Originally Processed With FOIA(s):
S; 2011-1613-F[1]

FOIA Number:
S

FOIA MARKER

This is not a textual record. This is used as an administrative marker by the George Bush Presidential Library Staff.

Record Group/Collection: George H.W. Bush Presidential Records
Collection/Office of Origin: Speechwriting, White House Office of
Series: Speech File Backup Files
Subseries: Chron File, 1989-1993

OA/ID Number: 13769
Folder ID Number: 13769-001

Folder Title:
Solar Energy Research Institute 9/16/91 [OA 8327] [2]

Stack:	Row:	Section:	Shelf:	Position:
G	26	21	6	1

NSF

Recipients of the
National Medal of Science for 1991

Behavioral/Social Sciences

Robert W. Kates [1]

For his fundamental contributions to the understanding of natural and man-made hazards, and the global problem of world hunger.

George A. Miller [2]

For his innovative leadership in the scientific study of language and cognition, and for his commitment to improved education for literacy.

Biological Sciences

Mary Ellen Avery [3]

For her discovery of the major cause of respiratory distress syndrome of premature infants and the strategies for treatment and prevention.

G. Evelyn Hutchinson [4]

For his role in the emergence of ecology as a modern science, and introducing American geochemists to the importance of living organisms in the cycles of the elements. His work has proved the importance of environmental studies for society in general.

Elvin A. Kabat [5]

For his seminal contributions in the field of immunology, and for bringing the field to its present prominence.

Salvador E. Luria* [6]

For a lifetime devoted to applying genetics to viruses and bacteria, and for guiding the development of generations of students who have helped create the modern power of molecular biology.

Paul A. Marks [7]

For his contribution to hematology in defining the genetic basis for G6PD deficiency and thalassemia, the genetic control of human cancer cell proliferation.

Folke K. Skoog [8]

For his pioneering achievements in the chemical induction and regulation of organ formation in plants; and for contributions to the development of tissue culture as an experimental technique of fundamental importance in biotechnology.

Paul C. Zamecnik [9]

For his pioneering research of protein biosynthesis to biochemical attack, paving the way for dissection of the genetic code; and for introducing the concept and method of "antisense DNA" as an approach to viral gene inhibition and chemotherapy.

Chemistry

Ronald Breslow [10]

For his incisive work on enzyme mimics that has built bridges between chemistry and biochemistry, and for his seminal work on novel conjugated molecules and a new class of anticancer agents.

**Awarded Posthumously*

Gertrude B. Elion [12]

For her basic research in chemistry which revolutionized our understanding of immunosuppression, and enhanced the sciences of chemistry and medicine by elucidating fundamental principles of drug-receptor interactions.

Dudley R. Herschbach [12]

For his seminal contributions to the fundamental understanding of reactions of atoms and molecules, collision by collision.

Glenn T. Seaborg [13]

For his outstanding work as a chemist, scientist and teacher in the field of nuclear chemistry.

Engineering

George H. Heilmeier [14]

For his major contributions to the technological competitiveness of the United States and to the cause of national defense.

Luna B. Leopold [15]

For his influence on the course of hydrology, for outstanding service in converting a data gathering agency into a progressive research operation, and for a distinguished academic career.

H. Guyford Stever [16]

For his scientific and engineering leadership in applying new results of scientific research and technological development to the purpose of government, industry, and academe.

Mathematics

Alberto P. Calderón [17]

For his ground-breaking work on singular integral operators and the application to important problems in partial differential equations, including the Atiyah-Singer index theorem and the propagation of singularities of non-linear equations.

Physical Sciences

Arthur L. Schawlow [18]

For his role in the conception of the laser and in advancing its applications, especially in laser spectroscopy.

Edward C. Stone, Jr. [19]

For his outstanding leadership as project scientist for the Voyager space mission and its experiments in the outer Solar System.

Steven Weinberg [20]

For his contributions to the discovery of the structure of the fundamental forces of nature; the development of the standard model, and the unification of the weak and electromagnetic forces.

Recipients of the
National Medal of Technology for 1991

COMMERCE
JOHN SARGENT
377-3037
LONG CITATIONS

Advanced Manufacturing Technology

Geoffrey Boothroyd and Peter Dewhurst

For their concept, development, and commercialization of Design for Manufacture and Assembly (DFMA), which has dramatically reduced costs, improved product quality and enhanced the competitiveness of major U.S. manufacturers.

F. Kenneth Iverson

For his concept of producing steel in minimills using revolutionary slab casting technology that has revitalized the American steel industry.

Product and Process Innovations

Gordon C. Bell

For his continuing intellectual and industrial achievements in the field of computer design; and for his leading role in establishing cost-effective, powerful minicomputers which serve as a significant tool for engineering, science and industry.

John Cocke

For development and implementation of Reduced Instruction Set Computer (RISC) architecture that significantly increased the speed and efficiency of computers, thereby enhancing U.S. technological competitiveness.

Carl Djerassi

For his broad technological contributions to solving environmental problems; and for his development of insect control products that are harmless and biodegradable.

Frederick Jones and Joseph A. Numero

For revolutionizing the preservation and distribution of food and other perishables through their development of refrigeration technology for trucks, trailers, boxcars, ships and planes; and for the development of a worldwide sales and service network.

The Pegasus Team

For their invention, development, and production of the Pegasus rocket, the world's first privately-developed space launch vehicle that opened the door to significantly increasing payloads in space.

Charles E. Reed

For his management risk-taking in continuous innovation leading the General Electric Company to world class production of advanced engineering materials.

Technology Management

Stephen D. Bechtel, Jr.

For outstanding leadership in applying modern technology management principles within the Bechtel Group, a world-class engineering and construction firm.

Robert W. Galvin

For advancement of the American electronics industry through continuous technological innovation, establishing Motorola as a world class electronics manufacturer.

Technological Manpower Development

James J. Duderstadt

For his excellence in the development and implementation of strategies for engineering education; and for his successes in bringing women and minorities into the Nation's technological workforce.

Grace M. Hooper

For her pioneering accomplishments in the development of computer programming languages that simplified computer technology and opened the door to a significantly larger universe of users.

Technology Transfer

John P. Stapp

For his research on the effects of mechanical force on living tissue leading to safety developments in crash protection technology for automobiles, aircraft, trains, manned space flight and other modes of transportation.

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

minicomputer

NOMINEE(S)/ORGANIZATION:

Chester Gordon Bell
Ardent Computer Company
880 Maude Avenue
Sunnyvale, CA 94086

NOMINATOR(S):

Erich Bloch, Director
National Science Foundation
1800 G. Street, N.W.
Washington, D.C. 20550

CONTACT PERSON:

Erich Bloch
(202) 357-7748

CITATION:

Intellectual and industrial achievements in the field of computer design, leading role in establishing the "minicomputer" (small, relatively inexpensive, powerful class of computer) as a significant tool for science, engineering and industry, and continuing contribution to the development of the U.S. computer science and industry.

FURTHER BACKGROUND:

C. Gordon Bell is widely recognized for seminal and continuing contributions to the design, development, and commercialization of the "minicomputer." Bell lead the engineering teams that designed a series of innovative computers beginning with the PDP 4-8 which revolutionized computing and computing applications. The PDP-8 formed the basis for company growth from $25 million in 1966 to over $1 Billion in 1977. These achievements were duplicated in the role Bell played in the creation, development, and business exploitation of Digital's VAX line of minicomputers. Bell has displayed more vision than any computer designer in the field, in the area of understanding how a particular architecture, as yet not created, could address an important set of requirements of a board community. In recent years this has led him to help start two new companies with innovative potentially "breakthrough" technologies which could radically advance both the industry and the applications to which the computers are applied.

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

MEDAL OF SCIENCE WINNER 73 BCP

first oral contraceptive

NOMINEE(S)/ORGANIZATION:

Dr. Carl Djerassi
Department of Chemistry
Stanford University
Stanford, CA 94305-5080

NOMINATOR(S):

Dr. Rose Ann Dabek
Chairman of the American
Chemical Societies Committee on
Patents and Related Matters
American Chemical Society
1155 Sixteenth Street, NW
Washington, D.C. 20036
(513) 245-2885

CONTACT PERSON:

Nominator
(513) 245-2885

CITATION:

For his technological contribution to environmental problems, including population and insect control. He has brought both creative science and technology and their application to these endeavors.

FURTHER BACKGROUND:

A major part of Carl Djerassi's scientific and social effort has been directed toward the solution of critical human problems. He invented not only the first oral contraceptive (for which he received the National Medal of Science in 1973), he also synthesized Cortisone at Syntex, and started a new company (Zoecon Corporation) based on new methods for insect control. He made millions of dollars in business while continuing to publish over 1000 articles. He was an a model for combining academics and industrial pursuits. He was a part of the new wave of faculty-university relationships that encouraged private sector activity. The transfer of technology from Wayne State University and Stanford to the private sector was very impressive.

The direct economic benefit of his first synthesis of an oral contraceptive must be reckoned in the billions of dollars. Worldwide the effect has passed the $trillion mark.

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

The National Medal Of Technology

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

NOMINEE(S)/ORGANIZATION:

Grace Murry Hopper
U.S. Navy, Retired
1400 Joyce Street A 1614
Arlington, VA 22202

NOMINATOR(S):

Ms. Jill S. Baylor
Secretary
Society of Women Engineers
7377 S. Hudson Way
Littleton, Colorado 80122

CONTACT PERSON:

Ms. Jill S. Baylor
(303) 741-7937

CITATION:

For her pioneering efforts in the development of programming languages and the expansion of our knowledge and expertise in using them which made computers accessible to many people.

FURTHER BACKGROUND:

Admiral Hopper's major achievements include: 1) working with the first large-scale digital computer - Mark I; 2) wrote the programming manual for the Mark I which resolved some the early programming bugs; 3) led the development of the first English language compiler which was actually used, and which was a major input to COBOL; 4) came up with the term "bug" for something that makes a program run awry; and 5) a life time of continued work on standards such as the standardization of computer languages.

The development of compilers as well as the various commuter languages have revolutionized the work place as we know it. She gave leadership to need to train individuals in the required new skills to use the computers. The merit of the advancement represented by a computer language which enabled non mathematicians to use computers is without doubt. She helped move the state of the art from programming in assembly language and higher level languages such as COBOL thereby greatly increasing the application of the computer.

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

The National Medal Of Technology

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

NOMINEE(S)/ORGANIZATION:

Robert W. Galvin
Chairman
Motorola Inc.
1303 East Algonquin Road
Schaumburg, IL. 60196
(602) 965-1722

NOMINATOR(S):

Clovis R. Haden, Dean
College of Engineering and Applied Sciences
Arizona State University
Tempe, AZ 85287-5506

first to win both Malcolm Baldrige Award and NMI of Tech

CONTACT PERSON:

Clovis R. Haden
(602) 965-1722
George Grimsrud
Motorola, Inc.
(312) 576-0642

CITATION:

Advancement of the American electronics industry through the continuous technological and management innovation required to maintain its international competitiveness.

FURTHER BACKGROUND:

He is known worldwide for his advancement of the American electronic industry through continuous technological and management innovation required to maintain its international competitiveness. Since becoming President of the Motorola company in 1956, he has guided the company through dramatic changes in its technology base, its management approach, and it national international posture.

He has developed one of the world's leading manufacturers of electronic systems, cellular telephones, integrated circuits, discrete semiconductors, defense and aerospace electronics, automotive and industrial systems, data communications, information processing and handling equipment, and what is a seemingly endless list of new and innovation products. In short, he established Motorola as one of the top semiconductor companies in the world, with sales of over $8 billion. He also led the company to the first Malcolm Baldrige Award.

To Jeannie

Date 9/11 Time 11:05

WHILE YOU WERE OUT

M John Sargent

of

Phone 377-1397

Area Code Number Extension

TELEPHONED		PLEASE CALL	
CALLED TO SEE YOU		WILL CALL AGAIN	
WANTS TO SEE YOU		URGENT	
RETURNED YOUR CALL			

Message 26 6s

Operator

AMPAD EFFICIENCY®

23-023 CARBONLESS

when did POTUS go on computer?

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

NOMINEE(S)/ORGANIZATION:

The Pegasus Team

Space Pegasus Rocket

NOMINATOR(S):

youngest - 40's

Richard DalBello
Director
&
John F. Mitchell
Vice Chairman
Committee Office of Space Commerce
Motorola, Inc.
1303 East Algonquin
Schaumberg, IL 60176
(708) 576-6500, and

U.S. Department of Commerce
Office of Space Commerce
(202) 377-8125

- DAVID W. THOMPSON
- ANTONIO L. ELIAS
- DAVID S. HOLLINGSWORTH
- ROBERT R. LOVELL

CONTACT PERSON:

launch rockets from airplanes instead of ground

David W. Thompson, Orbital Sciences Corporation
(703) 631-3600

CITATION:

For the invention, development, production and cooperation of the Pegasus rocket, the world's first privately-developed space launch vehicle.

FURTHER BACKGROUND:

The Pegasus air-launched rocket, the world's first commercially-developed and operated Earth-to-space vehicle, sets new standards for launch vehicle performance, flexibility, safety and affordability against which other rockets will be measured for decades to come. The product of a two and one half years of collaborative effort by Orbital Sciences Corporation and Hercules, Inc., Pegasus is the first all-new unmanned launch vehicle to be developed in the U.S. in 20 years. By enabling the economical launching of new satellite-based global personal communications networks, worldwide environmental monitoring systems, low-gravity materials and pharmaceutical processing laboratories and smaller, more flexible scientific and military spacecraft, Pegasus has opened a low-cost gateway to space and the space industry.

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

IBM 801

NOMINEE(S)/ORGANIZATION:

John Cocke
IBM Thomas J. Watson
Research Center
Yorktown Heights, NY 10598

NOMINATOR(S):

Dr. John A. Armstrong
Corporate Officer of IBM Corporation
IBM Vice President,
Science and Technology
Old Orchard Road
Armonk, NY 10504

CONTACT PERSON:

Dr. L.A. Kasprzak,
IBM Corporation
2B-73, 500 Columbus Ave.
Thornwood, NY 10594
(941)742-5926

CITATION:

For development and implementation of Reduced Instruction Set Computer (RISC) Architecture.

FURTHER BACKGROUND:

Dr. Cocke invented the concept the Reduced Instruction Set Computer (RISC) and led the development of the first RISC machine, the IBM 801. RISC architecture minimizes complexity and uses simple instructions which execute in one machine cycle, producing systems significantly more efficient than possible with complex computer designs; RISC is particularly efficient when combined with Dr. Cocke's work on optimize compilers. RISC architecture implemented in current technology offers more computing power at lower cost than ever before., This changes the slope of the performance/cost curve, thus making high performance computing accessible to new types of users.

Today RISC is almost universally the base architecture for engineering work stations throughout the information processing industry. Even now RISC forms the basis for many other very-high-performance microprocessor system designs and is rapidly being adopted as the architecture of choice for such systems.

In 12987, John Backus, the father of Fortran, made two observations; "The RISC paradigm will come to be the standard for future machines..." and "I believe that Dr. Cocke has done more to improve the speed and efficiency of computation in general than any living person..."

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

role in reconstruct of Kuwait

chm. Nat'l Academy of Eng.

NOMINEE(S)/ORGANIZATION:

Stephen D. Bechtel, Jr.
50 Beale Street
P.O. Box 3965
San Francisco, CA 94119

NOMINATOR(S):

Dr. Ralph Landau
Consulting Engineer
Stanford University (ANS)
c/o Listowel Incorporated
Two Park Avenue
New York, NY 10016
(212) 683-8660

CONTACT PERSON:

Diane Aldridge
(415) 768-0104

CITATION:

For outstanding leadership in the engineering profession as chairman of the National Academy of Engineering and as leader of the world renowned primary engineering and construction organization in the United States.

