr. Wernher von Braun.

.Award of the Medal to Dr. Wernher von Braun during the Ford Administration.

DKS

Concur

Do Not Concur

_____

.Award ceremony at the Alexandria Virginia Hospital.

President would participate if schedule permits.

_____

President desires to have Medal presented by Vice President Rockefeller or Science and Technology Adviser Stever.

DKS

V.P. if possible.

TAB "A"

REPORT OF THE PRESIDENT'S COMMITTEE

ON THE NATIONAL MEDAL OF SCIENCE FOR 1976

The Committee met on three occasions in sub-committees in the basic areas of Biological Sciences, Physical Sciences, Mathematical Sciences and Engineering Sciences, on December 9, 11, and 18, 1976, respectively, and as a whole on December 19. On December 9, Drs. Handler and Lang were present, and they conferred by telephone with Dr. McElroy. On December 11, Drs. Giaever, Press, Baldeschwieler, Walling, and Newmark met; and on December 18, Drs. Bing and Lax considered the Mathematics nominations; and Drs. Stever and Newmark the Engineering nominations, discussing these also by telephone with Dr. David.

At these meetings, each group considered all the active nominations and prepared a priority listing of from four to ten candidates in each area together with drafts of the "Citations" and "Summary of Achievements."

The Executive Secretary of the Committee, Dr. Richard S. Nicholson, met with the groups on December 18 and 19, and was represented by Mr. Philip M. Smith on December 9 and 11.

The entire Committee, except for Drs. McElroy, Press and David, met on December 19 and had available for consideration the priority listings of each of the groups, as well as the draft citations and summaries. After general discussion of the basic guidelines, agreement was reached on group quotas, total number of candidates, and assignment of individual nominees to the basic groupings. A resulting list of candidates was prepared, ranked in descending order in each of five categories, to be submitted to the President. This list is attached.

Also, on December 19, a slight revision was made to the letter calling for nominations for the 1977 awards, to emphasize the fact that all potential candidates in a particular field were to be considered in the nominations submitted to the Committee.

As a final action, the Committee discussed prospective nominees for appointment to fill the two present vacancies on the Committee and the four additional vacancies that will be created at the end of December 1977. Nominations for these vacancies will be transmitted by the members of the Committee to the President's Science Adviser.

Nathan M. Newmark

Nathan M. Newmark
Chairman

December 22, 1976

NOMINATIONS BY THE PRESIDENT'S COMMITTEE

ON THE NATIONAL MEDAL OF SCIENCE FOR 1976*

Biological Sciences

1. Roger Charles Louis Guillemin
2. Edward D. Wilson
3. Keith R. Porter
4. Efraim Racker

Engineering Sciences

1. Morris Cohen
2. Peter C. Goldmark
3. Erwin W. Mueller

Mathematical Sciences

1. Hassler Whitney
2. K. O. Friedrichs

Physical Sciences

Chemistry

1. Herbert S. Gutowsky
2. Henry Taube
3. Frederick D. Rossini

Physics

1. Samuel A. Goudsmit **
2. George Uhlenbeck **
3. Verner E. Suomi

* Ranked in descending order in each category.

** Because the contributions of these nominees are so closely related an award should be given to both or neither.

ALPHABETICAL LIST OF 1976 NOMINEES

NAME	YEAR OF BIRTH	CURRENT ADDRESS
COHEN, Morris	1911	Institute Professor Dept. of Metallurgy and Materials Science Massachusetts Inst. of Tech. Cambridge, Massachusetts
FRIEDRICKS, K. O.	1901	Courant Institute of Mathematical Sciences New York University New York, New York
GOLDMARK, P. C.	1906	Goldmark Communications Corp. 98 Commerce Road Stamford, Connecticut
GOUDSMIT, S. A.	1902	Department of Physics University of Nevada Reno, Nevada
GUILLEMIN, R.	1924	Department of Neuroendocrinology Salk Inst. of Biological Studies San Diego, California
GUTOWSKY, H. S.	1919	Department of Chemistry University of Illinois Urbana, Illinois
MUELLER, E. W.	1911	Department of Physics 104 Davey Laboratory Pennsylvania State University University Park, Pennsylvania
PORTER, K. R.	1912	Department of Molecular, Cellular and Developmental Biology University of Colorado Boulder, Colorado
RACKER, E.	1913	Section of Biochemistry, Molecular, and Cell Biology Cornell University Ithaca, New York

ROSSINI, F. D.	1899	Department of Chemistry Rice University Houston, Texas
SUOMI, V. E.	1915	Professor of Meteorology and Environmental Studies and Director of the Space Science and Engineering Center University of Wisconsin Madison, Wisconsin
TAUBE, H.	1915	Department of Chemistry Stanford University Stanford, California
UHLENBECK, G. E.	1900	Professor of Physics Rockefeller University New York, New York
WHITNEY, H.	1907	The Institute for Advanced Study Princeton, New Jersey
WILSON, E. O.	1929	Museum of Comparative Zoology Laboratories Harvard University Cambridge, Massachusetts

PRESIDENT'S COMMITTEE ON THE NATIONAL MEDAL OF SCIENCE - 1976

Nathan M. Newmark (Chairman)
John D. Baldeschwieler
R. H. Bing
Edward E. David, Jr.
Ivar Giaever
Philip Handler (Ex Officio)

Anton Lang
Peter D. Lax
William D. McElroy
Frank Press
H. Guyford Stever (Ex Officio)
Cheves Walling

Richard S. Nicholson (Executive Secretary)

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ON THE NATIONAL MEDAL OF SCIENCE FOR 1976

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1. Samuel A. Goudsmit **
2. George Uhlenbeck **
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GUILLEMIN, R.	1924	Department of Neuroendocrinology Salk Inst. of Biological Studies San Diego, California
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SUOMI, V. E.	1915	Professor of Meteorology and Environmental Studies and Director of the Space Science and Engineering Center University of Wisconsin Madison, Wisconsin
TAUBE, H.	1915	Department of Chemistry Stanford University Stanford, California
UHLENBECK, G. E.	1900	Professor of Physics Rockefeller University New York, New York
WHITNEY, H.	1907	The Institute for Advanced Study Princeton, New Jersey
WILSON, E. O.	1929	Museum of Comparative Zoology Laboratories Harvard University Cambridge, Massachusetts

PRESIDENT'S COMMITTEE ON THE NATIONAL MEDAL OF SCIENCE - 1976

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Anton Lang
Peter D. Lax
William D. McElroy
Frank Press
H. Guyford Stever (Ex Officio)
Cheves Walling

Richard S. Nicholson (Executive Secretary)

MORRIS COHEN

Institute Professor, Department of Metallurgy and Materials Science, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Citation: For original research and advancement of knowledge of the physical and mechanical metallurgy of iron and steel, and especially for his work on the martensitic transformation in the hardening of steel.

Summary of Achievements

The contributions of Morris Cohen are most notable in the following areas of metallurgical research: Phase transformations in metals; heat treatment and metallography; thermodynamics and solid-state diffusion; mechanical behavior, strengthening mechanisms, and fracture in metals; physical properties and structure of metals and alloys.

Morris Cohen's work was timely in furthering the basic knowledge of the martensitic transformation and properties of martensitic steel at the stage when the application and usage of such steels was expanding rapidly. His researches and that of his students in this area are the basis of our present understanding of the properties of steel.

His studies of the tempering effects in commercially important grades of steel promoted a more general understanding of the tempering reactions, knowledge which is required if the high hardness and strength of martensitic steels are to be practicable for use where toughness is required.

Present thinking on precipitation and age-hardening phenomena in nonferrous alloys also owes a great deal to his initial work. The continued research of Morris Cohen and his students has clarified our understanding of the initiation and propagation of cleavage fracture in iron and steel, and has proved most valuable to the practicing metallurgist in the proper application of steels in complex structures in hostile environments.

Whole new classes of high strength materials are being developed on the basis of his pioneering research.

K. O. FRIEDRICHS

Professor Emeritus of Mathematics, Courant Institute, New York University, New York, New York 10012

Citation: For bringing the powers of modern mathematics to bear on problems in physics, fluid dynamics, and elasticity.

Summary of Achievements:

Friedrichs is one of the founders of the modern theory of partial differential equations arising in mathematical physics. He made rigorous the mathematical theory of the Schrödinger operator, and created the basic mathematical ingredient of acoustical and quantum mechanical scattering theory. He has given many novel applications of perturbation theory to linear and nonlinear problems. In collaboration with Stoker, Friedrichs has made numerous discoveries about the buckling of elastic structures.

The theory of stability of difference equations, of fundamental use in all numerical analysis, is contained in a paper of Friedrichs, written jointly with Courant and Levy. He wrote, also with Courant, the basic mathematical study of shock waves, which has been influential in aerodynamics. He has contributed to the theory of flight, and helped to clarify the puzzle of transonic flow. In the late fifties and sixties, Friedrichs made basic contributions to the study of propagation of magnetohydrodynamic waves within the context of the controlled thermonuclear fusion program.

"The Mathematical Aspects of Quantum Theory of Fields", written in the fifties, was pioneering work and attracted many young researchers to this area.

PETER C. GOLDMARK

President, Goldmark Communication Corporation, Stamford, Connecticut.

Citation: For contributions to the development of the communication sciences for education, entertainment, culture and human service.

Summary of Achievements:

Dr. Peter C. Goldmark, in 36 years of activity, has created a series of important inventions which have had a great impact on the science and technology communications for the benefit of mankind.

Starting in 1936 with two technicians and one room, he has built an industrial research laboratory that now has a staff of several hundred professionals and support personnel, and is rated as one of the leading electronics and communications research organizations in the world. Under his leadership CBS Laboratories have produced devices and systems that have, and will continue to have, a profound influence on industry, government and society.

His contributions to his country during World War II as the head of a scientific laboratory in England have been singled out by such American Presidents as Roosevelt and Eisenhower, and have gained the mutual respect of fellow scientists.

Subsequently, he played an important part in America's space effort with several significant inventions, including the high-resolution photographic readout and transmission for the NASA Lunar Orbiter program and color television technology for the Apollo mission.

He was the first in 1940 to produce a working system of color television broadcasting. This same system has been used by the Apollo astronauts to transmit live color television pictures to earth from the moon.

In painstaking development, which started in 1959, Peter Goldmark created the first system of cassette television--called EVR--which is destined to provide a new medium for education at all levels in the home.

His vision of educational and other benefits inherent in improved electronics has been a prime factor in broadening communications technology for medicine. As part of this effort, he developed as a visiting professor medical electronics for the University of Pennsylvania a miniature color television system to send live color pictures from inside the human anatomy, which is used today for medical education and clinical diagnosis.

During the intervening years CBS Laboratories' scientists, under his direction, have turned out a long series of communication systems for the nation's defense effort, of which only a small part is publicly known. One such development is the highly sophisticated photographic laser transmission system called "Compass Link" to send high quality photographs from Saigon to Washington in minutes over a satellite network.

Recently, he directed the development of a new generation, high-speed electronic photocomposition system (Linotron) now in use at the U.S. Government Printing Office and by the Air Force Logistics Command.

In the last decade Dr. Goldmark has increasingly directed his attention to the social consequences of communication techniques and their application for a healthy development of an American rural environment.

Towards this objective he has chaired since 1969 a distinguished panel of scientists for the National Academy of Engineering's Committee on Telecommunications as part of a presidential advisory group.

After his retirement as President of CBS Laboratories in December of 1971, he formed the Goldmark Communications Corporation to devote his great energies mainly to this problem and to the benefit of his country.

The National Academy of Engineering, to which he is a long standing member, is sponsoring such a project of Dr. Goldmark's on "The New Rural Society" in cooperation with the Department of Housing and Urban Development and other government agencies.

It is therefore our opinion that Dr. Goldmark is a person of exceptional merit, highly deserving of the award of the National Medal of Science.

SAMUEL A. GOUDSMIT

Emeritus Deputy Chairman, Brookhaven National Laboratory,
Long Island, New York

Citation: For the major discovery, together with George E. Uhlenbeck, of the electron spin as the source of a new quantum number.

Summary of Achievements

As every textbook on atomic physics written since 1925 has stated, Uhlenbeck and Goudsmit showed that the electron had an intrinsic angular momentum (spin) and an intrinsic magnetic moment. These revolutionary concepts explained many of the then puzzling experimental phenomena in atomic spectra, as well as those observed in the study of the anomolous Zeeman effect. The concept of the spin and magnetic moment of the electron played an enormously important role in the various developments of quantum mechanics such as the Pauli Principle, Fermi Statistics and Dirac's Theory of the Electron. The electron spin is, of course, now firmly established and because of this discovery, Uhlenbeck's and Goudsmit's names are forever linked together in the history of physics.