FURTHER BACKGROUND:

As a civil engineer and the leader of one of the nation's foremost engineering and construction firms for the past 30 years, he directly contributed to building America's industrial base and improving the quality of life at home and abroad. His vision has required harnessing the best in technology to provide premier technical and management services to support the capital investments of industry and government. During his career he has directed tens of thousands of engineers and support staff in building some of the most significant engineering projects of this century -- projects that have provided electricity, fuels, minerals, chemicals and other vitally needed resources to communities through the world; projects that have also significantly enhanced U.S. exports of goods, products, and services. Some of his notable projects include the James Bay hydroelectric project--the largest civil engineering project ever undertaken in Canada--which merges two rivers to generate more than 210.5 million kilowatts of powder; Jubail Industrial City in the Arabian desert, which consisted of infrastructure for several basic industries and a population of 250,000; some of the first production platforms in the North Sea, LNG complexes in Indonesian forests, the world's largest cooper project in New Guinea; and presently a major role in the reconstruction of Kuwait.

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

plastics engineering

NOMINEE(S)/ORGANIZATION:

Charles E. Reed
3200 Park Avenue
Bridgeport, Conn. 06604

NOMINATOR(S):

John F. Welch Jr. Chairman & CEO
General Electric Company
3135 Easton Turnpike
Fairfield, Conn. 06431
(203) 373-2971

CONTACT PERSON:

George Wise
GE R&D Center
P.O. Box 8
Schenectady, NY 12301
(518) 387-7915

CITATION:

World leadership in Advanced Engineering Materials.

FURTHER INFORMATION:

In management positions where he could have settled for the exploitation of existing technologies, he was a risk taker, urging the move ahead to the next breakthrough: for example, as General Manager of GE's Chemical and Metallurgical Division, he was not satisfied to stand pat with winning product, Lexan polycarbonate, but he championed the development of Noryl resin, a major extension of the product line, in spite of extreme technical and market challenges. He demonstrated vision: where others saw engineering plastics as a minor sideline of an electrical manufacturing company, he foresaw that it could one of GE' s major business areas, and that GE could compete head-to-head with the world's giant chemical companies.

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

lead to G-FORCE testing

NOMINEE(S)/ORGANIZATION:

Colonel John Paul Stapp
1413 Rockwood
Alamagordo, New Mexico 88311

"taking it to the limit"

he has had the most shock b/c did testing on himself; his students wouldn't do ☺

NOMINATOR(S):

George D. Aravosis
1988 SAE President
400 Commonwealth Drive
Warrendale, PA 15096
(412) 776-4841

CONTACT PERSON:

Max E. Rumbaug
Executive Vice President
SAE
(412) 776-4841

CITATION:

Research on the effects of mechanical force on living tissue leading to safety developments in crash protection technology and further developments in manned space flight.

FURTHER BACKGROUND:

Colonel Stapp's career is an outstanding example of achievements in technology transfer. He believed that limits set for human tolerance were not accurate and set out to discover the real limits. When experiments with dummies and animals limited him, he become a "subject" of his own experiments. His personal involvement demonstrated his willingness to take risks to insure the safety of others.

Because of the technology transfers from public to the private sector, the dreams of going faster and further have become the realities of modern technology. His research led to discoveries of new design for all vehicles and an awareness of the possibilities for manned space exploration a realistic goal. His impact on modern technology is immeasurable when viewed in terms of the contributions of the space program and to all vehicles.

His career involved more than twenty years of research in the Air Force, planning, designing and carrying out thousands of experiments. He organized and founded two laboratories for the US Air Force, the Aero Medical Facility of Edwards Air Force Base and the Aeromedical Field Laboratory of Holloman Air Force Base. He Continued to serve his country with the National Highway Safety Administration for several years. He has published more than 50 original papers on medical and aero-space medical research and related subjects and has published over twelve chapters in textbooks and encyclopedias on aerospace medicine, acceleration, deceleration and space flight.

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

NOMINEE(S)/ORGANIZATION:

Dr. Kenneth Iverson
Chairman and CEO
Nucor Corporation
4425 Randolf Road
North Carolina 28211

revitalized the domestic specialty steel industry

NOMINATOR(S):

Dr. William B. Street, Dean
College of Engineering
Cornell University
Carpenter Hall
Ithaca, NY 14850

CONTACT PERSON:

Dr. William B. Street
(607) 255-6088

CITATION:

Mr. Iverson is a leading innovator in the U.S. steel industry. His concept of making steel in minimills using revolutionary slab casting technology has revitalized the domestic specialty steel industry.

FURTHER BACKGROUND:

Mr. Iverson has long been a leading innovator in the steel industry. Four years after joining Nucor, he led the company into making it own steel in bold effort to remain competitive. However, instead of taking the traditional approach, Mr. Iverson turned to the use of new technology. He built non-unionized mini-mills, usually in rural areas, installed modern electronic arc furnaces which melted scrap, and began to continuously cast and roll slab instead of pouring ingots and re-rolling them the old-fashioned way. As a result, Nucor makes steel for about two man-hours per ton, compared to four-to-five man hours per ton for large integrated companies, and at 50% lower cost.

A more recent gamble is his $400 million dollar investment to build two new plants which will be the first commercial application of new technology to cast thin (2") continuous slabs of steel. If it works, Nucor will move to the 7th largest producer in the U.S.

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

Proposed 1991 National Medal of Technology Recipient

NOMINEE(S)/ORGANIZATION:

Dr. James Johnson Duderstadt
2068 Fleming Administration Building
Ann Arbor, Michigan
48109-1340

NOMINATOR(S):

Charles M. Vest
Provost and Vice President
for Academic Affairs
(President -elect of MIT)

education

CONTACT PERSON:

Patricia DuCharme
(313) 936-2254

CITATION:

For distinguished service as an engineering educator and leader of higher education devoted to relevant education of the highest quality and to the full participation of young men and women of all races in the benefits and responsibilities of the engineering profession.

FURTHER BACKGROUND:

Dr. Duderstadt, as Dean of Engineering, was directly responsible for a revolutionary change in the quality of faculty, facilities, research, computational infrastructure and education at the University of Michigan's College of engineering in the early 1990's. These changes benefitted thousands of students. As Provost and President of the University of Michigan, he introduced strategic planning processes that led to major commitments to the basic sciences, and to an institutional commitment to developing a diverse faculty and student body of the type so essential to the fabric of U.S. society. These effective local actions are consistent with his more global influence as he has emerged as a national leader through service on the National Science Board and numerous other panels where he has emphasized development of human resources. Because of his leadership many Michigan students and faculty work regularly with industrial colleagues on the "factory floor" and in process design facilities, and graduate with a good working knowledge of industrial software.

At the national level, Dr. Duderstadt has focussed on the critical need to attract increasing numbers of women and minority students into the field of engineering. He has chaired the Task Force on Demographic Trends and the Committee on Education and Human Resources of the National Science Board and served on the Task Force on Undergraduate Science and Engineering Education.

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 2

Proposed 1991 National Medal of Technology Recipient

NOMINEE(S)/ORGANIZATION:

Dr. Goeffrey Boothroyd
Dr. Peter Dewhurst

NOMINATOR(S):

Hermann Viets
Dean, College of Engineering
University of Rhode Island
Bliss Hall
Kingston, RI 02881
(401) 792-2186

CONTACT PERSON:

Miles Parker III
(401) 751-7270

CITATION:

For the discovery, development and commercialization of Design for Manufacture anc Assembly (DFMA) principles.

BACKGROUND:

With the exception of the early work done at Hitachi on a Japanese version, called the Assembly Evaluation Method (AEM), Drs. Boothroyd and Dewhurst are the only individuals in the world, it is believed, to have successfully devised a comprehensive method for early design analysis (DFA). Moreover, it is believed, there is no other known group offering quantified, early DFM costing and process selection information at this time.

Several major companies, including Ford, General Motors, Allied-Signal, Xerox and Digital Equipment Corporation, have already established in-house training program for their engineers on the Boothroyd-Dewhurst method. Ford Motor Company, for example, has trained over 10,000 designers and manufacturing engineers in these methods. Boothroyd-Dewhurst are currently being featured in several major magazines.

CUTTING TRIP TO CRIMEA SHORT TO RECEIVE AWARD

8/27/91

Nobels

Voyager

laser

Founding Molecular

bio

Modern Ecology

Mary Ellen Avery
Thomas Morgan Rotch Professor of Pediatries
Harvard Medical School
Boston, MA

Citation: For her discovery of the major cause of respiratory distress syndrome of premature infants and the strategies for treatment and prevention.

Summary of Achievements

Dr. Avery's studies have pursued the site of synthesis, chemical composition and hormonal regulation of pulmonary surfactants; established the linkage between diabetes and hyaline membrane disease; provided the necessary background for the use of glucocorticoids given to mothers to accelerate lung maturation in their offspring; provided the background for the development of surfactant replacement therapy; and played a significant part in the nearly 50 percent reduction in deaths from respiratory distress syndrome.

Avery is one of the founders of neonatal intensive care, and a major advocate of improving access to care for all premature and sick infants. She promoted regionalization of care throughout the 1960's and 1970's; traveled widely as an advocate for perinatal medicine; and has had a leading role in national and international settings.

Dr. Avery's investigative career and work is both the bridge and the supporting structure linking the laboratory and the bedside. Her book, The Lung and Its Disorders in the Newborn Infant, was "to serve the clinician and the investigator, whose common aims are sometimes obscured by their different approaches."

Avery pursued her initial observation that absence of surfactant was responsible for hyaline membrane disease. Her group determined that inactivation of the surface properties of the lung occurred in pulmonary edema, the process which became known as adult respiratory syndrome (ARDS). She led the team of investigators who determined that surfactant was synthesized in alveolar lining cells; that it was composed of a variety of phospholipids; that its appearance was linked to lung development; and that this development could be influenced and accelerated by multiple factors including administration of corticosteroids. These observations on lung development and its regulation were tenaciously pursued by Avery and colleagues to establish the linkage between material diabetes and hyaline membrane disease, and to provide the necessary background for human studies involving the administration of glucocorticoids to mothers to accelerate lung maturation in their offspring.

The amplification of teaching by her students, and now in turn their own students, has surely had a significant role in the nearly 50 percent reduction in deaths from respiratory distress syndrome in the United States from the early 1970's to the early 1980's, from approximately 10,000 deaths per year in 1970 to 5,300 deaths per year in 1980. From the late 1960's to the present it can be estimated that

approximately 52,000 infants have been saved due to improvements in respiratory distress syndrome care. Finally, the advent of surfactant replacement therapy, now being evaluated world-wide (and licensed in Japan) promises further reduction in respiratory distress syndrome.

The impact of Avery's research and teaching is attested to by the more than 50 trainees who have worked in her laboratories, and the several hundreds who have participated in the care of infants in nurseries in institutions where she had a leadership role. Of her trainees, at least 10 have had leadership positions in neonatology divisions in this country and Canada, and second generation trainees now number at least 50 at Harvard alone. In addition, they have contributed to major scientific achievements in neonatology in the areas of respiratory control, lung development, and lung injury.

This discovery showed the hyaline membrane disease was due to immaturity of the developing lung in these infants. Their pulmonary epithelial cells were not developed sufficiently to be able to synthesize and secrete adequate amounts of surfactant. Thus, this study was probably the first to demonstrate that a disease could be caused by inadequate extent of normal development. Consequently, this discovery marked not only a milestone in deciphering a major clinical problem, but also showed that there were important medical applications to an understanding of basic developmental biology. Thus, Avery's work initiated today's extensive and widespread analyses of developmental biological approaches to disease.

BRINGING 84 YR. OLD DAD ALONG

Ronald Breslow
S. L. Mitchell Professor of Chemistry
Columbia University
New York, NY

Citation: For his incisive work on enzyme mimics that has built bridges between chemistry and biochemistry, and for his seminal work on novel conjugated molecules and a new class of anticancer agents.

Summary of Achievements

Ronald Breslow stands with a select few American organic chemists who have made landmark contributions, and achieved recognition in a wide range of disciplines related to organic chemistry. Breslow's research has changed our understanding of chemistry phenomena from enzymes and enzyme mimics to organic magnets and anti-cancer agents.

Dr. Breslow pioneered the notion that the complex and highly selective chemical reactions catalyzed by enzymes can be understood in simple mechanistic terms. Moreover, Breslow's concept of *biomimetic chemistry*, a term which he introduced, has now led to devising completely synthetic catalysts which draw analogy from biological strategies. The results of this kind of thinking have been that enzymes are no longer considered as magical black boxes and that the lessons of biochemistry can be applied to chemical problems far outside that field.

Breslow coined the term anti-aromaticity and obtained the first quantitative evidence for the existence of anti-aromatic molecules such as cyclopropenyl anion and cyclopentadienyl cation; he was one of the few individuals to obtain quantitative estimates of the molecular destabilization that results from enforced interaction of $4n$ π-electrons in planar conjugated molecules. In the 1950's and 1960's, Dr. Breslow played a major role in establishing the chemistry of the nonbenzenoid aromatic compounds. His work established experimentally the stability of molecules that simple theories had predicted would be stable. His recognition of aromatic stabilization and antiaromatic destabilization provided the basis for later theories, such as the Woodward-Hoffman rules which classified a complete field of chemical reactivity.

Much of modern organic chemistry is involved in the application of the techniques and strategies developed during this period to the solution of problems in other fields. Dr. Breslow was the pioneer in the development of this approach to problem solving. He combined growing understanding of reactivity with new synthetic methods and instrumentation to address problems in biochemistry, and provided the leadership that popularized this approach. He demonstrated his ability to extract the essential basic chemical features of complex problems ranging from enzyme reactions to magnetism and to design a simple, easily synthesized model or straightforward mechanistic study

to demonstrate the key principles. The students and postdoctoral fellows that have been trained in his laboratory have carried on this tradition, and are involved in areas of research ranging from biomedical through biomimetric and synthetic organic chemistry to inorganic and polymer chemistry.

Dr. Breslow also applied organic chemical insight to another field he helped to define, one which is now generally referred to as biomimetic chemistry. His first contribution came in the area of enzyme and coenzyme mechanisms, where he discovered the chemical mechanism used by thiamine in biochemical reactions. Following that, he carried out some of the most important work in molecular recognition. His studies on cyclodextrin binding and catalysis, and in remote functionalization of steroids, were among the first to demonstrate that the concepts of molecular recognition could be used in a rational way to control molecular reactivity in synthetic systems. He has personified and defined the field of biomimetic chemistry, and he has trained a large cohort of former students and associates who are now scientific leaders here and around the world.

His enthusiasm for chemistry and dedication to the ethics of science has made him stand out not only as a premier research contributor, but also as a thoughtful and rational proponent of the development of chemistry and science research and education in the United States.

Alberto P. Calderón
Professor of Mathematics Emeritus
The University of Chicago
Chicago, IL

Citation: For his ground-breaking work on singular integral operators leading to their application to important problems in partial differential equations, including his proof of uniqueness in the Cauchy problem, the Atiyah-Singer index theorem and the propagation of singularities of non-linear equations.

Summary of Achievements

Alberto P. Calderón's work in harmonic analysis, ergodic theory, partial differential equations, interpolation of operators, transference methods, and other topics has led the way for many others to follow. His ideas have had a significant influence on parts of mathematics in which he has not worked himself, and his influence on colleagues outside his realm of research has often been crucial to their mathematical work.

Dr. Calderón's contributions to mathematical analysis center on the theory of singular integral operators in n-dimensions and their application to the theory of linear partial differential equations. His contributions have a decisive character, both in the introduction of the sharpest technical tools in the singular integral theory and in the most imaginative attack on major problems in partial differential equations using that theory.