From this early discovery when he was only 23 years old, Dr. Samuel A. Goudsmit went on to a distinguished and creative career in physics, and has made numerous contributions to atomic structure, nuclear spin, mass spectrography and statistical problems. During World War II, he was head of the "Alsos" mission whose object was to assess Germany's progress toward a nuclear bomb. For this work he received the Medal of Freedom and was made an officer of the Order of the British Empire.

For many years Dr. Samuel A. Goudsmit has served as an Editor-in-Chief for The Physical Review and Physical Review Letters which he founded in 1958. Under his leadership these journals have become the undisputed leading physics journals in the world.

Goudsmit has received many awards in his career; the most outstanding are the Research Corporation Award in 1954 and the Max Planck Medal of the German Physical Society in 1964.

It is remarkable that Samuel A. Goudsmit has achieved eminence in two areas, as a creative scientist and as an editor of the major bulk of the world's physics literature.

ROGER CHARLES LOUIS GUILLEMIN

Resident Fellow and Research Professor
The Salk Institute
San Diego, California 92110

CITATION: For demonstrating the presence of a new class of hormones, made in the brain, that regulate the function of the pituitary gland, thereby making possible improved diagnosis and treatment of numerous endocrine disorders.

SUMMARY OF ACHIEVEMENTS

The role of the adenohypophysis (the anterior pituitary) as master endocrine gland of the body has been appreciated for a half-century during which much has been learned of the nature and mode of action of the six different hormones that are synthesized and secreted by this small organ. Two decades ago, attention was drawn to understanding the mechanisms that, in turn, regulate the rate of synthesis and secretion of those hormones. A few investigators were attracted to the possibility that such control is exercised by the hypothalamus, a very small protuberance extending from the bottom side of the brain and connected to the adenohypophysis by a small blood vessel (a portal vein).

Roger Guillemin has been the most successful of all investigators who addressed this question. He pioneered in devised assays using either whole animals or preparations of adenohypophysis in tissue culture to detect when that gland is stimulated to release each of its individual hormones. With those assays he was able to demonstrate that the hypothalamus itself manufactures and secretes into that portal vein minute amounts of a family of independent, discrete 'releasing factors' (RFs), each of which, in reaching the adenohypophysis, causes the latter to release one of its specific hormones.

Next, he conquered the problem of isolating more preparations of several of the releasing factors from thousands of animal brains. To date, he has purified and established the unusual chemical structure of each of the following: Thyrotrophic RF, which causes release of the hormone which in turn causes release of thyroxine by the thyroid; the luteinizing RF which causes release of the gonadotrophic hormones which, in turn, stimulate the testes or ovary; the growth RF which causes release of the growth hormone and, most recently, 'somatostatin,' which has the opposite effect, i.e., it prevents release of growth hormone from the pituitary and also suppresses secretion of glucagon by the pancreas and gastrin by the stomach.

Each of these RFs proved to be a small polypeptide; each has proved to be present in areas of the brain other than the hypothalamus. When

these findings are combined with the recent description of the enkephalins, the polypeptides that are the natural 'opiates,' it becomes clear that a new chapter has been opened in knowledge of chemical communication in the nervous system.

HERBERT S. GUTOWSKY

Director, School of Chemical Sciences and Head, Department of Chemistry, University of Illinois, Urbana, Illinois.

Citation: In recognition of pioneering studies in the field of nuclear magnetic resonance spectroscopy.

Summary of Achievements

Nuclear magnetic resonance spectroscopy is probably the most important tool that has been developed for chemical studies in the last 25 years.

Herbert Gutowsky was among the first to recognize the importance of this to chemistry. His major contributions include:

(a) Pioneering research in the phenomena of the chemical shift and electron-coupled spin-spin interactions which are fundamental to the wide use of nuclear magnetic resonance for analysis of the structures of molecules in solution.

(b) The application of nuclear magnetic resonance in chemical kinetics, with particular emphasis on proton exchange and molecular conformational rearrangements.

(c) Studies of crystallographic structure, molecular motion and phase transitions in solids.

Dr. Gutowsky has made major contributions to both the basic theory of nuclear magnetic resonance spectroscopy and to the development of experimental methods and instrumentation. This work has been applied to solids, liquids, gases, solutions, polymers, metals, and biological substances.

Aside from his own scientific work, Gutowsky has made important contributions to American science as Chairman of the Committee on Professional Training of the ACS and as Chairman of the NAS panel reviewing data on the effect of flurocarbons on the ozone layer of the stratosphere.

ERWIN W. MUELLER

Evan Pugh Research Professor of Physics, The Pennsylvania State University, University Park, Pennsylvania.

Citation: For his invention of the field-emission microscope, the field-ion microscope, and the atom-probe microscope, which helped to resolve the atomic structures of solids.

Summary of Achievements:

In August 1955, as a result of his invention of the field-ion microscope, Erwin Mueller became the first man to see a crystal as a collection of individual atoms. With his later invention of the atom-probe microscope, it became possible to identify a single atom.

The work of Dr. Mueller has changed surface physics from a phenomenological subject to a field in which detailed atomic mechanisms can be studied. The impact of his work on the science of surfaces has been likened to the influence of cloud chambers and other particle tracking devices in nuclear physics.

In addition to his uniquely important contributions to instrument development, Dr. Mueller has advanced the understanding of the atomic mechanisms of emission, ionization, and desorption.

KEITH R. PORTER

Professor (former Chairman)
Department of Cellular, Molecular
and Developmental Biology
University of Colorado, Boulder

CITATION: "For a multitude of fundamental contributions to the elucidation of the fine structure of cells by electron microscopy coupled with dynamic approaches, which has inaugurated a new era of cell biology integrating structure and function into a comprehensive and unified picture of the life of cells."

SUMMARY OF ACHIEVEMENTS

All living creatures are built up of microscopic elementary units, the cells. Understanding of structure and function of cells, in normal as well as pathological situations, is therefore one essential premise for the understanding of structure and function of the whole organism, including man, in health as well as in sickness.

For three centuries, man's understanding of cell structure was limited by the resolution power of the light microscope, although this was enough to show that the cell was a complex microcosm comprising a variety of substructures each of which could be presumed to have specific functions.

Porter was among the first to grasp the opportunity afforded by the electron microscope which increased resolution power by several orders of magnitude, and he was the first to use this instrument in biology in a systematic, broadly-based manner. He was thus responsible, more than any other single investigator, for demonstrating the importance of the electron microscope for biological research, contributing to its rapidly expanding use in biology, and thus providing us with a "new" view of the cell. This new view included both far more detailed information about structures that were known from light microscopic studies, and the existence of structures that could not be seen with the light microscope, or could be seen only as indistinct shadows. An example of the former was Porter's discovery of striation in fibrin which led him into later studies on collagen and its formation. As to "new" cell structures, Porter has to his credit the greatest number of such structures discovered or characterized in detail by any electron microscopist, in healthy as well as diseased cells. He showed that a tumor-inducing agent in the milk of mice (Bittner milk agent) was very probably associated with a defined particle present in infected cells, and he clarified the nature of the inward extensions of the muscle cell surface

(transverse tubules). He expanded our knowledge of the endoplasmic reticulum, a membrane system permeating the entire cell and also connecting adjacent cells, into a variety of specialized cell types. He discovered the autolysosomes of the liver, the "coated vesicles" in oocytes, the microtubules which are present in a great variety of cells, and most recently, using the high voltage electron microscope, the microtrabaeculae - structures in the "cytosol," the matrix which is present in cells between the organized structures and which had been considered as having little if any structure of its own. However, in all this work Porter never stopped at describing a cell structure, whether "old" or "new," but by selecting cell types associated with defined functions or processes and by subjecting cells to experimental treatments he succeeded in gaining profound insights into the function of that structure. Thus, he demonstrated or laid the basis for demonstrating that the endoplasmic reticulum in many cells played a central role in protein synthesis and in secretion of various products while in striated muscle cells it was involved in circulating calcium ions as a means of regulating muscle contraction and in smooth muscle cells it played an important role in detoxification of drugs and other toxic materials. The autolysosomes were recognized as important in the degradation of structures in aging cells, the coated vesicles in the selective uptake of proteins by cells. Porter's discovery of the nature of the transverse tubules opened up an important area of studies concerned with the inward spread of contraction activation in muscle cells. Last not least, microtubules were found, with Porter himself leading the way, to play central roles in the determination and modification of cell shape and in cell (nuclear) division. This fusion of structural and functional aspects is in fact the most important general impact Porter's work has had on cell biology; it has opened a new era in this discipline, enabling us to develop comprehensive and integrated understanding of cell structure and function.

Two features have been essential for this impact of Porter's work. Firstly, he exhibits a unique sovereignty in the choice of biological material. He has worked with muscle cells, cell cultures, plant cells and other cell types, but in each case he selected that cell type which best exhibited what he was searching for. This is not simple coincidence or serendipity; it is the sign for a very fine and broad understanding of organisms and the cell types of which they are composed. Secondly, Porter evidently possesses a singular ability for recognizing the usefulness of new technical developments for biological research. The electron microscope, scanning electron microscope, and high voltage electron microscope had been "around" and had been used with biolgical materials before Porter. But as already stated, Porter was the first to use the electron microscope in the study of cell structure systematically and on a broad basis, and more recently but in quite a similar manner he has pioneered the uses of the scanning electron microscope and the high voltage electron

microscope and has become the head of the first high voltage electron microscope facility set up for biological research. In all these cases, he designed methods for adapting the technology to the special characteristics of biological materials. Thus, he introduced the use of osmium tetroxide as a particularly conservative agent for fixing cells and tissues, and designed the Porter-Blum microtome for preparation of ultrathin tissue sections for electron microscopic study; both methods belong to the standard equipment of the modern cell biology laboratory. Considering both the remarkable sweep and the incisiveness of Porter's work it is not surprising that he had a profound influence on "his" discipline. His laboratories at the Rockefeller University, Harvard and the University of Colorado have been training grounds for very numerous students and postdoctoral fellows who were infected by his enthusiasm but also steeped in his rigorous and demanding attitudes, and who are now carrying on his work, many of them by now in leading positions of their own.

EFRAIM RACKER

CITATION: For major contributions to understanding of the subcellular mechanism whereby oxidative and photosynthetic energy is transformed into the specific form of chemical energy utilizable by living cells.

SUMMARY OF ACHIEVEMENTS

Animal cells are engines, viz., they perform work -- such as muscle contraction -- utilizing energy that they obtain by the combustion of fuel, the oxidation of carbohydrate or fat by oxygen. But they do so not as in man-made machines, by using the heat liberated in such a process, but by utilizing the free energy of the process, at constant temperature, to drive the chemical formation of one compound, adenosine triphosphate (ATP), the potential energy of which is, in turn, used to drive all other energy-requiring processes possible in living systems (nervous transmission, chemical syntheses, growth, special secretions, formation of urine, etc., etc.). For three decades numerous laboratories, worldwide, have attempted to learn the nature of the process whereby the energy liberated by the chemical reactions by which sugar or fat is oxidized to carbon dioxide and water is linked to the formation of ATP. A multitude of investigators showed this process to be localized in the subcellular organelles termed mitochondria. Many theories were offered but each was destroyed by observation and experiment. One hypothesis, however, the 'proton-motive hypothesis,' which was offered on the basis of scanty and insufficient evidence, has been shown by Racker to be a valid description of this vital process.

Racker's entire scientific career has been addressed to the question of the mechanisms of ATP formation. He played a central role in demonstrating how that process operates in the process called glycolysis in muscles or fermentation by yeast or bacteria, in the absence of oxygen. And he had played a central role in establishing the fate of the glucose molecule in the special metabolic pathway that operates when liver cells are engaged in synthesizing fat from sugar. When he turned to the events in aerobic mitochondria, he was struck by the inability to find any intermediates in the process and by the fact that that process is intimately related to the organized structure of mitochondria and the integrity of the mitochondrial membranes. By learning how to fragment those membranes and reconstitute them from their fractional components, Racker and his colleagues identified the components essential to the process of oxidative phosphorylation, described their chemical nature and provided the final proof of the validity of the proton-motive

hypothesis. This has proved to be the mechanism operative in formation of ATP both in cells oxidizing fat or carbohydrate and in plant cells obtaining energy for this process by photosynthesis. These findings have also illuminated the mechanisms by which cations are actively transported across all biological membranes, as in muscle contraction and nervous transmission.