Dr. Calderón's contributions to the development of singular integral operators began with his celebrated paper on the existence of certain singular integrals. With Antoni Zygmund, he proved the important theorem on the L^p boundedness of such operators for $p > 1$. The significant concept of the Calderón-Zygmund decomposition of functions, which became a near-universal tool of real-variable analysis, was introduced at this time. Beginning a systematic attack on problems in partial differential equations, Calderón proved the first general uniqueness result for the Cauchy problem for higher order partial differential operators and systems. He demonstrated the factorization of such operators in terms of singular integral operators. This approach was the major stimulus to the analytical substructure for the proof of the Atiyah-Singer Index Theorem and gave rise to the subsequent development of various theories of pseudo-differential operators. Calderón also applied his machinery to obtain general results on local solvability for linear partial differential equations.

Dr. Calderón made an important attack on the theory of elliptic boundary value problems by establishing the first general method of reducing such problems to systems of singular integral equations on the boundary. He obtained very sharp results in the theory of Sobolev spaces and introduced the complex method of interpolation of operators in general Banach spaces.

Dr. Calderón introduced a new level of attack upon the theory of singular integral operators with his celebrated theorem on the first commutator established in 1965. He also posed the problem of showing the boundedness of the higher commutators, developing important consequences of such results. He applied these ideas in obtaining sharper results in the theory of pseudo-differential operators and, after the first proof of the higher commutator theorem was given by Coifman and Meyer, he established a significant and much more general result. This led to broad development and application of this sphere of ideas, including the study of propagation of singularities for solutions of nonlinear partial differential equations.

The impact of Calderón's work on the post-Second-World-War development of Fourier analysis and its application to partial differential equations is second to none. Through the influence of the basic ideas he introduced, he has made lasting contributions to contemporary mathematics. The various programs he has launched have been the base for the work of numerous other researchers.

pioneering work helped develop drugs to combat leukemia, malaria, herpes, and immune system disorders. techniques she helped devise led to development of the AIDS drug AZT. NOBEL Co-winner

Gertrude B. Elion
Scientist Emeritus
Burroughs Wellcome Company
Research Triangle Park, NC

Citation: For her basic research which enhanced the sciences of chemistry and medicine by elucidating fundamental principles of drug-receptor interactions for nucleic acid antagonists.

Summary of Achievements

Gertrude Elion was awarded the 1988 Nobel prize with George H. Hitchings and Sir James Black for the development of a highly innovative biochemical approach to the rational design of drugs, leading to the development of a series of uniquely valuable therapeutic agents. In these discoveries the fundamental principles of differential enzyme biochemistry and of synergistic interactions of two drugs blocking a common metabolic pathway were established.

In 1946 Elion joined George Hitchings' project of probing nucleic acid biosynthesis with analogs of the purine and pyrimidine bases. By the early 1950's she was the leader of the antipurine effort with 6-mercaptopurine and soon found it to be superior in immunosuppression, and the earliest agent to support organ transplantation in the presence of genetic differences.

She documented the action of allopurinol as an inhibitor of xanthine oxidase in animals.

As head of the Experimental Therapy Division at Burroughs Wellcome, she developed the antiherpetic agent acyclovir through an investigation which included discovering the mechanism by which the drug is activated to destroy the virus while avoiding toxicity to the human heart.

The manner in which these important drugs were discovered, namely a rational course of molecular design based on drug-receptor and drug-enzyme classification, has done much to revolutionize the way in which novel drugs are designed. The differentiation of major subclasses of adrenergic and histamine receptors and of evolutionary differences in the dihydrofolate reductases of various species have been an important by-product of her research.

Dr. Elion's contributions to biomedical research span an enormously productive career of nearly 50 years, and there are few areas of medicine and therapeutics which have not been profoundly affected by her work. She pioneered the field of purine and pyrimidine chemistry and metabolism, and her discoveries have directly or indirectly led to important drug treatments for organ transplantation, leukemias and other cancers, gout, malaria and viral diseases.

Dr. Elion has been an extremely effective spokesperson for communicating the nature and importance of science to the lay public. Society and the public have benefitted tremendously from the creative, productive and dynamic qualities of Dr. Elion's life and career.

FORMER WHITE HOUSE FELLOW 1970-71
SERVING AS SPECIAL ASSISTANT TO THE SECRETARY OF DEFENSE

55 YOUNGEST END

George H. Heilmeier
Senior Vice President and Chief Technical Officer
Texas Instruments Incorporated
Dallas, TX

Citation: For his major contributions to the technological competitiveness of the United States and to the cause of national defense.

Summary of Achievements

George Heilmeier is one of the Nation's most imaginative and innovative engineers. He is an enormously competent individual who has a reputation for challenging the "accepted." His technical work over the years has been very significant and has focused on the areas of solid state electronics. He has made a number of personal contributions in that regard such as his pioneering work on liquid crystal displays at RCA. His contributions to management have included serving as Director of the Defense Advanced Research Projects Agency which oversees much of the most advanced technological work conducted by the Department of Defense. At Texas Instruments, he has had management responsibility for the technological prowess of that corporation.

Dr. Heilmeier has voluntarily contributed his expertise and time to a number of important undertakings and has been a long-time member of the Defense Science Board. In that capacity, he was a significant contributor to the Defense Science Board Task Force on semiconductor competitiveness. He has himself chaired a number of Defense Science Board Task Forces as well as served on advisory committees to NASA and a number of universities.

Dr. Heilmeier has been recognized for his personal technical contributions as well as his management expertise by a number of organizations, including his selection for membership in the National Academy of Engineering. Dr. Heilmeier is considered to be one of the most distinguished managers of high technology that this country has produced in the last two decades.

Dr. Heilmeier has also been a powerful force in building effective bridges between research universities and the semiconductor industry. He has been especially helpful in getting U.S. research universities to think about long-range research problems related to semiconductor manufacturing. This is truly a rare event. The path that was created to cause this reorientation of faculty interests toward long-term industrial issues will serve the Nation well.

Dudley R. Herschbach
Frank B. Baird, Jr. Professor of Science
Harvard University
Cambridge, MA

Citation: For his seminal contributions to the fundamental understanding of reactions of atoms and molecules, collision by collision.

Summary of Achievements

The very basis of chemistry, reactions between molecules, has been brought to a new level of understanding by research which was initiated in 1961-1962 by Dudley R. Herschbach and coworkers. The study of chemical reactions by scattering of precisely defined beams of atoms or molecules against other beams of molecules or ions has yielded information about chemical reactions at an entirely new level of detail. Dr. Herschbach's analysis of the mechanics of reactive scattering made possible the first detailed description of the now-classic K + HBr experiment, and has influenced all of the later reactive molecular beam studies. Herschbach's students enhanced the power of the method by combining crossed beams with the universal method of detection by mass spectrometry, and by introducing laser induced fluorescence into the crossed beam experiments.

The past twenty-five-year period has witnessed a rapid maturation of this field from a few novelty experiments in the mid 1960's to the most powerful means we now have at our disposal to understand the dynamics of reactive scattering. Dr. Herschbach's deep physical insight into the information that can be obtained from such molecular beam experiments and his enthusiastic championing of the significance of this type of research has brought about a new major sub-discipline in chemical physics whose practitioners populate nearly every university in the country.

Dr. Herschbach's research has focused on the dynamics of molecular reactions. He developed molecular beam and spectroscopic techniques which allow the observation of reaction products immediately after the single collision events in which the new molecules are formed. He applied quantum theory and statistical methods to a variety of problems in molecular structure and reaction rate theory and is particularly concerned with electronic structure and reaction rate dynamics. His research group aims to elucidate the molecular dynamics of chemical reactions and the underlying forces, both in single collision and in condensed phases. His theoretical work on a new approach to electron correlation energy calculations has raised hopes for evaluating multielectron correlation energies.

Herschbach's work provides a detailed picture of the transfer of energy and angular momentum during the formation and decomposition of chemical bonds and the interconversion of energy among different kinds of molecular motion. He has had outstanding success in correlating electronic structure with reactions dynamics. His recent work has found examples of reactions that require exchange of two or three pairs of bonds in a single collision event, yet proceed with

practically no activation energy. Herschbach also discovered interconversion among translational, vibrational, and electronic energy. Processes akin to liquid phase reactions are now also being studied in his laboratory using beams of van der Waals clusters, permitting the investigation of isolated solvated molecules. These studies include exchange reactions, inelastic scattering and collisional dissociation of the solute molecules contained in small solvent clusters.

Subsequent to the "rebound mechanism" in reactions of K with CH_3I and the "harpoon mechanism," Herschbach and his students have made many other discoveries. These include the "long lived complex" mechanisms, exchange reactions, stripping mechanisms, direct (or impulsive) mechanisms, flame mechanisms, reactive and non-reactive transfer processes, rotational to electronic energy transfer, persistent collision complexes, loose and tight complexes, preferred reaction geometries, osculating complexes, dependence on the number of degrees of freedom, trihalogen complexes, a remarkable analogy of H + C_2 and K + CH_3I rebound reactions, orbital asymmetry effects, the FOF intermediate in the O + F_2 reaction, migratory effects in vinylic and allylic reactions, facile bimolecular and termolecular reactions of diatomics, and several types of reactions with van der Waals complexes.

In addition to these contributions to the chemical aspects, Dr. Herschbach has been a leader in the development of experimental and theoretical techniques for the study of mechanisms of reactions in the gas phase. Dr. Herschbach's boundless creativity, irrepressible enthusiasm and remarkable imagination have enabled him to play a leading role in every aspect of major developments in the field of reaction dynamics since its inception. The field of chemical dynamics, especially the understanding of the detailed dynamics of elementary chemical reactions, would not have experienced such a dramatic advancement were it not for the pioneering work and special leadership of Dr. Herschbach.

(Posthumous)

NEPHEW FRANCIS HUTCHINSON AND WIFE JOYCE FLYING FROM LONDON TO ACCEPT

G. Evelyn Hutchinson
Sterling Professor Emeritus of Zoology
Senior Research Biologist
Yale University
New Haven, CT

Citation: For his role in the emergence of ecology as a modern science, and introducing American geochemists to the importance of living organisms in the cycles of the elements. His work has proved the importance of environmental studies for society in general.

Summary of Achievements

G. Evelyn Hutchinson has been called the "father of modern ecology." His extraordinarily broad knowledge of living organisms - animals, plants, protists, fungi and monerans; his deep understanding of the physical and chemical basis of living organisms and of the earth on which they live; and his not inconsiderable mathematical ability have all served him well in fostering his important contributions to the field of ecology. His early ecological work centered on the study of the limnology, a discipline to which he was led through an early interest in the systematics and natural history of water bugs. Early studies of the limnology of South African inland waters were followed by more than a decade of concentrated work on Lindsley Pond, New Haven, Connecticut. Critical analyses of intermediary metabolism in this lake, of the relationship of phytoplankton periodicity to chemical changes, of a quantitative radiochemical study of the phosphorus cycle; and of the history of plankton populations in the lake all provided data for subsequent theoretical work and for his synthetic A Treatise on Limnology. Professor Hutchinson has always regarded lakes as ideal habitats for the study of ecological principles since input and output measurements are so readily made.

In the 1940's Hutchinson's interests embraced biogeochemistry. He made outstanding contributions to the study of the biogeochemistry of aluminum and phosphorus, and essentially introduced this discipline to America, where it now flourishes. Also of great significance are his geochemical writings on atmospheric gases in which he emphasized the probable continual production, though at a decreasing rate, of nitrogen, hydrogen, oxygen and carbon dioxide from the interior of the earth through geological time.

There followed an increasing interest on Hutchinson's part in theoretical ecology with concern over competition between species and niche differentiation. It was his formulation of a generalized theory of the niche in 1957 that more than any other piece of work changed the course of modern ecology. His subsequent interests in diversity and size distributions among species extended and confirmed the trends toward quantitative theoretical ecology.

In Hutchinson's later work he manifested an interest in human evolution, in the relationship of ecology to society, and in completing syntheses of the fields of limnology and theoretical ecology.

Professor Hutchinson's greatness in science follows from a remarkable capacity to see resemblances in very diverse objects and to draw theoretical conclusions from these perceptions. During the course of his active teaching career at Yale University he trained a large number of students who, with their students, comprise a substantial fraction of the top ecologists of America today. He has also, through his provocative and broadly ranging published essays, enlightened a wide body of readers about the interrelationship of science and the humanities as well as the significance of our environmental resources.

former students include One Nobel Laureate

Elvin A. Kabat
Higgins Professor of Microbiology Emeritus
Columbia ~~University~~
New York, NY

Citation: For his seminal contributions in the field of immunology, and for bringing the field to its present prominence.

Summary of Achievements

No one else in immunology has contributed as much as Elvin Kabat has over a span of more than 50 years to our understanding of the structure and function of antibodies and the operation of the immune system.

Dr. Kabat's work has been characterized by the development of new fundamental concepts that he has been able to document and validate with elegant experimental evidence. Thus, as a dividend from his studies on the chemical basis for the specificity of carbohydrate antigens, including the blood group substances, he defined the nature of the antigenic epitope. From this beginning he was able to deduce the size and structure of the antibody combining site. This renewed interest in antibodies, which had been the focus of some of his early research, led to his extensive molecular studies that have done much to clarify the basis for antibody diversity.

He studied the mechanism of bacterial agglutination as a precipitin reaction at the surface of the pneumococcus. In 1937-38 he first determined molecular weights and electrophoretic properties of horse, cow, pig, rabbit, monkey and human anti-pneumococcal antibodies. He showed that antibodies were gamma globulins; studied chicken tumor viruses; and developed a quantitative immunochemical method for determining gamma globulin in cerebrospinal fluid used in diagnosing multiple sclerosis and neurosyphilis. Using brain tissue emulsions in Freund adjuvants, he produced acute disseminated encephalomyelitis and established this experimental disease as an acute form of multiple sclerosis.

In 1945, Dr. Kabat began a study of water soluble blood group A, B, H, Le, I and i antigens, determined the structures of isolated oligosaccharides, and established a composite structure for these complex blood group glycoproteins. He demonstrated the antigenicity of dextran in humans proposed for use as a plasma expander during the Korean War, and established how to prepare dextran so that allergic reactions would be negligible. He used the system of human anti-α(1->6)dextran, α(1->6)dextran and its oligosaccharides as a molecular ruler for determining the sizes and shapes of anti-α(1->6) dextran combining sites, principles now used in characterizing all kinds of antibody combining sites.

He and T. T. Wu developed an equation to examine heavy and light chains of amino acid sequences of the variable regions of immunoglobulins and antibodies, showed that each chain had three hypervariable regions, and predicted that these would contain the

amino acids contacting the antigen and fold to form the antibody combining site. This was several years before any x-ray structures of antibody combining sites were known. This prediction has been confirmed by x-ray structures now termed complementarily determining regions (CDRs). He formulated the minigene hypothesis to account for antibody diversity, a hypothesis confirmed by studies in the chicken and by the presence of D and J minigenes in heavy and J minigenes in light chains of all antibodies and T-cell receptor chains. His cloning and sequencing studies on antibodies to $\alpha(1\rightarrow6)$ dextrans established that the antibody forming studies was highly protected against major germ-line gene loss. The CDRs are now used in attempting to make molecular models of different types of antibody combining sites and design antibodies for therapeutic use.

Robert W. Kates
University Professor and
Director, Alan Shawn Feinstein
World Hunger Program
Brown University
Providence, RI

Citation: For his fundamental contributions to the understanding of natural and man-made hazards, global environmental change, and the prevalence and persistence of world hunger.

Summary of Achievements

Robert W. Kates has been primarily responsible for developing new methods and new theory used by research workers and policymakers in investigating the interactions of perturbed human, technological, and environmental systems. These are being applied to reduce the human distress caused by hazardous events.

He pioneered in methods of measuring human perception of the probability and magnitude of extreme events in nature, and of the intervening role of technology in shaping those perceptions of environment as well as of possible ways of coping with them. He is a leading international expert on risk assessment of the hazards caused by extreme geophysical events such as floods, earthquakes and prolonged drought. He has pioneered in the extension of methods for analyzing natural hazards to those created or exacerbated by human action, such as dam failures, automobile and industrial accidents, and chemical spills. He has few, if any, peers in the international scientific community on human perception of risk and hazard and strategies to cope with extreme events or to mitigate their harmful consequences. Dr. Kates' efforts have improved fundamentally the way that risk assessments are carried out and comparisons are made of different types of hazards. His many books and papers are internationally recognized as the seminal theoretical studies and as the essential prerequisites for formulating sound policy prescriptions.

Dr. Kates has sustained a long-term interest in the environmental, cultural, political, and technological causes of world hunger. He was instrumental in the establishment of two university research programs, the Center for Technology Environment and Development at Clark University, and the Hunger Program at Brown University. The Clark Program was the first to investigate disruptive natural and technological events in an integrated fashion. The Nation's first Hunger Program at Brown University examines the phenomenon of world hunger in the context of human perception and coping processes. Both programs are leading to new insights and new approaches. His research is instrumental on the topic, and encouragement of rigorous cross-disciplinary study of the problems is providing a long overdue focus on this most significant Third World issues.

The taxonomies and analytic methods emerging from his work have become standard tools among a wide range of international practitioners and teachers dealing with extreme events in nature and society. They have had a major influence on the approaches taken in the current wave of studies on climate impact related to the greenhouse effect.

His scientific work is distinguished by originality in method and the engagement of basic problems confronting the global environment. His persistent concern for the welfare of common people who might benefit from applications of new findings is evident in the ways in which research results could be used to help improve the plight of residents of a Tennessee floodplain, a Managua slum, or a Tanzanian farm.

Luna B. Leopold
Professor of Geology
University of California
Berkeley, CA

Citation: For his contribution to the hydromechanics of rivers, for influencing the direction and content of physical geography, and for outstanding service to the field of water resources.

Summary of Achievements

Luna B. Leopold's contributions to the earth sciences span a lifetime and their influence has been pervasive. Through his work in meteorology, hydrology, geomorphology, and natural resources, and on the interrelations among them, he has profoundly influenced both the study of the surface of the earth and, in a broader context, the process of environmental management which depends upon this scientific foundation. His influences and accomplishments are recognized throughout the world.

From the outset, Dr. Leopold's work has been creative and pioneering. His early work on the meteorological conditions in southern California included specific reference to conditions associated with pollution in the Los Angeles area. Similarly, his cloud seeding experiments in Hawaii in 1948 were among the first. From the beginning, his research consistently related meteorology and climatology to landscape processes, a conceptual framework which has now become a central feature, not only of geomorphology, but of the current exploration of the potential impacts of climatic change.

Dr. Leopold's greatest impact on earth sciences began with publication in 1953 of the classic paper "The Hydraulic Geometry of Stream Channels," which received the first Kirk Bryan Award of the Geological Society of America, initiated a new era of quantitative study of rivers, and stimulated quantitative approaches in the broader field of geomorphology. Revealing an orderly framework of river behavior, it provided a basis for observations of rivers throughout the world. The text in geomorphology based upon this and subsequent work extended the influence of these studies. From mapping in the field to theoretical and laboratory studies of sediment transport and flow in open channels, Leopold's breadth of inquiry stimulated comparable inquiries by scholars in this country and abroad. Not only does his work on rivers cover a remarkable range from field to laboratory, but includes the introduction to the field of concepts of statistical mechanics and energy distribution which stimulated fresh approaches throughout the discipline of geomorphology. The present state of the science of rivers and landscape development is largely the result of his leadership.

While serving as Chief Hydrologist of the U.S. Geological Survey, in addition to developing a major research effort in the field of water resources, Leopold demonstrated remarkable foresight in establishing two unique observational networks on rivers; one a group of nearly pristine river benchmark basins, the other a set of river channel

reaches, both designed to provide baselines against which to measure both natural and anthropogenic changes. Decades later, these drainage basins are among the few available providing benchmarks for the study of airborne contaminants of surface waters.

The goal of defining the scientific basis for water-resource management has extended throughout Leopold's career with more than 30 publications on drought, constraints on water supply, and the ecological consequences of water-resource development. He continues to be a major force introducing rigorous scientific concepts into discussions of water and land management.

Leopold's publishing career has also included other intellectually provocative streaks on the value of and methods for quantifying visual characteristics of landscapes; ethical issues in resource management; the value of data collection; and the promotion of scientific creativity. He was one of the first hydrologists, and certainly the first geomorphologist, to anticipate the influence of urbanization on water resources and on river channels in particular.

Throughout an extraordinarily productive career, Luna B. Leopold has been a creative scientist contributing a succession of new and fundamental ideas to the study of earth surface processes. Moreover, this same creativity is manifested in his work on environmental issues reflecting a superb combination of scientific inquiry and public policy.

(POSTHUMOUS)
WIDOW, DR. ZELLA LURIA
PROF. OF PSYCH @ TUFTS WILL ACCEPT AWARD

Salvador E. Luria
Institute Professor Emeritus
Massachusetts Institute of Technology
Cambridge, MA

NOBEL PHYSIOLOGY

Citation: For a lifetime devoted to applying genetics to viruses and bacteria, and for guiding the development of generations of students who have helped create the modern power of molecular biology.

Summary of Achievements

Salvador E. Luria, one of the founders of molecular biology, understood that genetics had the power to revolutionize the world if only we could apply it to a very simple organism. He joined with "the phage group," a small band of men who saw the future possibilities in a virus of bacteria, a phage. Luria's most extraordinary contribution was to show that mutations occurred spontaneously and randomly, independent of the selection by the environment. Other contributions include the visualization of phage in the electron microscope, characterization of "restriction" systems in bacteria--giving rise to the restriction enzymes, one of the most powerful tools of biotechnology--and the study of proteins that kill bacteria.

In 1969 he was jointly awarded the Nobel Prize in Physiology or Medicine with Drs. Max Delbruck and Alfred Hershey for scientific contributions in the replication and genetic structure of viruses. However, his influence on modern science is much broader. He is a great teacher and has trained many of the leading figures in today's biology. As an administrator, he helped bring into existence the Cancer Center at the Massachusetts Institute of Technology, which is a leading site for the molecular analysis of cancer. His influence was remarkable because he was always looking ahead, sensing where biology was heading and positioning MIT in the lead; and it is to Luria's credit that MIT biology ranks as one of the leading departments in the world.

Luria has influenced students and the public through his writings. In 1953 he wrote General Virology, a textbook used by generations of students. He supports good science whenever he finds it and is uncompromising in his devotion to the ideals of science.

Paul A. Marks
President
Memorial Sloan-Kettering Cancer Center
New York, NY

Citation: For his contribution to hematology in defining the genetic basis for G6PD deficiency and thalassemia, and discovery of an approach to control cancer cell proliferation with new inducers of differentiation.

Summary of Achievements

Paul Marks has made important discoveries that have impacted on cell regulation and differentiation. He recognized early the importance of biochemistry and molecular biology in attacking clinical problems related to his training as a hematologist. His early studies described the decrease in activity of enzymes critical to the life span of human red blood cells. He demonstrated that a genetically determined deficiency in the enzyme glucose-6-phosphate dehydrogenase (G6PD) predisposed individuals to hemolytic anemia.

While at the Pasteur Institute, Dr. Marks isolated globin mRNA and demonstrated its relative stability compared to mRNAs of prokaryotic cells. He showed that mRNA was translated on polyribosomes, providing important evidence for the function of ribosomes in protein synthesis. Building on these important observations, he showed that the genetic defect in the thalassemia syndromes selectively decreased the expression of one or another of the globin genes, which resulted in a hemoglobin deficiency and anemia. His laboratory was among the first to demonstrate the molecular heterogeneity in the genetic defects leading to the thalassemia syndromes.

Dr. Marks' research has provided major new understanding of the cellular and molecular aspects of cell differentiation. Focusing primarily on erythroid cell differentiation of normal and transformed cells, he and his colleagues discovered polar planar compounds, exemplified by hexamethylene bisacetamide, which are potent inducers of differentiation of various transformed cells. These agents induce transformed cells to express normal products of the differentiated cells and to lose their oncogenic properties and the capacity to divide. These studies characterized the multistep process involved in induced terminal differentiation, including the loss of cell division and the modulation of expression of various genes related to cell cycle progression, such as proto-oncogenes metabolic functions and various differentiated characteristics. He defined alterations in the structure of chromatin containing the alpha and beta globin genes associated with inducer-mediated onset of active transcription of these genes. Clinical studies have been initiated to evaluate the potential of the cytodifferentiation agent, hexamethylene bisacetamide, in controlling human cancer cell proliferation -- a new approach to treating the disease.

Paul Marks has provided outstanding leadership as a researcher, teacher, clinician and academic administrator. His leadership of two major institutions in the academic biomedical area, Columbia University College of Physicians and Surgeons and the Memorial Sloan-Kettering Cancer Center, has been marked by outstanding institutional development. His example has been a powerful factor in the development of student interest in medical science.

George A. Miller
Professor of Psychology
Princeton University
Princeton, NJ

Citation: For his innovative leadership in the scientific study of language and cognition, and for his commitment to improved education for literacy.

Summary of Achievements

George A. Miller has an extraordinary record of innovative leadership in scientific psychology and cognitive science. Several times in each phase of a long, productive career, he has been among the initiators of a new direction of investigation that later became a major focus of research. To initiate just one of these new fields would ordinarily be considered a major, lifetime scientific contribution.

His first such contribution was to the rise of mathematical psychology. He explored in particular the potential of information theory as an approach to the quantification of psychological phenomena. His paper, "The Magical Number Seven, Plus or Minus Two," is one of the most frequently cited papers in all of psychology.

In 1960 he helped to found the Center for Cognitive Studies at Harvard, an interdisciplinary research group with an extensive program of post-doctoral fellows and visiting researchers. Its impact on cognitive psychology and cognitive science was powerful. Nearly every current senior figure in those fields was a fellow or visiting researcher at the Center.

Later, creating a laboratory at Rockefeller University, Miller was among the first to argue for language acquisition as a significant research area. He turned his lifelong interest in human language to an emphasis on the lexicon, semantics and vocabulary. At the time, acquisition was considered of little scientific interest, but Miller proved once again to be a pioneer in linguistics, psychology and the computer science of natural language.

In addition to his research contributions, Dr. Miller has been concerned throughout his career with both effective communication of the ideas of scientific psychology and application of his research field to improvement of the human condition, particularly through education. At Harvard, he was among that exceptional group of professors who paired their research contributions with effective teaching at the introductory, general education level. Consistent with that commitment, he has written a number of highly readable, accessible books that bring these ideas to wider audiences.

In the early 1970's he played a central role in developing the initial National Institute of Education* research agenda, that turned the talents of many of the Nation's outstanding cognitive researchers to the problem of reading comprehension and other educational problems, laying the foundation for effective innovations now in development.

Miller has not only been a major, and original, contributor to the research literature of cognitive psychology and psycholinguistics, he has also been a science statesman of great importance. The single most important development in psychology during the second half of this century was its transformation from a strictly behavioral science into a cognitive science. He redefined psycholexicology, the study of words and their meanings in the language user's mental lexicon. The foundations were laid in a voluminous book, Language and Perception, which set the theoretical and formal standards for a rapidly expanding subdiscipline in psycholinguistics. The mental lexicon has been Miller's main interest ever since. His publications have ranged from children's acquisition of word meanings to the long-range project WordNet, which aspires to computer model human lexical memory, and which has reached the stage of representing the meanings of over 64,000 words.

Miller's impact on "the science of mental life" is due to the brilliance of his ideas, and effectiveness in mediating these ideas. He has been a thorough experimentalist, which was important to win hard-core psychologists for his new views. He always provided a formal-mathematical foundation for his work, which opened the doors to computer scientists and theoreticians.

---

*The National Institute of Education is now known as the Office of Educational Research and Improvement, Department of Education.

Arthur L. Schawlow
J. G. Jackson and C. J. Wood Professor of Physics Emeritus
Stanford University
Stanford, CA

Citation: For his role in the conception of the laser and in advancing its applications, especially in laser spectroscopy.

Summary of Achievements

Arthur Schawlow has had an outstanding career as a physicist. He has made an extraordinary contribution to all scientific fields through his invention of the laser, and has followed this major discovery with many years devoted to the application of lasers in the field of optical spectroscopy, for which he was awarded a Nobel Prize in Physics in 1981.

Dr. Schawlow made contributions in the fields of microwave spectroscopy, nuclear quadrupole resonance, and superconductivity. He coauthored the first paper on the theory of lasers and ways of constructing them; coauthored the book Microwave Spectroscopy, and developed the optical maser, now called a laser.

Schawlow has been extremely productive in the field of spectroscopy and electromagnetic radiation and has been a key figure in the development of the new field of quantum electronics. This involves lasers, quantum optics, and the resulting laser applications, new optical possibilities, and new communications technology. Schawlow proceeded to open up other new physics and engineering possibilities in the field of exceedingly high spectral resolution and precision measurements. These involved the cooling of atoms or molecules to very low temperature and the resulting exceedingly high precision in frequency measurement.
Schawlow has also been active in spanning the gap between universities and industry by serving on a number of boards, and as a national leader in the field of physics. He has trained a large number of students, many of whom have important positions in the world of optics and quantum electronics.

VERY WELL KNOWN

NOBEL CHEMISTRY

Glenn T. Seaborg
Associate Director, Lawrence Berkeley Laboratory
University of California
Berkeley, CA

Citation: For his outstanding work as a chemist, scientist and teacher in the field of ~~nuclear~~ chemistry.

Summary of Achievements

Glenn T. Seaborg has been a leader in the study of transuranium elements for the past 60 years. His co-discoveries of ten transuranium elements and numerous isotopes have benefitted scientific research, medicine and industry for years. Throughout his career he has served as a scientific advisor to the U.S. Government in the national and international arenas and worked to improve math and science education in the United States.

Following the discovery of nuclear fission in 1939, Seaborg turned his attention from radiochemical research to identifying the transuranic elements resulting from neutron bombardment of uranium. By February 1940, he and his co-workers positively identified a new element with atomic number 94. He and his team further demonstrated that plutonium 239 was fissionable by slow neutrons, a key step in the events leading to the development of controlled nuclear fission.

Dr. Seaborg won the 1951 Nobel Prize in Chemistry for his work on the chemistry of transuranium elements. During World War II he headed the group at the University of Chicago's Metallurgical Laboratory which devised the chemical extraction processes used in producing plutonium for the Manhattan Project. He and his co-workers have since discovered nine more transuranium elements: americium, curium, berkelium, californium, einsteinium. fermium, mendelevium, nobelium, and element 106. Dr. Seaborg holds more than 40 patents, including those on elements americium and curium, making him the only person to ever hold a patent on a chemical element.

He formulated the actinide concept of heavy element electronic structure which accurately predicted that the heaviest natural occurring elements, together with synthetic transuranium elements, would form a transition series of lanthanide elements. This concept, one of the most significant changes in the periodic table since Dimitri Mendeleev's 19th century design, shows how the transuranium elements fit into the periodic table and thus demonstrates their relationships to other elements.

His co-discoveries include many isotopes that have practical applications in research, medicine and industry, (such as iodine-131, technetium-99m, cobalt-57, cobalt-60, iron-55, iron-59, zinc-65, cesium-137, manganese-54, antimony-124, californium-252, americium-241, plutonium-238) as well as the fissile isotopes plutonium-239 and uranium-233.

Dr. Seaborg continues as a research scientist searching for new isotopes and elements at the upper end of the periodic table, including the "superheavy" elements. He is investigating the mechanism of reactions of heavy ions with heavy element target nuclei and is concerned with determining the chemical properties of the heaviest chemical elements.