FREDERICK D. ROSSINI

Professor of Chemistry, Rice University, Houston, Texas.

Citation: For contributions to basic reference knowledge in chemical thermodynamics.

Frederick Rossini has been one of the pioneers in the development of techniques for high precision thermochemical measurements and the collection of thermodynamic data on important classes of chemical compounds. Dr. Rossini served as scientific and administrative leader of the thermo-chemistry section of the National Bureau of Standards where he developed much of the basic reference data on which modern engineering practice relies for the design of internal combustion engines, chemical processes, and power generating plants.

Professor Rossini's work includes high-precision values for the heats of formation of water, carbon dioxide and a variety of hydrocarbons, which form the basic family of chemical compounds involved in common combustion processes. This precision determination of physical and thermochemical properties of these compounds has laid the goundwork for the optimum use of fossil fuels.

VERNER E. SUOMI

Professor of Meteorology and Director of Space Science Engineering Center, University of Wisconsin, Madison, Wisconsin.

Citation: As a distinguished meteorologist and inventor, he has provided a new view of the dynamics of our atmosphere which already has brought substantial benefits to the people of this nation and the world.

Summary of Achievements:

Dr. Suomi is the major driving force in the scientific community in the application of space systems for improvement of weather service to the public. His impact on international meteorology has been enormous, and people of all nations will benefit in the coming decades. His service to environmental science and engineering has both distinguished him and brought great credit to his country.

Dr. Suomi studies nature with the efficiency of an engineer yet with the subtlety and insight of a true scientist. His is a unique and highly productive talent -- he translates natural occurrences into quantitative measurements with which men can comprehend their environment.

Dr. Suomi's best known development is the "spin-scan camera," which has revolutionized satellite meteorology, saved millions of dollars in weather observations, and upon which the world's largest international scientific undertaking is based. The spin-scan camera has made it possible to look at the same weather system repeatedly at intervals of a few minutes. From these observations it is possible to measure the dynamics of the phenomena: air motion, cloud height and growth rates, rainfall location and amounts, and even the extent of atmospheric pollution. Other satellite systems produce interesting pictures, but from the spin-scan camera data we obtain numbers which describe weather accurately and which have moved satellite sensing from qualitative viewing to quantitative measurement.

Three major benefits of Suomi's contribution in this area are of great importance:

(1) The great stability of the spin-scan camera provides a basis for highly accurate measurements.

(2) The spin-scan camera provides measurements in the time-domain. That is, by repeating observations at short intervals, rates of change are apparent -- like a movie instead of a snapshot.

(3) The spin-scan camera is simple, hence extremely long-lived, and it produces data at costs much less than any earth-based system could. The world's largest cooperative international scientific program, the Global Atmospheric Research Program, would not be possible without the data from the spin-scan camera. The United States, ESRO, Russia, and Japan have all adopted the spin-scan camera concept for their operational meteorological satellite systems; and all are being coordinated through Suomi for international data compatability.

HENRY TAUBE

Professor of Chemistry, Stanford University, Stanford, California.

Citation: In recognition of contributions to the understanding of reactivity and reaction mechanisms in inorganic chemistry.

Summary of Achievements:

Henry Taube's early work was concerned with the mechanisms of atomic and free radical reactions in solution. He was a pioneer in the application of isotopes to chemistry, including his first definitive measurements of hydration numbers of metal ions in solution, and the elucidation of inorganic reaction mechanisms using isotopic tracer studies. He recognized the dependence of substitution labilities of metal complexes on their electron configuration, and provided insights into the relationships between electronic structure and chemical reactivity. This pioneering work on the mechanisms of electron transfer and redox reactions includes demonstration of the role of bridging ligands on electron transfer between metal ions.

Taube's recent work has contributed to discoveries in the chemistry of ruthenium, the formation and properties of complexes of molecular nitrogen, the mechanism of nitrogen fixation, and the development of new insights into the reactivity of O_2 in electrochemical systems of importance to fuel cells and energy storage.

GEORGE E. UHLENBECK

Professor of Physics, Rockefeller University, New York, New York

Citation: For the major discovery, together with Samuel A. Goudsmit, of the electron spin as a source of a new quantum number.

Summary of Achievements

As every textbook on atomic physics written since 1925 has stated, Goudsmit and Uhlenbeck showed that the electron had an intrinsic angular momentum (spin) and an intrinsic magnetic moment. These revolutionary concepts explained many of the then puzzling phenomena in atomic spectra as well as those observed in the study of the anomolous Zeeman effect. The concept of the spin of the electron played an enormously important role in the various developments of quantum mechanics such as the Pauli Principle, Fermi Statistics and Dirac's Theory of the Electron. The electron spin is, of course, now firmly established and because of this discovery, Goudsmit's and Uhlenbeck's names are forever linked together in the history of physics.

From this discovery early in his career, Dr. George E. Uhlenbeck has had a major influence on the fields of statistical mechanics and quantum mechanics and their many applications to the various aspects of physics. Characteristic of his contributions is his clarifying analysis of problems and their reduction to essential points. During World War II Uhlenbeck was connected with the theory section of MIT Radiation Laboratory. His work there resulted in the book Threshold Signals (with J. L. Lawson).

Dr. Uhlenbeck is a past president of the American Physical Society, and in 1955 he received the Oersted Medal for his "notable contribution of the teaching of physics". As a superb teacher, he has had a major influence on the course of physics in the USA, and his many pupils who have gone on to successful careers are eloquent testimony to his ability.

In addition, he has received numerous honorary degrees and awards; the most outstanding are the Max Planck Medal of the German Physical Society in 1964 and the Lorentz Medal in 1970.

HASSLER WHITNEY

Professor of Mathematics, Institute for Advanced Studies
Princeton, New Jersey 08540.

Citation: For founding, and bringing to maturity, the discipline of Differential Topology.