Dr. Seaborg has authored 23 books, more than 500 scientific articles, and guided the graduate studies of more than 60 successful Ph.D candidates. Work by Seaborg and coworkers accounts for nearly 10 percent of the entire known periodic table of the chemical elements, an almost unbelievable achievement. He is one of the true scientific giants of the 20th century.

83 MIDEST

Folke K. Skoog
C. Leonard Huskins Professor of Botany Emeritus
University of Wisconsin
Madison, WI

Citation: For pioneering work on plant hormones, including discovery of cyotkinins (a major clas), chemical induction of organ formation and regulation of morphogenesis in plants, and contributions to the development of plant tissue culture as an experimental technique of fundamental importance in biotechnology.

Summary of Achievements

Folke Skoog is one of the foremost plant scientists of this century. Among his achievements is his discovery of a major class of plant hormones, the cytokinins, and his systematic exploration of their chemical relationships and biological activity; his demonstration that plant growth and organ formation in tissue cultures can be chemically regulated; and his extensive contributions to the development of tissue cultures as experimental material. Over the past 25 years, Skoog has been the most frequently cited plant scientist in the worldwide scientific literature.

Following his pioneering research in the 1930's on the newly discovered plant hormone, auxin, Skoog began investigating factors controlling organ differentiation in plant tissue cultures, i.e., the formation of roots and shoots from undifferentiated callus. Working with excised tobacco pith tissues, he and his associates found that the cells failed to divide and grow unless some vascular tissue was left attached or an extract of it was added. This led to the detection of cell-division activity in several natural products and to the isolation in 1954 of "kinetin" from aged herring sperm DNA. Collaborative work in the laboratories of Skoog and F. M. Strong led to the identification of Kinetin and other compounds of related structure with biological activity. These were generically named "cytokinins."

Discovery of the cytokinins triggered a flood of publications that has continued to the present from laboratories around the world. Skoog's and N. J. Leonard's laboratories in more than 20 years of collaborative work synthesized hundreds of cytokinins and antagonists, and established the principles that govern their structure-activity relationships. Meanwhile, work in several laboratories, including Skoog's, demonstrated that a number of cytokinins occur naturally and that one or more of these compounds occur in every tested organism from bacteria to man. It is now recognized that the cytokinins comprise one of the major classes of hormones known to regulate plant growth and development. The discovery and rapid expansion of knowledge of the cytokinins rank as one of the major advances made in the plant sciences in the past half-century.

Early studies by Skoog established that variations in the proportions of cytokinins and auxins and interactions between these and nutritional factors in the culture media decisively influence organ initiation. He showed that organ formation could be chemically controlled to an astonishing degree: tissues could be made to develop as undifferentiated masses of cells, or to differentiate with proliferation of roots only, shoots only, or roots and shoots to give complete plants. His concept that regulatory control is exerted by the relative levels of hormones and other factors has modified physiological concepts and horticultural practices. Skoog's adoption of plant tissue cultures for the study of organ differentiation, his thorough exploration of conditions needed for optimal growth of plant tissues on media of defined composition, and his demonstration that whole plants can be generated from cultured cells have been crucial to the production of transgenic plants and other advances in biotechnology.

Folke Skoog served as the major professor for more than 60 Ph.D. students and as the mentor for 40 postdoctoral associates. Owning to his widely acknowledged insight into biological phenomena, high professional standards, incisive views and leadership qualities, he has had an exceptional impact on the course and quality of research in the plant sciences internationally for the past 50 years.

NICE TO BE ON THE RECEIVING END - USED TO HAND OUT THE AWARDS

H. Guyford Stever
Corporate Director and Science Consultant
Washington, DC

Citation: For his scientific and engineering leadership in applying new results of scientific research and technological development to the purposes of government, industry, and academe.

Summary of Achievements

H. Guyford Stever, a scientist, engineer, educator, and administrator, has served universities, government and industry. This broad experience, combined with his research and teaching in a number of different fields in which he was engaged in the first two decades of his professional life, served as the base of both his institutional leadership and his science policy work of the last three decades. He has made contributions in aeronautical, missile, and spacecraft engineering, cosmic rays, electronics and radar, gas discharge and gas dynamics, compressible aerodynamics and two phase flow, science and engineering education, and science policy.

Dr. Stever's presidency of Carnegie Mellon University was marked by significant change and growth in the institution, including the merger of Carnegie Institute of Technology and Mellon Institute to form CMU; the addition of the School of Urban and Public Affairs; the formation of a Department of Computer Science; and a Transportation Research Center. His work at CMU, two decades of service on the Massachusetts Institute of Technology faculty, government sponsored research, headship of two MIT departments, and extensive advising of several government agencies prepared him for the Directorship of the National Science Foundation.

As Director of the NSF, he strengthened its highest priority mission as supporter of basic research, primarily conducted in universities by peer-reviewed principal investigators. A secondary NSF role emerged, resulting from the OPEC Oil Embargo of 1973. He rapidly increased NSF's non-fossil and renewable energy sources research, later transferred to the Energy Research Development Agency. Energy systems studies were increased, conducted by an energy policy group enlarged to handle the NSF Director's dual role as Science Advisor, especially his Chairmanship of the White House Energy R&D Advisory Committee. A new science policy group, Science and Technology Policy Office, addressed newly emerging issues, such as loss of international competitive strength.

As the Science Advisor, President Ford directed him to reestablish the White House science structure. The 1976 Science and Technology Act created the Office of Science and Technology Policy with the Presidential Advisor as Director. Dr. Stever was appointed the first director.

Much of Stever's contributions to the Air Force and Defense Department in various fields cannot be detailed, but he has played a personal and significant role in many new scientific and technological areas such as radar, structural dynamic problems, supersonic and hypersonics, ballistics missiles, and anti-ballistic missiles. He has combined original work with major system management developments and then made important contributions to policy realizations. He has been one of this country's most powerful leaders in science, technology, and engineering affairs.

In international science exchange, Stever began in World War II in London with radar and guided missile liaison with British ministries, labs, and armed services.

Few individuals have been called upon to serve so broadly in the national science-society arena and few have accomplished so well the task of ensuring that wisdom, experience, and creativity be applied.

Edward C. Stone 55 YOUNGEND
Professor of Physics
California Institute of Technology
Pasadena, CA

Citation: For his outstanding leadership as project scientist for the Voyager space mission and its observation in the outer Solar System.

Summary of Achievements

Edward Stone is for both scientists and the intelligent public, representative of the most successful recent NASA mission, the exploration of the outer solar system by Voyager spacecrafts. Since 1972 he coordinated the science programs of eleven teams of experimenters on both Voyagers. Costing under $700 million, Voyagers I and II were ingeniously reprogrammed in midcourse to take advantage of gravitational boosts to attain sufficient velocity to travel outwards to otherwise inaccessible Uranus, Neptune and their satellites. Dr. Stone was central in coordinating new goals with the experimenters. As communications and computer programs improved during 12 years in space, the spacecraft became a more sophisticated scientific tool. Dr. Stone showed outstanding ability in coordinating the work of the science teams, seizing opportunities as new phenomena were recognized. The Voyager mission has drawn international acclaim for its outstanding scientific discoveries. It has established new standards of sophistication for planetary science as a richly rewarding field of scientific study. On several occasions during its twelve year tour, Voyager was challenged by life threatening problems which were masterfully overcome by Edward Stone. In addition, he interpreted to the media and to scientists under the pressure of short flyby times, the discoveries and their first scientific interpretations. Conscious of the need for communication with the public, he has also been active in television science program planning.

During the years of this responsible leadership position, he carried out space experiments on the composition and propagation of cosmic rays as principal investigator on 9 of 14 spaceflights. He has specialized in solar and flare cosmic rays, obtaining the otherwise unknown isotopic compositions of light and heavy elements at different energies.

His individual scientific accomplishments link astronomy with planetary science, geochemistry, plasma and cosmic-ray physics, representing a basis for a new area of broad scientific synthesis.

NOBEL PHYSICS

Steven Weinberg
Josey Regental Professor of Science
Department of Physics
University of Texas
Austin, TX

he's bad!

Citation: For his contributions to the discovery of the structure of the fundamental forces of nature; the development of the standard model, and the unification of the weak and electromagnetic forces.

Summary of Achievements

Since early in his scientific career in the late 1950's, Steven Weinberg has been recognized as one of the dominant voices in American physics and is considered one of the world's foremost theoretical physicists. He has contributed seminal ideas to almost every development of contemporary elementary particles physics. From his publication list of over 200 papers, one can construct a history of the development of our understanding the fundamental structure of matter.

Steven Weinberg is the most cited physicist of the last fifty years. He authored in 1967 one of the most cited physics papers, A Model of Leptons which proposed the unification of the weak and electromagnetic forces. For this work, Dr. Weinberg shared the 1979 Nobel Prize with Drs. Sheldon L. Glashow and Abdus Salam. Although this unification is one of the most important discoveries of the last thirty years, it is a part of the pattern of development inspired by the work of Dr. Weinberg which led to the realization that all of the fundamental forces are based on non-abelian gauge field theories. Dr. Weinberg is the leading architect of the other aspects of this discovery: the elementary particles fit into a simple pattern called the standard model which combines the theory of strong interactions with the electroweak theory.

Although Dr. Weinberg's work has been concentrated in the theory of elementary particles, he has also made significant contributions to astrophysics, cosmology, and magneto hydrodynamics. He is the author of the prize-winning The First Three Minutes: A Modern View of the Origin of the Universe, a widely read book making the modern ideas of the origin of the Universe understandable to a broad public.

Beyond his original research, Weinberg has been influential with his magnificent 1972 treatise Gravitation and Cosmology, a textbook that has introduced generations of young physicists and astrophysicists to general relativity and its applications to cosmology.

Paul C. Zamecnik
Principal Scientist
Worcester Foundation for Experimental Biology
Shrewsbury, MA

Citation: For his pioneering research on protein biosynthesis opening the door to biochemical attack, and paving the way for dissection of the genetic code; and for introducing the concept and method of "antisense DNA" as an approach to viral gene inhibition and chemotherapy.

Summary of Achievements

Paul Zamecnik has shown an outstanding ability to identify important problems and acquire the biochemical knowledge required to pursue them. He has played a large role in identifying the key features of protein synthesis. Together with a group of young investigators that he led with great skill, he achieved the first successful synthesis of protein in vitro, recognized its coupling to energy utilization, identified the presence of both particulate and soluble components, identified transfer RNA (initially called soluble RNA) as the set of carriers of activated amino acids, and developed the soluble protein-synthesizing system from Escherichia coli.

In the early 1950's Zamecnik described his unexpected observations that small RNA's showed finite separate capacities to bind specific amino acids and transfer them into biosynthesized proteins. This work moved progressively into the collaboration with Dr. Mahlon Hoagland on the in vitro biosynthesis of proteins, which proved fundamental in all subsequent analysis of protein synthesis, making possible the discovery of the mode of genetic coding of synthesis, the ribosome, and the accessory accelerating and other controlling factors. The physician-turned-biochemist turned the scalpel with which he teased apart the finely-integrated steps of protein synthesis and now trained it to block one of those steps.

As early as 1977 he recognized the possibility of inhibiting RNA virus replication by binding of a complementary (antisense) oligodeoxynucleotide. This recognition came to him as the result of his joint discovery with Walter Gilbert of the terminal repetitive sequences in the genomic RNA of a retrovirus, Rous sarcoma virus, and his proposal that the function of these sequences in viral replication might be blocked by a complementary oligodeoxynucleotide. This prescient idea was confirmed experimentally and has stimulated an active research field in the use of "anti-sense" nucleic acids as probes or inhibitors of cellular or viral gene expression.

In summary, Paul Zamecnik's work carried protein synthesis from the theater of physiological and metabolic studies into a precise biochemical science, paving the way for illumination of the process of genetic translation. His subsequent introduction of the "anti-sense" hybridization approach to the inhibition of viral gene expression has stimulated the emergence of an intensely active research field, with both therapeutic and experimental potential.

appeal to history till your metaphysics has assured you that there *is* a history to appeal to; and likewise your conjectures as to the future presuppose some basis of knowledge that there *is* a future already subjected to some determinations. The difficulty is to make sense of either of these ideas. But unless you have done so, you have made nonsense of induction.

You will observe that I do not hold induction to be in its essence the derivation of general laws. It is the divination of some characteristics of a particular future from the known characteristics of a particular past. The wider assumption of general laws holding for all cognisable occasions appears a very unsafe addendum to attach to this limited knowledge.

Whitehead, *Science and the Modern World,* III

116 The progress of science consists in observing these interconnections and in showing with a patient ingenuity that the events of this evershifting world are but examples of a few general connections or relations called laws. To see what is general in what is particular and what is permanent in what is transitory is the aim of scientific thought. In the eye of science, the fall of an apple, the motion of a planet round a sun, and the clinging of the atmosphere to the earth are all seen as examples of the law of gravity. This possibility of disentangling the most complex evanescent circumstances into various examples of permanent laws is the controlling idea of modern thought.

Whitehead, *Introduction to Mathematics,* I

117 All mathematical calculations about the course of nature must start from some assumed law of nature. . . . Accordingly, however accurately we have calculated that some event must occur, the doubt always remains—Is the law true? If the law states a precise result, almost certainly it is not precisely accurate; and thus even at the best the result, precisely as calculated, is not likely to occur. But then we have no faculty capable of observation with ideal precision, so, after all, our inaccurate laws may be good enough.

Whitehead, *Introduction to Mathematics,* III

118 In science the man of real genius is the man who invents a new method. The notable discoveries are often made by his successors, who can apply the method with fresh vigour, unimpaired by the previous labour of perfecting it; but the mental calibre of the thought required for their work, however brilliant, is not so great as that required by the first inventor of the method.

Russell, *Place of Science in a Liberal Education*

119 The kernel of the scientific outlook is a thing so simple, so obvious, so seemingly trivial, that the mention of it may almost excite derision. The kernel of the scientific outlook is the refusal to regard our own desires, tastes, and interests as affording a key to the understanding of the world. Stated thus baldly, this may seem no more than a trite truism. But to remember it consistently in matters arousing our passionate partisanship is by no means easy, especially where the available evidence is uncertain and inconclusive.

Russell, *Place of Science in a Liberal Education*

120 Man has existed for about a million years. He has possessed writing for about 6,000 years, agriculture somewhat longer, but perhaps not much longer. Science, as a dominant factor in determining the beliefs of educated men, has existed for about 300 years; as a source of economic technique, for about 150 years. In this brief period it has proved itself an incredibly powerful revolutionary force. When we consider how recently it has risen to power, we find ourselves forced to believe that we are at the very beginning of its work in transforming human life.

Russell, *Science and Tradition*

121 The effect of science upon our view of man's place in the universe has been of two opposite kinds; it has at once degraded and exalted him. It has degraded him from the standpoint of contemplation, and exalted him from that of action. The latter effect has gradually come to outweigh the former, but both have been important.