Summary of Achievements:

Topology, a branch of geometry, was created in the twentieth century. Differential Topology, a newer branch which rivals the older in depth and in variety of applications, is the child of Whitney. This theory is a confluence of geometric, analytic and algebraic notions, and in turn had profound influence on each of its parent disciplines. Almost single handed, Whitney created Cohomology - a basic tool in algebraic geometry, homological algebra, algebraic number theory, differential geometry and even in quantum field theory. Fiber Bundle is another idea of Whitney's which lives on as a separate subject at the frontiers of research; one of the basic notions of this field are the so-called Stiefel-Whitney classes. Yet another creation of Whitney's is Obstruction Theory, one of the basic tools in homotopy theory.

In a paper written in 1955 Whitney initiated the study of Singularities of Differential Mappings. In the hands of R. Thom this subject has taken on great potential significance for describing the development of complicated structures, such as occur in biology.

EDWARD O. WILSON

CITATION: "For his outstanding achievements in the science he has called sociobiology, summarized in his book of that title, published in 1975. This work will in the long run greatly help in the understanding of the enormous social problems which beset the present generation: ever-increasing crime rates and vandalism among juveniles, racial antagonism, widspread discontent with the present social systems. Academic sociology has been unsuccessful in coping with these problems, as demonstrated by the fact that they are increasing rather than decreasing. An approach to these problems from the biological viewpoint should prove more successful, and Wilson's book provides the basis for such an approach."

SUMMARY OF ACHIEVEMENTS

E. O. Wilson, Chairman of the Center for Environmental and Behavioral Biology and Associate of the Museum of Comparative Zoology, Harvard University, is the author of a recent (1975) book, "Sociobiology: The New Synthesis" in which, drawing on his own work and on "the studies of a myriad of animals conducted by hundreds of investigators in various biological disciplines" he demonstrates the existence of various distinct patterns of social behavior in animals and merges them into a general sociobiology -- a science which aims at understanding social behavior on the basis of firm biological facts, and the methods and concepts of which can be extended to man. Wilson's book is thus the first available basis for developing a better understanding of human behavior -- man's social attitudes, activities and anomalies -- and thus ultimately finding solutions for the enormous social problems confronting mankind which pay the necessary attention to man's entire biological "make-up." This attention has been lacking in the efforts of academic sociology as these have been based on analyses of human behavior alone, with little concern to fundamental biological factors which can be fully understood only when the social behavior of animals in general is taken into account -- as it is in Wilson's book.

The book is not the product of a sudden inspiration but of a continuous evolution on the part of the author. Wilson's first major work -- his doctoral thesis -- was a revision of a group of ants. It is rightly considered a masterpiece of systematics but it is conservative in the sense that it largely employs established methods of one discipline. In his subsequent work, however, Wilson went into, or made use of methods and concepts of, an ever increasing number of other disciplines: biogeography, biomathematics, evolution, ecology, biochemistry -- intensive work on insect pheromones, the volatile substances playing an essential role in insect behavior -- sociology and ethology.

However, this ever continuing broadening of his work was not adding more single pieces to a mosaic which was becoming increasingly complex but in which each piece remained separate and distinct. Wilson possesses in an uncommon measure an ability not overly common in scientists, the ability to synthesize. The various pieces of his work are again and again welded into an integrated, unified structure in which they have lost some of their individuality but are adding up to far more than their simple, arithmetic sum.

This integration of results and concepts from a variety of disciplines resulted in several remarkable books which preceded "Sociobiology": first, "The Theory of Island Biogeography," co-authored in 1967 with the late R. H. McArthur and a seminal work in ecology; next, "The Insect Societies" (1971), universally acclaimed as the definitive treatment of the field. "Sociobiology" is thus so far the last -- although we fervently hope, not the last -- milestone on a road which led the author, in a deliberate, carefully planned and executed manner, to increasingly broader concepts without, however, any loss in precision and depth. The book is however of singular importance since it takes the author, and ourselves, to our very own problems, the problems of man. In Wilson's own words, again, "it is the intellectually viable contention of the final chapter that the sociobiological methods which have proved effective in the study of animals can be extended to human beings." Wilson is careful to stress that because of "our vastly more complex, flexible behavior" the application of those methods will be "technically more difficult." The book has generated a very widespread discussion and has been subjected to some violent if not vicious attacks. These however have been based on ideological rather than strictly scientific considerations. The book is a thoroughly scientific work, in which the author fully recognizes gaps in our knowledge and the uncertainties in some of his conclusions. But for this very reason it can serve as the basis for more definitive research and improved structuring of the theory of human social behavior, and may ultimately lead to a genuine understanding and, on this basis, solution of such grave and as yet unresolved problems as ever-increasing crime rates, vandalism, racist antagonism and the vague but very real discontent of many with present social orders.

TAB "B"

LIST OF 1976 NOMINATIONS AND
SUMMARY CITATIONS FOR THE NATIONAL MEDAL OF SCIENCE

NAME	CITATION
Morris Cohen Institute Professor Department of Metallurgy and Materials Science Mass. Institute of Technology Cambridge, Massachusetts	For original research and advancement of knowledge of the physical and mechanical metallurgy of iron and steel, and especially for his work on the martensitic transformation in the hardening of steel.
K. O. Friedrichs Professor Emeritus Curant Institute of Mathematical Sciences New York University New York, New York	For bringing the powers of modern mathematics to bear on problems in physics, fluid dynamics, and elasticity.
Peter C. Goldmark President Goldmark Communication Corp. 98 Commerce Road Stamford, Connecticut	For contributions to the development of the communication sciences for education, entertainment, culture and human service.
Samuel A. Goudsmit Department of Physics University of Nevada Reno, Nevada	For the major discovery, together with George E. Uhlenbeck, of the electon spin as the source of a new quantum number.
Roger C. L. Guillemin Department of Neuroendocrinology Salk Inst. of Biological Studies San Diego, California	For demonstrating the presence of a new class of hormones, made in the brain, that regulate the function of the pituitary gland, thereby making possible improved diagnosis and treatment of numerous endocrine disorders.
Herbert S. Gutowsky Department of Chemistry University of Illinois Urbana, Illinois	In recognition of pioneering studies in the field of nuclear magnetic resonance spectroscopy.
Erwin W. Mueller Department of Physics 104 Davey Laboratory Pennsylvania State University University Park, Pennsylvania	For his invention of the field-emission microscope, the field-ion microscope, and the atom-probe microscope, which helped to resolve the atomic structures of solids.

Keith R. Porter
Department of Molecular, Cellular and Developmental Biology
University of Colorado
Boulder, Colorado

For a multitude of fundamental contributions to the elucidation of the fine structure of cells by electron microscopy coupled with dynamic approaches, which has inaugurated a new era of cell biology integrating structure and function into a comprehensive and unified picture of the life of cells.

Efraim Racker
Section of Biochemistry, Molecular and Cell Biology
Cornell University
Ithaca, New York

For major contributions to understanding of the subcellular mechanism whereby oxidative and photosynthetic energy is transformed into the specific form of chemical energy utilizable by living cells.

Frederick D. Rossini
Department of Chemistry
Rice University
Houston, Texas

For contributions to basic reference knowledge in chemical thermodynamics.

Verner E. Suomi
Professor of Meterology and Environmental Studies and Director of the Space Science and Engineering Center
University of Wisconsin
Madison, Wisconsin

As a distinguished meterologist and inventor, he has provided a new view of the dynamics of our atmosphere which already has brought substantial benefits to the people of this nation and the world.

Henry Taube
Department of Chemistry
Stanford University
Stanford, California

In recognition of contributions to the understanding of reactivity and reaction mechanisms in inorganic chemistry.

George E. Uhlenbeck
Professor of Physics
Rockefeller University
New York, New York

For the major discovery, together with Samuel A. Goudsmit, of the electron spin as a source of a new quantum number.

Hassler Whitney
Professor of Mathematics
The Institute for Advanced Study
Princeton, New Jersey

For founding, and bringing to maturity, the discipline of Differential Topology.

Edward O. Wilson
Museum of Comparative Zoology
Laboratories
Harvard University
Cambridge, Massachusetts

For his outstanding achievements in the science he has called sociobiology, summarized in his book of that title, published in 1975. This work will in the long run greatly help in the understanding of the enormous social problems which beset the present generation: ever-increasing crime rates and vandalism among juveniles, racial antagonism, widespread discontent with the present social systems. Academic sociology has been unsuccessful in coping with these problems, as demonstrated by the fact that they are increasing rather than decreasing. An approach to these problems from the biological viewpoint should prove more successful, and Wilson's book provides the basis for such an approach.

TAB "C"

WERNHER VON BRAUN

Formerly:

Director, George C. Marshall Space Flight Center
National Aeronautics and Space Administration
Huntsville, Alabama

and

Deputy Associate Administrator
National Aeronautics and Space Administration
Washington, DC

Citation:

For unswerving commitment to space travel; for inspirational leadership in managing complex and technologically advanced developments and for persuading others to support such endeavors; all of which resulted in the large, liquid-fueled rocket becoming a practical space launch vehicle for multiple purposes, including the Apollo, Skylab and Space Shuttle Programs.

Summary:

Wernher von Braun was chief engineer of the interdisciplinary team of scientists responsible for the development of the V-2 rocket in Germany, and director of the United States government-industry team responsible for the Redstone, Jupiter, Juno, Saturn I, Saturn IB, and Saturn V vehicles in this country. The Jupiter was the first major successful vehicle for this country; the Saturn series of space launch vehicles was indispensable to the Apollo Program and also launched Skylab, our first Space Station. The Apollo Program was accomplished because of von Braun's leadership in the NACA Special Committee on Space Technology in 1958, the U. S. Army study "Project Horizon" in 1959, and the engineering-management councils leading to President Kennedy's decision in 1961. Certainly the dominance of liquid-fuel rockets for large launch vehicles during the last three decades has been due to von Braun. Although much of his

contribution was in management of these large programs and in persisting with them at times when many thought them impractical or unnecessary, there is no question but that he made the major technical and scientific decisions in the early stages of the programs, and contributed technically to the eminence of the U. S. space program throughout his career. Through the National Space Institute, which he founded in 1975, he continues to attempt to educate all Americans on the meaning and utility of space science and technology.

Von Braun was born in Wirsitz, Germany in 1912. He received a BS degree from the University of Berlin in 1932 and his doctorate in 1934. He came to the United States in 1945 and became a U. S. citizen in 1955. He was Director of NASA's George C. Marshall Space Flight Center from 1960 to 1970, and Deputy Associate Administrator, responsible for planning future space missions, until his retirement from Government service in 1972. Since 1972 he has served as Corporate Vice President for Engineering and Development, Fairchild Industries. He is a fellow of the American Institute of Aeronautics and Astronautics and has received countless awards, including the Distinguished Civilian Service Award of the Department of Defense in 1957, the Distinguished Federal Civil Service Award presented by President Dwight D. Eisenhower in 1959, the NASA medal for Distinguished Service, the Louis W. Hill Space Transportation Award of the AIAA, and the Goddard Memorial Trophy.

TAB "D"

BIOGRAPHY OF WERNHER VON BRAUN

Dr. Wernher von Braun joined the National Aeronautics and Space Administration when the Army Ballistic Missile Agency development team at Huntsville, Alabama, which he headed, was transferred to NASA in 1960. This group formed the nucleus of the George C. Marshall Space Flight Center at Huntsville. While Dr. von Braun was its Director, the Center developed the world's largest rocket, the Saturn V, which carried men to the moon. He later served as NASA's Deputy Associate Administrator in charge of planning from 1970 to 1972, when he retired from Government service.

Wernher von Braun was born in Wirsitz, Germany, March 23, 1912. In the spring of 1930, he enrolled at the Berlin Institute of Technology and in his spare time assisted Professor Hermann Oberth in testing a liquid-fueled rocket engine of about 67 newtons. In September 1930, after Oberth had left Berlin, von Braun continued experiments under the sponsorship of the German Society for Space Travel. He received his bachelor's degree in 1932.

In the fall of 1932, he accepted a research grant from the German Ordnance Department, which enabled him to develop and conduct scientific investigations with 1.3- and 2.7-kilonewton liquid-fueled rocket engines. Starting with one mechanic, he built up a small development station at Kummersdorf Army Proving Grounds.

In 1934, von Braun received his Ph. D. in physics at the University of Berlin. For reasons of military security, his thesis bore the non-descript title "About Combustion Tests," but it contained a complete theoretical investigation, supported by experiments, of the injection, combustion, equilibrium, and expansion phenomena involved in a 1933 model liquid-fueled rocket engine. His university research led to full time employment as a rocket development engineer with the Ordnance Department. In December 1934, his group launched two A-2 liquid-fueled rockets, which reached altitudes of about 2.6 km.