Russell, *Science and Tradition*

122 The way in which science arrives at its beliefs is quite different from that of mediaeval theology. Experience has shown that it is dangerous to start from general principles and proceed deductively, both because the principles may be untrue and because the reasoning based upon them may be fallacious. Science starts, not from large assumptions, but from particular facts discovered by observation or experiment. From a number of such facts a general rule is arrived at, of which, if it is true, the facts in question are instances. This rule is not positively asserted, but is accepted, to begin with, as a working hypothesis. If it is correct, certain hitherto unobserved phenomena will take place in certain circumstances. If it is found that they do take place, that so far confirms the hypothesis; if they do not, the hypothesis must be discarded and a new one must be invented. However many facts are found to fit the hypothesis, that does not make it certain, although in the end it may come to be thought in a high degree probable; in that case, it is called a theory rather than a hypothesis. A number of different theories, each built directly upon facts, may become the basis for a new and more general hypothesis from which, if true, they all follow; and to this process of generalization no limit can be set. But whereas, in mediaeval thinking, the most general principles were the starting point, in science they are the final

conclusion—final, that is
ment, though liable to b
still wider law at a later

Rus

123 The view is often defende
built up on clear and sh
cepts. In actual fact no s
exact, begins with such
ginning of scientific activ
scribing phenomena an
group, classify, and corr
stage of description, it is
plying certain abstract
hand, ideas derived from
tainly not the fruit of t
Still more indispensable
will later become the b
ence—as the material is
must at first necessarily
uncertainty; there can b
delimitation of their con
main in this condition,
standing about their me
ences to the material of
we seem to have deduce
which is, in point of fac
strictly speaking, they ar
tions; although everythi
chosen in no arbitrary m
the important relations t
material—relations that
we can clearly recogniz
It is only after more sear
field in question that v
with increased clarity t
derlying it, and progres
concepts that they beco
at the same time consi
deed, it may be time t
tions. The progress of s
a certain elasticity even

Freud, *In*

124 It is a mistake to believe
nothing but conclusively
it is unjust to demand
mand only made by th
authority in some form
religious catechism by s
a scientific one. Science
few apodictic precepts;
ments which it has dev
of probability. The ca
these approximations t
to carry on constructive
final confirmation are a
entific habit of mind.

1
He [the scholar] must be a solitary, laborious, modest, and charitable soul. He must embrace solitude as a bride. . . . That he may become acquainted with his thoughts.
EMERSON, *Nature, Addresses, and Lectures: Literary Ethics.*

To talk in public, to think in solitude, to read and to hear, to inquire and to answer inquiries, is the business of a scholar.
SAMUEL JOHNSON, *Rasselas.* Ch. 8.

Where should the scholar live? In solitude, or in society? in the green stillness of the country, where he can hear the heart of Nature beat, or in the dark, gray town, where he can hear and feel the throbbing heart of man?
LONGFELLOW, *Hyperion.* Bk. i, ch. 8.

2
Hell is paved with the skulls of great scholars.
GILES FIRMIN, *The Real Christian. See also* HELL: ITS PAVEMENT.

3
The world's great men have not commonly been great scholars, nor its great scholars great men.
O. W. HOLMES, *The Autocrat of the Breakfast-Table.* Ch. 6.

4
The classic scholar is he whose blood is most nuptial to the webbed bottle. . . . Port hymns to his conservatism.
GEORGE MEREDITH, *The Egoist.* Ch. 19.

5
The ink of the scholar is more sacred than the blood of the martyr.
MOHAMMED, *Tribute to Reason.*

6
A mere scholar, a mere ass.
ROBERT BURTON, *The Anatomy of Melancholy.* Pt. i, sec. ii, memb. 3, subsec. 15.

A mere scholar is a mere—you know the old proverb.
SUSANNAH CENTLIVRE, *Stolen Heiress.* Act i.

A scholar at court is an ass among apes.
JOHN CLARKE, *Paræmiologia,* 145.

This scholar, rake, Christian, dupe, gamester, and poet.
DAVID GARRICK, *Jupiter and Mercury.*

He was a rake among scholars, and a scholar among rakes.
MACAULAY, *Essays: Aikin's Life of Addison.* Referring to Sir Richard Steele.

7
He is yet a scholar, than which kind of man there is nothing so simple, so sincere, none better.
PLINY, of Isæus, the Greek sophist. (BURTON, *Anatomy of Melancholy,* i, ii, 3, 15.)

8
Love seldom haunts the breast where learning lies,
And Venus sets ere Mercury can rise.
Those play the scholars who can't play the men,
And use that weapon which they have, their pen.
POPE, *The Wife of Bath: Prologue,* l. 369.

9
He was a scholar, and a ripe and good one;
Exceeding wise, fair-spoken and persuading:
Lofty and sour to them that loved him not,
But to those men that sought him sweet as summer.
SHAKESPEARE, *Henry VIII.* Act iv, sc. 2, l. 51.

A scholar and a soldier.
SHAKESPEARE, *The Merchant of Venice.* Act i, sc. 2, l. 124.

Gentleman and scholar.
BURNS, *The Twa Dogs. See also under* GENTLEMAN.

SCHOOL, see Education

SCIENCE

I—Science: Definitions

10
Science is the labour and handicraft of the mind; poetry can only be considered its recreation.
FRANCIS BACON, *Description of the Intellectual Globe.* Ch. 1.

Science is for those who learn; poetry, for those who know.
JOSEPH ROUX, *Meditations of a Parish Priest.* Pt. i, No. 71.

11
What we might call, by way of eminence, the *dismal science.*
THOMAS CARLYLE, *The Nigger Question.* Referring to political economy and "social science."

The science of sciences. (Scientia scientiarum.)
S. T. COLERIDGE, *Biographia Literaria.* Ch. 12. Referring to philosophy. *See also under* PHILOSOPHY.

The science of fools with long memories.
PLANCHÉ, *Preliminary Observations: Pursuivant of Arms.* Speaking of Heraldry.

12
What art was to the ancient world, science is to the modern.
BENJAMIN DISRAELI, *Coningsby.* Bk. iv, ch. 1.

Science and art belong to the whole world, and the barriers of nationality vanish before them.
GOETHE, *Remark,* to a German historian, 1813

13
Science distinguishes a man of honour from one of those athletic brutes whom undeservedly we call heroes.
DRYDEN, *Fables: Preface. See also under* GAME.

14
Men love to wonder, and that is the seed of our science.
EMERSON, *Society and Solitude: Works and Days.*

15
Geometry, which is the only science that it

hath pleased God hitherto to bestow on mankind.
THOMAS HOBBES, *Leviathan*. Pt. i, ch. 4.

And Lucy, dear child, mind your arithmetic. . . . What would life be without arithmetic, but a scene of horrors?
SYDNEY SMITH, *Letters: To Miss* ——, 22 July, 1835.

1
Science is the topography of ignorance.
O. W. HOLMES, *Medical Essays*, p. 211.

Equipped with his five senses, man explores the universe around him and calls the adventure Science.
EDWIN POWELL HUBBLE, *Science*.

Human science is uncertain guess.
MATTHEW PRIOR, *Solomon*. Bk. i, l. 740.

True science teaches, above all, to doubt and to be ignorant.
MIGUEL DE UNAMUNO, *The Tragic Sense of Life*, p. 93.

2
A series of judgments, revised without ceasing, goes to make up the incontestable progress of science.
DUCLAUX, *Pasteur*, p. 111.

3
Science is nothing but perception.
PLATO, *Theætetus*. Sec. 182.

4
Economics, the science of managing one's own household. (*Οἰκονομικὴν*, administrandæ familiaris rei scientiam.)
SENECA, *Epistulæ ad Lucilium*. Epis. 89, sec. 10.

5
Science is the great antidote to the poison of enthusiasm and superstition.
ADAM SMITH, *The Wealth of Nations*. Bk. v, pt. 3, sec. 3.

6
Technocracy.
WILLIAM H. SMYTH. Used first by him in *Industrial Management*, March, 1919.

Scientific reorganization of national energy and resources, coördinating industrial democracy to effect the will of the people.
WILLIAM H. SMYTH, definition of technocracy. (*Concerning Irascible Strong*, 1926.)

Scientific management.
FREDERICK W. TAYLOR. Evolved as name for the "Taylor system" about 1910. (SULLIVAN, *Our Times*. Vol. iv, p. 77.)

7
Science is organized knowledge.
HERBERT SPENCER, *Education*. Ch. 2.

8
Science when well digested is nothing but good sense and reason.
STANISLAUS, King of Poland, *Maxims*. No. 43.

Science is a first-rate piece of furniture for a man's upper-chamber, if he has common-sense on the ground floor.
O. W. HOLMES, *The Poet at the Breakfast-Table*. Ch. 5.

Science is madness if good sense does not cure it. (Ciencia es locura Si buen senso no la cura.)
UNKNOWN. A Spanish proverb.

9
Science is a cemetery of dead ideas.
MIGUEL DE UNAMUNO, *The Tragic Sense of Life*, p. 90.

10
To define it rudely but not inaptly, engineering is the art of doing that well with one dollar which any bungler can do with two after a fashion.
ARTHUR M. WELLINGTON, *The Economic Theory of Railway Location: Introduction*.

II—Science: Apothegms

11
While bright-eyed Science watches round.
THOMAS GRAY, *Ode for Music*, l. 11.

Like truths of Science waiting to be caught.
TENNYSON, *The Golden Year*, l. 17.

12
Every science has been an outcast.
R. G. INGERSOLL, *The Liberty of Man, Woman and Child*.

13
Science is . . . like virtue, its own exceeding great reward.
CHARLES KINGSLEY, *Health and Education: Science*.

14
One Science only will one genius fit,
So vast is Art, so narrow human wit.
POPE, *Essay on Criticism*. Pt. i, l. 60.

15
[We] do not learn for want of time
The sciences which should become our country.
SHAKESPEARE, *Henry V*. Act v, sc. 2, l. 58.

16
Only when genius is married to science, can the highest results be produced.
HERBERT SPENCER, *Education*. Ch. 1.

17
Science moves, but slowly, slowly, creeping on from point to point.
ALFRED TENNYSON, *Locksley Hall*, l. 134.

Mystics always hope that science will some day overtake them.
BOOTH TARKINGTON, *Looking Forward*, p. 112.

III—Science: Its Shortcomings

18
'Twas thus by the glare of false science betray'd,
That leads, to bewilder; and dazzles, to blind.
JAMES BEATTIE, *The Hermit*. St. 5.

19
The atoms of Democritus,
And Newton's particles of light
Are sands upon the Red Sea shore,
Where Israel's tents do shine so bright.
WILLIAM BLAKE, *Mock On, Voltaire, Rousseau*.

(Mosbacher, Bromley, Massey on Bdcast)

Protocol Alexander

8:30 a.m.
Rev Damar Hawkins
9/16/91
— — — — — —
Dept. Sec. @ commerce
Rocky Schnabel;

Sec. Alexander

check w/ Clair Seckler
pr. 4 tech Mos. / Bromley

Massey read & cutting

9/16/91
@ 9:05 am read off screen to Damar; got
out of her mtg and read from Dale's
text and he approved.
—Bunton

McGroarty/Bunton
September 13, 1991
10:30 am
[AWARDS]

PRESIDENTIAL REMARKS: NATIONAL SCIENCE AND TECHNOLOGY AWARDS
SEPTEMBER 16, 1991
THE ROSE GARDEN
10:30 A.M.

It's my pleasure to welcome all of you to the Rose Garden. [Introductory acknowledgements: Secretaries Mosbacher and Lujan. Dr. Bromley. Dr. Walter Massey, Director of NSF. Henson Moore, Deputy Secretary of Energy.]

With us today are five Nobel laureates; leading engineers of the information age; authors of some of this century's world-changing discoveries and inventions -- men and women who compress quantum leaps of learning within a single lifetime of achievement. // From the first moments of creation -- to the frontiers of the solar system and, now with Voyager, beyond: The scope of your knowledge spans the canvas of human endeavor. //

Some of you are not only experts in your field -- you are the inventors of your field, the ones whose quest and questions turned to knowledge. //

Today, your nation recognizes your monumental accomplishments -- honors the difference you have made: Advancing human understanding, improving the human condition, helping mankind conquer ignorance and illness, helping this Nation compete and prosper. //

Today's award-winners range in age from the Pegasus Team -- a group of precocious 40-something scientists and one 37 year-old who designed and built the world's first private space rocket

-- to Admiral Grace Hopper, born in 1906, who pioneered the revolution that put personal computers on the desks of millions of Americans -- [[and dragged even this President into the computer age. It's been almost six months since my first computer lesson, and I'm making progress: I make the same mistakes -- but five times faster.]]

The men and women we honor exemplify not simply the life of the mind -- but the spirit of adventure and risk that accompanies the quest for advancement. / Take Stephen Bechtel, whose vision helped a city spring from the Saudi desert, helped turn the arctic waters of James Bay into a source of energy for millions of North Americans -- and who's now helping Kuwait rise up from the ashes of war. / Consider Colonel John Paul Stapp, expert on the human impact of G-force stress. When his experiments became too dangerous to impose on others, Colonel Stapp became his own subject. As an old naval aviator, I can hardly believe he's withstood 40-G's: that's the same as going from 632 miles per hour to a dead stop in 1.4 seconds. / Colonel Stapp put himself on the line -- and made flying safer for everyone from passengers on commuter shuttles to astronauts now orbiting on the shuttle Discovery. //

From the work of a single individual come benefits that can banish suffering -- and prolong life -- for many millions of people. Consider the career of Gertrude Elion, Nobel Prize winning biochemist. Her life's work spans the quests to defeat

leukemia and malaria -- to today's battle against AIDS and other immune system disorders. //

Together, your efforts transformed our world. Yet as a Nation, our honor for all you've done falls short if we fail to sustain your forward march. / This Administration has proposed what progress demands: record funding levels for research and development -- with funds channeled to the individual investigator and small research teams that so often redefine the state-of-the-art. To advance technology, we've focused funds on the areas of energy and aeronautics, biotechnology and advanced materials, high performance computing and communications. To advance science and engineering research, we've urged Congress to approve an 18 percent increase in funding for the National Science Foundation -- keeping us on track with our commitment to double spending on that vital research arm by the year 1994. // Our commitment to science and technology proves beyond doubt we will not shortchange the future. //

In the words of astronomer Edwin Powell Hubble: "Equipped with his five senses, man explores the universe around him, and calls the adventure Science." Science and technology hold open the hope of infinite possibility -- of answers that eluded Einstein, of a new world free from fear and want. That same shining future -- that new world of possibility -- exists within every child. // In the end, the progress of enlightenment comes down to education: what are we doing to cultivate the children sitting today in classrooms around the country -- the generation

we'll ask to provide solutions to the challenges of a new century, answers to questions that haven't yet been asked. /

Unless we act immediately, the next generation may not be equipped to follow in your footsteps. / All of you know our National Education Goals, and the strategy I call America 2000 -- our challenge to everyone with a stake in our schools to literally re-invent American education. / Well right now, in some studies of math and science aptitude, U.S. students rank dead last among the industrialized nations. That one statistic alone should shake us out of our complacency -- and show us the scope of the challenge we face. //

If we're going to be first in the world in math and science by the year 2000, there's not a moment to waste. Because we're serious, next year's budget targets $661 million for pre-college math and science education -- a one-year increase of 28 percent.

Today, I salute every one of you who has taken the time to share your wisdom in the classroom. I mentioned earlier we have five Nobel laureates in our midst today. Let me recognize another medal-winner for a singular distinction: Elvin Kabat, who's had the satisfaction of seeing one of his students go on to win a Nobel. //

We must preserve the vital connection between teaching and research. / That's the idea behind the Commerce Department's Technology Heroes program -- to turn Medal of Technology winners into role models for our children. / **And that's why, today, I am pleased to announce the establishment of the Presidential**

Faculty Fellows program -- to provide 5-year grants totaling $500,000 to as many as 30 young faculty members each year. These grants will support young scholars in their path-breaking work in science and technology -- and their teaching in the classroom. / Perhaps years from now, some of those Presidential Faculty Fellows will have their own day here in the Rose Garden. //

In honoring each of you, this Nation honors the boundless horizons of the human mind -- the soaring spirit of inquiry -- the special genius of the architects who fashion today's fantastic idea into tomorrow's usable tools. Your work stands as its own reward -- so let me simply add your nation's thanks. //

Once again, welcome to the White House, and congratulations on your well-earned honors. // Now, with the help of Dr. Massey, Secretary Mosbacher and Dr. Bromley, we will present the awards.

# # #

THE WHITE HOUSE

WASHINGTON

September 10, 1991

MEMORANDUM TO THE PRESIDENT

THROUGH: DAVID DEMAREST
TONY SNOW TS

FROM: BETH HINCHLIFFE BH

SUBJECT: ADDRESS TO PHILADELPHIA DRUG TREATMENT CENTER

On Thursday, September 12, you will be addressing an audience of approximately 250 at the V.A./Penn Addiction Treatment Center in Philadelphia. Secretary Derwinksi and Director Martinez are expected to attend. The audience will consist primarily of health professionals involved in drug research and treatment at this center.

Your remarks (10 minutes, cards) begin with a reflection on the Administration's progress since the National Drug Strategy was released. They then focus on the ways to deal with drug abuse -- treatment at centers like this for the already-addicted; and prevention through the development of a national moral conscience.

THE WHITE HOUSE

WASHINGTON

91 SEP 9 04:28

September 9, 1991

MEMORANDUM FOR THE PRESIDENT

THROUGH: DAVID DEMAREST
TONY SNOW TS

FROM: CURT SMITH CS

SUBJECT: REPUBLICAN EAGLES LUNCHEON

On Thursday, September 12th, at noon, you will deliver remarks (approximately 14 minutes/on cards) at the Republican Eagles luncheon in the Mayflower Hotel. Guests are generous contributors to the Republican National Committee, annually donating fifteen thousand dollars. 270 to 300 attendees are expected. Acknowledgements include Larry Bathgate, Bobby Holt, Jeanie Austin, and Bill McManus; also in the audience is Ambassador Kirkpatrick.

Your remarks focus on leadership; on the distinct functions of executive, judicial, and legislative powers; and on the distinction between executive administration in foreign and domestic policy. Your speech then elaborates on the various obstacles to executive will in the domestic arena -- specifically, congressional recalcitrance and delay.

McGroarty/Bunton
September 11, 1991
3:00 pm
[AWARDS]

PRESIDENTIAL REMARKS: NATIONAL SCIENCE AND TECHNOLOGY AWARDS
SEPTEMBER 16, 1991
THE ROSE GARDEN
10:30 A.M.

It's my pleasure to welcome all of you to the Rose Garden. [Introductory acknowledgements: Dr. Bromley. Secretary Mosbacher. Dr. William Massey, Director of NSF.]

With us today are five Nobel laureates; leading engineers of the information age; authors of some of this century's world-changing discoveries and inventions -- men and women who compress quantum leaps of learning within a single lifetime of achievement. // From the first moments of creation -- to the frontiers of the universe and, now with Voyager, beyond: The scope of your knowledge spans the canvas of human endeavor. //

Some of you are not only <u>experts</u> in your field -- you are the <u>inventors</u> of your field, the ones whose quest and questions turned to knowledge. //

Today, your nation recognizes your monumental accomplishments -- honors the difference you have made: Advancing human understanding, improving the human condition, helping mankind conquer ignorance and illness, helping this Nation compete and prosper. //

Today's award-winners range in age from <u>the Pegasus Team</u> -- a group of precocious 40-something scientists and one 37 year-old who designed and built the world's first private space rocket -- to <u>Admiral Grace Hopper</u>, born in 1906, who pioneered the

revolution that put personal computers on the desks of millions of Americans -- [[and dragged even this President into the computer age. It's been almost six months since my first computer lesson, and I'm making progress: I make the same mistakes -- but five times faster.]]

The men and women we honor exemplify not simply the life of the mind -- but the spirit of adventure and risk that accompanies the quest for advancement. / Take Stephen Bechtel, whose vision helped a city spring from the Saudi desert, helped turn the arctic waters of James Bay into a source of energy for millions of North Americans -- and who's now helping Kuwait rise up from the ashes of war. / Consider Colonel John Paul Stapp, expert on the human impact of G-force stress. When his experiments became too dangerous to impose on others, Colonel Stapp became his own subject. As an old naval aviator, I can hardly believe he's withstood ~~26~~ 40 G's: that's the same as going from 632 miles per hour to a dead stop in 1.4 seconds. / Colonel Stapp put himself on the line -- and made flying safer for everyone from passengers on commuter shuttles to astronauts on our space shuttle. //

Together, your efforts transformed our world. Yet as a Nation, our honor for all you've done falls short if we fail to sustain your forward march. / This Administration has proposed what progress demands: record levels for research and development -- with funds channeled to the individual investigator and small research teams that so often redefine the state-of-the-art. To advance technology, we've focused funds on

the areas of energy and aeronautics, biotechnology and advanced materials, high performance computing and communications. To advance science, we've urged Congress to approve an 18 percent increase in funding for the National Science Foundation -- keeping us on track on our 7-year commitment to double spending on that vital research arm by the year 1994. // Our commitment to science and technology proves beyond doubt we will not shortchange the future. //

In the words of astronomer Edwin Powell Hubble: "Equipped with his five senses, man explores the universe around him, and calls the adventure Science." Science and technology hold open the hope of infinite possibility -- of answers that eluded Einstein, of a new world free from fear and want. That same shining future -- that new world of possibility -- exists within every child. In the end, the progress of enlightenment comes down to education: what are we doing to cultivate the children sitting today in classrooms around the country -- the generation we'll ask to provide solutions to the challenges of a new century, answers to questions that haven't yet been asked. /

Unless we act immediately, the next generation may not be equipped to follow in your footsteps. Right now, in some studies of math and science aptitude, U.S. students rank dead last among the industrialized nations. That one statistic alone should shake us out of our complacency -- and show us the scope of the challenge we face. //

All of you know our ambitious goal to be first in the world in math and science by the year 2000. Because there's no time to waste, next year's budget targets $661 million for pre-college math and science education -- a one-year increase of 28 percent.

Today, I salute every one of you who has taken the time to share your wisdom in the classroom. I mentioned earlier we have five Nobel laureates in our midst today. Let me recognize another medal-winner for a singular distinction: Elvin Kabat, who's had the satisfaction of seeing one of his students go on to win a Nobel. //

We must preserve the vital connection between teaching and research. That's the idea behind the Commerce Department's Technology Heroes program -- to turn Medal of Technology winners into role models for our children. That's why I am announcing today the establishment of the Presidential Faculty Fellows program, to provide grants totaling $500,000 to up to 30 young faculty members. This money will support their path-breaking work in science and technology. Perhaps years from now, some of those Faculty Fellows will have their own day in the Rose Garden. //

In honoring each of you, this Nation honors the boundless horizons of the human mind -- the soaring spirit of inquiry -- the special genius of the architects who fashion today's fantastic idea into tomorrow's usable tools. Your work stands as its own reward -- so let me simply add your nation's thanks. //

Once again, welcome to the White House, and congratulations on your well-earned honors. {Now, Dr. Bromley and Secretary Mosbacher will present the awards.}

# # #

BIOGRAPHICAL SKETCH
UPDATED THROUGH MARCH, 1991

JOHN PAUL STAPP, M.D., PH.D., SC.D.

BORN: 11 July 1910, in Bahia, Brazil, first of four sons of Rev. Charles Franklin Stapp, native of Burnet, Texas, and Louise Shannon Stapp of Burleson Texas, both Southern baptist foreign missionaries. Rev. Stapp was president of the American Baptist College in Bahia from 1909 to 1918.

EDUCATION: Grammar school subjects until 1922 taught at home by parents and tutors. In 1922-23 one year of Brownwood Texas High School.
1923-26 San Marcos Baptist Academy, Texas, High School Diploma
1926-27 San Marcos Baptist Academy, Texas, Business School
1927-31 Baylor Univ., Waco Texas, B.A., Zoology and Chemistry
1931-32 Baylor Univ., Waco Texas, M.A., Zoology and Chemistry
1934-40 Univ. of Texas, Austin Texas, Ph.D.; Biophysics
1939-44 Univ. of Minnesota Medical School, Minneapolis; M.D. and rotatinginternship
1944-AUS Medical Field Service School, Carlisle Barracks, Penn
1944-45 Residency in Military Medicine, Lincoln Army Air Base Regional Hospital, Nebraska
1945- Flight Surgeon's Course, Randolph Air Force Base, Texas
1946- Industrial Medical Course, Kelly AFB, Texas
1955- Diplomate, American Board of Preventive Medicine
1956- D.Sc. (hon.) Baylor University, Waco Texas
1980 D. Sc. (hon.) New Mexico State University, Las Cruces, N. Mex,

MILITARY CAREER:
1942-43 2Lt. MAC AUS Reserve in Medical School
1943- Private and PFC Army Student training program, Med.Scho
1943- 1Lt. Medical Corps, AUS Reserve (internship)
1944- Oct. 4 called to active duty AUS-Schools and general du medical officer, Pratt Army Air Base, Kansas
1946- Captain, MC AUS industrial medical officer, flight surgeon, Tinker AFB, Oklahoma
1946- Project officer, Aeromedical Laboratory, Wright Patters Army Air Base, Ohio
1947- Project officer, Air Crew deceleration, Muroc Army Air Base, California
1948- Major AUS, Chief, Aeromidical Field Laboratory, Muroc Army Air Base, California
1952- Lt.Col. USAD (MC) Section Chief, Aeromedical Lab, Wright Patterson AFB, Ohio
1953- Senior Flight Surgeon and Chief, Aeromedical Field Lab., Holloman AFB, New Mexico
1954- Lt.Col. USAF, Chief Aeromedical Field Lab., Holloman AF
1957- Col. USAF, Chief Aeromedical Field Lab., Holloman AFB
1958- Chief, Aerospace Medical Lab, Wright-Patterson AFB, Ohio
1960- Chief Scientist, Aerospace Medical Division, Brooks AFB, Texas
1960- Colonel Medical Corps, Regular Air Force
1962- Chief Flight Surgeon

1965- Accident Pathology, Armed Forces Institute of Pathology, Washington, D.C.
1967- Detached Service, Dept. of Transportation, Highway and Traff Safety, Washington D.C.
1970- Retired USAF

ACADEMIC CAREER:

1932-34 Instructor, Decatur Baptist College, Decatur, Texas
1934-39 Tutor and Fellow, University of Texas, Austin, Texas
1939-43 Fellow, graduate and medical student, U of Minnesota Medic.
1956 COMMENCEMENT SPEAKER, BAYLOR UNIVERSITY, D. SC.(HON.)
1970-72 Consultant, DOT
1972-74 Adjunct Prof. USC, Institute of Safety and Systems Managem consultant
1975- Prof. USC, Safety and Systems Management Institute; Consulta
1980 NEW MEXICO STATE UNIVERSITY, D. SC. (HON)

PUBLICATIONS:

1. More than 50 original papers on medical and aerospace medical research and related subjects.
2. More than 12 chapters in textbooks and encyclopedias on accele ation, deceleration, aerospace medicine, space flight, etc.
3. Numerous articles for news media on subjects related to his re search and experiences.

CAREER CONTRIBUTIONS:

Colonel Stapp began as a general duty medical officer, served as a industrial medical officer, flight surgeon, research project offic laboratory chief, chief medical scientist of a research division i the Air Force Systems Command, on detached service to the U.S. Dep ment of Transportation as a chief scientist, and as a consultant t the Surgeon General USAF and to the National Aeronautical and Spac Administration.

He organized and founded two laboratories for the U.S. Air Force: The Aeromedical Facility of Edwards Air Force Base, California and the Aeromedical Field Laboratory of Holloman Air Force Base, N.M. From 1946 through 1963, Colonel Stapp pioneered in research on the effects of mechanical force on living tissues. Several thousand e periments in the course of these investigations explored a quantit tive stress analysis of the human body to limits of voluntary tole ance of crash type impacts and decelerations. Injurious and letha end points for these forces were determined on suitably anesthetiz chimpanzees, swine and black bears within the human weight range. These dynamic stress analyses provide criteria for aircraft, space cabin and ground vehicle crash protection design; for tolerance li of trajectories for aircraft ejection seats and escape capsules thro the subsonic to hypersonic flight range; and basic data applicable impact forces of launch and ram deceleration expected in space bal tic flight. Concurrently, effects of windblast were studied by ex posures of volunteers on high speed rocket sleds and during jet ai craft flights with canopy removed. Colonel Stapp was his own volu teer subject for 29 rocket sled experiments, which included crash

gravity, including 40 gravity peaks, and windblast of 1105 pounds per square foot. This exposure was achieved by accelerating a rocket sled to 632 miles per hour in 5 seconds in 2910 feet, then decelerating it in 690 feet and 1.4 seconds to a stop. This last experiment of the series occured on 10 December 1954.

CORRECT THE G-FACTOR!

Following a tour as Chief of the Aerospace Medical Laboratory of Wright Air Development Center in 1958-60, and as Chief Scientist at the Aerospace Medical Division, 1960-65, Brooks Air Force Base, Texas, Colonel Stapp served at the Armed Forces Institute of Patholo in Washington, D.C., until 1967, when his services, as a Medical Scie tist were requested by Secretary Boyd of the newly organized Depart- ment of Transportation. He was on detached service with the National Highway Traffic Safety Administration until his retirement from the Air Force in August 1970, continuing as a consultant until April, 1972, when he joined the faculty of the University of Southern Calif ornia as Adjunct Professor in the Systems Management Center.

HONORS:

National Air Council Award for outstanding research contribution by an Air Force Officer in 1951.
Legion of Merit for research in human tolerance to abrupt decelerati in 1952.
John Jeffries Award of the Institute of Aeronautical Sciences, for outstanding contributions to aeronautics through medical research, in 1953.
Air Power Award for Science, from the Air Force Association in 1954.
Flight Safety Foundation Award for contributions to commercial air transport safety, in 1954.
In 1955, the Air Force Cheney Award for Valor, and an Oak Leaf Cluste to the Legion of Merit.
The Wilde Award of the American Rocket Society in 1956.
The Gorgas Award, Association of Military Surgeons, in 1957.
The Liljencrantz Award of the Aerospace Medical Association in 1957.
The Distinguished Alumni Service Award, University of Minnesota Medical School, 1958.
Purkinje Award, Czechoslovakian Medical Association in 1966.
The Golden Plate Award of the Academy of Achievement, in 1962.
Distinguished Service Award, National Reserve Officers Association, in 1963.
Distinguished Alumnus Award, San Marcos Baptist Academy, on the occasion of delivering a baccalaureate address at the 1963 Commence- ment Exercises.
Medical Tribune Award for contributions to automotive safety, in 1965.
Distinguished Services Medal, United States Air Force, in 1971.
Distinguished Service Award, American Association for Automotive Med. in 1972.
Elliot Cresson Medal, Franklin Institute, 1973
SAFETY ENGINEERING EXCELLENCE AWARD, U.S. DEPARTMENT OF TRANSP. 1979
HONDA MEDAL, AMERICAN SOCIETY OF MECHANICAL ENGINEERS 1984

ORGANIZATIONS:
Member, National Advisory Committee for Aeronautics Subcommittee on Flying Safety, 1955-58.
President, American Rocket Soc

U.S. Department of Commerce
Washington, D.C. 20230

U.S. DEPARTMENT OF COMMERCE
TECHNOLOGY ADMINISTRATION

THE UNDER SECRETARY FOR TECHNOLOGY
TECHNOLOGY ADMINISTRATION

FACSIMILE TRANSMITTAL SHEET

Number of Pages (including cover sheet): 4

Telephone Number: 202/377-1575
Fax Number: 202/377-4498
Room: HCHB 4824-C

Date: 11 Sept 1991

To: JEANNIE BUNTON

Agency/Company: RESEARCH

FAX number: 456-1651 Telephone number: _____

* * * * *

From: **John F. Sargent**

Division: **Director of Public Affairs**

Telephone: **202/377-1397**

SPECIAL INSTRUCTIONS/MESSAGE: Please note 40Bs on page 2 of the bio.

Dr. Massey reads the citations, and assisted by Dr. Bromley and Sec. Mosbacher, the President presents the medals.