By early 1937, his experimental station had grown to about 80 people who were busy developing an inertially guided A-3 rocket designed to carry 45 kg of payload to an altitude of 24 km. During the same year, the first successful experi-

mental flights with a liquid-fueled rocket engine installed in a propeller-driven, single engine fighter plane (He 112) were performed. In April 1937, the busy program of this group led to the establishment of the Rocket Center at Peenemuende, a joint enterprise of the German Army and Air Force. Dr. von Braun was Technical Director of the Army portion until 1945. In 1939-40, there were 25 successful launchings of A-5 rockets, an improved version of the A-3. During 1940-43, the main task of von Braun's organization was the development of the A-4 ballistic missile which later saw operational use as the V-2. The first successful V-2 launching occurred October 3, 1942. During 1943-45, von Braun's group, while still debugging the V-2, also developed the Wasserfall antiaircraft guided missile. In the closing months of World War II, von Braun led a group of engineers west and surrendered to the Allies. He and his colleagues came to the United States in September 1945 under contract to the U. S. Army where he directed high altitude firings of the V-2 at White Sands Missile Range. He became project director of guided missile development at Fort Bliss, Texas, and participated in the development of the two-stage Bumper-Wac (a V-2 carrying a Wac-Corporal as second stage) which reached an altitude of 400 km.

In 1950 the group was transferred to Huntsville. From April 1950 until February 1956, Dr. von Braun was first Technical Director, later Chief of the Guided Missile Development Division, Redstone Arsenal. During these years the group developed the Redstone, the first large guided ballistic missile to be introduced in the inventory of the U. S. Department of Defense.

Dr. von Braun became a United States citizen on April 14, 1955.

In February 1956, Dr. von Braun was appointed Director, Development Operations Division of the Army Ballistic Missile Agency in Huntsville, Alabama. Under his technical guidance, this Agency developed the Jupiter intermediate range ballistic missile and the Pershing Army missile. Jupiter-C, originally developed as a nose cone reentry test vehicle for the Jupiter IRBM, successfully launched the western world's first satellite, Explorer I, as well as two later satellites, Explorer III and IV. Juno II, which combined Jupiter-C upper stages with a

Jupiter IRBM first stage, successfully launched Pioneer III and IV as well as Explorer VII, VIII, and XI. Design study of the Saturn I booster was started in September 1958.

In July 1960, Dr. von Braun and his Army Ballistic Missile Agency development team were transferred to NASA.

From the months preceding the formation of NASA until President Kennedy announced the national goal of placing a man on the moon in the 1960's, von Braun's imagination, energy, and determination were particularly influential. He was one of the first to urge a lunar landing as a practical program. On interagency panels of technical experts and later as a member of NASA's management council, he insisted that alternatives be thoroughly investigated. His contributions were unique, because while his concepts were bold, he was always the solid, even conservative, engineer. Both attributes served the nation well during the origins of the Apollo Program.

During the period July 1960 to February 1970, von Braun was Director of the Marshall Space Flight Center, Huntsville, Alabama. In January 1961, a Redstone successfully placed a chimpanzee, Ham, in suborbital flight. Redstones then placed two astronauts in suborbital flight in May and July 1961. The Saturn I, IB, and V were developed during this period. Ten successful Saturn I's were launched from Cape Kennedy, three of which orbited Pegasus micrometeoroid-counting satellites also developed at Marshall. Five Saturn IB's were successfully launched in Project Apollo; the fifth launch, Apollo 7, was the first manned flight of Apollo. Seven Saturn V's were launched during this period. The third, Apollo 8, took three astronauts into lunar orbit. The sixth, Apollo 11, accomplished the historic first manned landing on the moon on July 20, 1969. The Saturn family of launch vehicles achieved an almost unbelievable record for reliability and safety.

In addition to providing launch vehicles for the manned lunar landings, the Marshall Center, under Dr. von Braun, also developed the Lunar Rover, which provided surface transportation on the moon for the last Apollo crews.

In the early postwar years, Dr. von Braun had written about the kinds of useful work that might be accomplished in space, including astronomy, survey of earth resources, and advanced technology. As Director of the Marshall Center, he put those ideas into practice through the development of Skylab, an orbiting laboratory. Marshall Space Flight Center was responsible for major sections of the laboratory, including the Apollo Telescope Mount, as well as the launch vehicles that lifted both laboratory and the three crews that manned it.

Dr. von Braun was instrumental, while at Marshall, in starting advanced planning for a later space transportation system--the principal element of which, the Space Shuttle, is now nearing completion. In March 1970, he transferred to NASA Headquarters to become Deputy Associate Administrator. In that position, he was responsible for integrated program planning, both within the agency and as NASA's senior representative to other governmental organizations, the science community, and private industry.

Since retiring from Government service in 1972, von Braun has been active in the aerospace industry, serving as Corporate Vice President for Engineering and Development, Fairchild Industries.

In July 1975, von Braun achieved the creation of the National Space Institute (NSI), serving as its first Chairman of the Board. The institute is a non-profit educational and scientific organization to popularize space science and technology. The NSI has mobilized a great number of prominent Americans (over 8000) in an active program to increase awareness of space benefits.

THE WHITE HOUSE

ACTION MEMORANDUM WASHINGTON LOG NO.:

Date: January 7, 1977 Time:

FOR ACTION: cc (for information):

Phil Buchen
Jim Cannon
Bob Hartmann
Jim Lynn
Jack Marsh
Max Friedersdorf
Brent Scowcroft
Bill Seidman
FROM THE STAFF SECRETARY

DUE: Date: Monday, January 10, 1977 Time: 10:00 A.M.

SUBJECT: Memorandum for the President, 1/7/77 re 1976 Report of the President's Committee on the National Medal of Science ans Proposal for Award to Dr. Wernher von Braun.

ACTION REQUESTED:

____ For Necessary Action
____ Prepare Agenda and Brief
X For Your Comments
X For Your Recommendations
____ Draft Reply
____ Draft Remarks

REMARKS:

Because of Dr. von Braun's condition would appreciate prompt response.

Support award

JWS

PLEASE ATTACH THIS COPY TO MATERIAL SUBMITTED.

If you have any questions or if you anticipate a delay in submitting the required material, please telephone the Staff Secretary immediately.

Jim Connor
For the President