Intro. acknowledgments

Henson Moore
Sec. Lujan

McGroarty/Bunton
September 10, 1991
5:45 pm
[AWARDS]

PRESIDENTIAL REMARKS: NATIONAL SCIENCE AND TECHNOLOGY AWARDS
SEPTEMBER 16, 1991
THE ROSE GARDEN
TIME?? 10:30 AM

It's my pleasure to welcome all of you to the Rose Garden. [Introductory acknowledgements: Dr. Bromley. Secretary Mosbacher. Dr. William Massey, Director of NSF.]

With us today are five Nobel laureates; leading engineers of the information age; authors of some of this century's world-changing discoveries and inventions -- men and women who compress quantum leaps of learning within a single lifetime of achievement. // From the first moments of creation -- to the frontiers of the universe and, now with Voyager, beyond: The scope of your knowledge spans the canvas of human endeavor. //

Some of you are not only <u>experts</u> in your field -- you are the <u>inventors</u> of your field, the ones whose quest and questions turned to knowledge. //

Today, your nation recognizes your monumental accomplishments -- honors the difference you have made: Advancing human understanding, improving the human condition, helping mankind conquer ignorance and illness, helping this Nation compete and prosper. //

Today's award-winners range in age from <u>the Pegasus Team</u> -- a group of precocious 40-something scientists and one 37 year-old who designed and built the world's first private space rocket -- to <u>Admiral Grace Hopper</u>, born in 1906, who pioneered the

revolution that put personal computers on the desks of millions of Americans -- [[and dragged even this President into the computer age. It's been almost six months since my first computer lesson, and I'm making progress: I make the same mistakes -- but five times faster.]]

The men and women we honor exemplify not simply the life of the mind -- but the spirit of adventure and risk that accompanies the quest for advancement. // Take Stephen Bechtel, whose vision helped a city spring from the Saudi desert, helped turn the arctic waters of James Bay into a source of energy for millions of North Americans -- and who's now helping Kuwait rise up from the ashes of war. // Consider Colonel John Paul Stapp, expert on the human impact of G-force stress. When his experiments became too dangerous to impose on others, Colonel Stapp became his own subject. As an old naval aviator, I can hardly believe he's withstood ~~36~~ 26-G's: that's the same as going from 632 miles per hour to a dead stop in 1.4 seconds. / Colonel Stapp put himself on the line -- and made flying safer for everyone from passenger [illegible]es to astronauts on our space shuttle. //

Check w/ John Sargent
36 G =
632 mph to 0
in 1.4 seconds
Not 36-Gs, but
26-Gs

Together, your efforts [illegible]rld. Yet as a Nation, our honor for all [illegible]ort if we fail to sustain your forward march [illegible]ation has proposed what progress demands: re[illegible]earch and development -- with funds [illegible]dividual investigator and small re[illegible] often redefine the

state-of-the-art. To advance technology, we've focused funds on the areas of energy and aeronautics, biotechnology and advanced materials, high performance computing and communications. To advance science, we've urged Congress to approve an 18 percent increase in funding for the National Science Foundation -- keeping us on track on our 7-year commitment to double spending on that vital research arm by the year 1994. // Our commitment to science and technology proves beyond doubt we will not shortchange the future. //

QUOTE.

Science and technology hold open the hope of infinite possibility -- of answers that eluded Einstein, of a new world free from fear and want. That same shining future -- that new world of possibility -- exists within every child. In the end, the progress of enlightenment comes down to education: what are we doing to cultivate the children sitting today in classrooms around the country -- the generation we'll ask to provide solutions to the challenges of a new century, answers to questions that haven't yet been asked. /

Unless we act immediately, the next generation may not be equipped to follow in your footsteps. Right now, U.S. students rank 12th in math and science -- dead last among the industrialized nations. That one statistic alone should shake us out of our complacency -- and show us the scope of the challenge we face. //

All of you know our ambitious goal to be first in the world in math and science by the year 2000. Because there's no time to

Do you remember which ed. speech you used this in before?

waste, next year's budget targets $661 million for pre-college math and science education -- a one-year increase of 28 percent. //

Today, I salute every one of you who has taken the time to share your wisdom in the classroom. I mentioned earlier we have five Nobel laureates in our midst today. Let me recognize another medal-winner for a singular distinction: Elvin Kabat, who's had the satisfaction of seeing one of his students go on to win a Nobel. //

We must preserve the vital connection between teaching and research. That's the idea behind the Commerce Department's Technology Heroes program -- to turn Medal of Technology winners into role models for our children. That's why I am announcing today the establishment of the Presidential Faculty Fellows program, to provide grants totaling $500,000 to up to 30 young faculty members to support their path-breaking work in science and technology. Perhaps years from now, some of those Faculty Fellows will have their own day in the Rose Garden. //

In honoring each of you, this Nation honors the boundless horizons of the human mind -- the soaring spirit of inquiry -- the special genius of the architects who fashion today's fantastic idea into tomorrow's usable tools. Your work stands as its own reward -- so let me simply add your nation's thanks. //

Once again, welcome to the White House, and congratulations on your well-earned honors. {Now, Dr. Bromley and Secretary Mosbacher will present the awards.}

McGroarty/Bunton
September 10, 1991
10:00 am
[AWARDS]

PRESIDENTIAL REMARKS: NATIONAL SCIENCE AND TECHNOLOGY AWARDS
SEPTEMBER 16, 1991
THE ROSE GARDEN
TIME??

It's my pleasure to welcome all of you to the Rose Garden. [Introductory acknowledgements: Dr. Bromley. Secretary Mosbacher. Dr. William Massey, Director of NSF.] // Seldom has there been in one place a collection of individuals with such tremendous impact on the state of science and technology.

With us today are five Nobel laureates;. leading engineers of the information age; authors of some of this century's world-changing discoveries and inventions -- men and women who compress quantum leaps of learning within a single lifetime of accomplishment. // Some of you are not only <u>experts</u> in your field -- you are the <u>inventors</u> of your field, the ones whose quest and questions turned to knowledge. //

[[Surely, among all this incandescent intellect, there is even someone who knows how to set the clock on a VCR.]]

From the first transatlantic cable to the age of the satellite link and the fax machine -- from the frontiers of the universe and, now with Voyager, beyond -- to the first moments of creation: The scope of your knowledge spans the entire canvas of human endeavor. //

Today, your nation recognizes your monumental accomplishments -- honors the difference you have made:

STAPP BASICALLY PUT SEAT BELTS IN AUTOS - WORKING ON # OF LIVES SAVED FROM SEAT BELT USE/

→ JOHN SERGANT COMMERCIALS

WORKING ON CONFIRMATION OF AGES/EXACT DOB(S)

airplane 1903

automobile 1885
gas engine

ISOTOPE LABELING 1913

TELEVISION 1926

Advancing human understanding, improving the human condition, helping mankind conquer ignorance and illness, helping this Nation compete and prosper. //

Today's award-winners range in age from the Pegasus Team -- a group of precocious young 40-year olds who designed and built the world's first private space rocket -- to Admiral Grace Hopper, born in 1901, the days before the airplane and automobile, who pioneered the revolution in computer languages that put computers on the desks of millions of Americans -- even my own. //

The men and women we honor exemplify not simply the life of the mind -- but the spirit of adventure and risk that accompanies the quest for advancement. // Take Stephen Bechtel, whose vision helped a city spring from the Saudi desert, helped turn the arctic waters of James Bay into a source of energy for millions of North Americans -- and who's now helping Kuwait rise up from the ashes of war. // Consider Colonel John Paul Stapp, expert on the limits of human endurance. When his experiments on G-Force stress became too dangerous to impose on others, Colonel Stapp became his own subject. He put himself on the line -- and made flying safer for everyone from passengers on commuter shuttles to astronauts on our space shuttle. //

Your efforts transformed our world. Yet as a Nation, our honor for all you've done falls short if we fail to sustain your forward march. / This Administration has proposed what progress demands: record levels for research and development -- with funds targeted on the individual investigator and small research

"Am. students consistently come in last or near last in math/science and science in the world when compared w/ students in other industrialized nations."

Kirk Winter SEC of ED off.

Draum - International Assessment of Educational Prog. 1988

Focus on 6 countries/ 6 nations/ 4 Canad. Provences

- UNDERACHIEVERS Curriculum 1989

8th grade 1st 20 countries participate

US Arith 10 of 20

Algebra 12/20

12th graders 15 countries

Geom 12/15

advanc algebra 14/15

JUST MATH

- Vance Grant → OFFICE OF ED. RESEARCH

"A WORLD OF DIFFERENCES 1989 ED. TEST SERVICE

13 yrs. old 12 countries or parts of

US 12th out of 12 in math

9th of 12 in Science

Science 1988 Achievement in 17 countries

10/14/high school ages

10: 8/15 tied

14: 13/17

9th school

Bio. 13/13

Chem. 11/13

Physics. 9/13

teams that are so often the leading edge of scientific enterprise. To advance technology, we've focused funds on the areas of energy and aeronautics, biotechnology and advanced materials, high performance computing and communications. To advance science, we've built into our budget an 18% increase in funding for the National Science Foundation -- keeping us on track on our 7-year commitment to double spending on that vital research arm by the year 1994. //

In technology and science, each challenge is a world of possibility. So, too, is every child. In the end, the progress of enlightenment comes down to education: what are we doing to cultivate the children sitting today in classrooms around the country -- the generation we'll ask to provide solutions to the challenges of a new century, answers to questions that haven't yet been asked. /

Unless we act immediately, the next generation may not be equipped to follow in your footsteps. Right now, the U.S. students rank 12th in math and science -- dead last among the industrialized nations. I can think of no other single statistic that should shake us out of our complacency -- show us the scope of the challenge we face to prepare right now for the century ahead. //

All of you know our ambitious goal to be first in the world in math and science by the year 2000. Because there's no time to waste, next year's budget targets $622 million for pre-college math and science education -- a one-year increase of 28%. //

Today, I salute every one of you who has taken the time to share your wisdom in the classroom -- to see that part of your quest to advance your corner of knowledge is to help spark this nation's young minds. I mentioned earlier we have five Nobel laureates in our midst today. Let me recognize another medal-winner for a singular distinction: Elvin Kabat, who's had the satisfaction of seeing one of his students go on to win a Nobel. //

We must preserve the vital connection between teaching and research. That's the idea behind the Commerce Department's Technology Heroes program -- to turn Medal of Technology winners into role models for our children. That's why I am announcing today the establishment of the Presidential Faculty Fellows program, to provide up to 30 young faculty members in science and engineering five-year grants totaling $500,000 to support their path-breaking work in science and technology. Perhaps years from now, some of those Faculty Fellows will have their own day in the Rose Garden. //

In honoring each of you, this Nation honors the boundless horizons of the human mind -- the soaring spirit of inquiry -- the special genius of the architects who fashion today's fantastic idea into tomorrow's usable tools. Your work stands as its own reward -- so let me simply add your nation's thanks. //

Once again, welcome to the White House, and congratulations on your well-earned honors. [Now, Dr. Bromley and Secretary Mosbacher will present the awards.]

# # #

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

September 6, 1991

MEMORANDUM FOR TONY SNOW
DAN McGROARTY
JEANNIE BUNTON

FROM: STEVE OLSON

SUBJECT: PRESIDENTIAL REMARKS

Attached are some talking points for the President's remarks on September 16 to honor the recipients of the Medals of Science and Medals of Technology.

The talking points include the announcement of a new program called the Presidential Faculty Fellows Program, and I've included a draft press release and fact sheet that describe the program. The release and fact sheet were prepared in August when it appeared as if the program might be announced then. Other events intervened, and the announcement has been delayed until now.

Both the press release and the fact sheet have been cleared through staffing, and Andy Card has approved announcing the program in September. I don't know if the press office will want to issue a separate press release with the program being announced in a speech, but we are going to send the draft release to them as input for whatever they chose to do.

cc: Allan Bromley
Ken Yale

Steve Olson
Sept. 6, 1991

OUTLINE AND TALKING POINTS FOR PRESIDENTIAL REMARKS
AT MEDALS OF SCIENCE AND TECHNOLOGY CEREMONY

September 16, 1991

I. Introduction and Welcome

• Throughout the history of this nation, scientists and engineers have been welcomed to the White House -- both to provide information and advice on issues of national importance and to be honored for their contributions to society. It is a privilege for me to be a part of that tradition.

II. Importance of Science and Technology to Society

• Today we stand in the midst of a scientific and technological revolution unparalleled in history. Scientific research has given us a profound new understanding of ourselves and of the universe in which we live. It has taught us about the first moments of creation and about the Earth under our feet, about the nature of living things and about the treatment of disease. It has pulled back the curtain of ignorance to reveal a world of great elegance and grandeur.

• And in technology, new devices and new processes are sweeping through American life, transforming our factories, our offices, our schools, and our homes. Computers and telecommunications help us manage vast amounts of information. High technology has revolutionized manufacturing, giving us better products that are less expensive. And just a few months ago, in Operation Desert Storm, technology demonstrated its ability to preserve freedom while safeguarding the precious lives of American men and women.

• Science and technology have been remaking America, but their influence does not stop at our borders. In Eastern Europe, in the Soviet Union, throughout the world, science and technology have been at the root of momentous changes. Modern communications technologies have not given us George Orwell's vision of a Big Brother peering over every shoulder. They have given us many new channels and sources of information, so that it becomes impossible for governments to control the most powerful force in modern society -- the force of an idea. The radio, the

television, the videotape recorder, the fax machine -- all have played a part in the revolutions of the past few years, and all will continue to reshape our world.

• It is not surprising that science, technology, and freedom have prospered together. Science and technology are the products of free men and women going wherever their curiosity and ingenuity will take them. As Thomas Huxley once wrote, "Science commits suicide when it adopts a creed." Or in the words of Robert Oppenheimer, "As long as men are free to ask what they must -- free to say what they think -- free to think what they will -- freedom can never be lost and science will never regress."

III. Challenges and the U.S. Response

• As dramatic as past advances have been, the revolution in science and technology is just beginning. An understanding of the fundamental laws of nature, new forms of energy and transportation, the conquest of illness -- including mental illness -- these are all now within our reach. In the process, science and technology will generate new opportunities and new markets throughout the world.

• Other countries recognize the potential of science and technology, and they are working hard -- as we are -- to realize that potential. As a result, our researchers, our firms, and our workforce are being tested. New technologies, foreign competition, and rapidly changing global markets are reshaping virtually every product, service, and job in America. We must aggressively manage those changes if we are to go head-to-head with the competition.

• This Administration is committed to seeing that science and technology continue to prosper in this country. We have proposed record levels of research and development and have focused specifically on the individual investigator and small-team research that is at the heart of the scientific enterprise. In technology, we are proposing special efforts in biotechnology and advanced materials, in energy technologies and aeronautics, in high performance computing and communications.

• For much of this century, the United States has led the world in science and technology. Now, as we prepare for the 21st century, our lead in creating new knowledge and new technologies isn't enough. We must continuously improve our ability to use the new science and new technologies that we have created.

IV. The Link to Education

• In the long run, the only way to ensure that this country will lead the world in science and technology is through education. Right now -- among America's young faculty members, in its colleges and universities, and in its secondary and elementary schools -- are the young people who will someday fill your shoes. We need to give them the opportunity to excel.

are teaching them to fill

• That is why I am today announcing a new Presidential awards program to be administered through the National Science Foundation called the Presidential Faculty Fellows Program. It will provide up to 30 young faculty members in science and engineering with $100,000 each for five years to support innovative and far-reaching developments in science and technology.

• By establishing this new program, I hope to encourage outstanding young scientists and engineers who demonstrate exceptional promise in research, teaching, and academic leadership. These awards recognize one of this nation's most precious resources -- our young scientists and engineers at the leading edge of their fields. They also demonstrate the vital interdependence of teaching and research, an interdependence that will be critical for America to continue to lead the world in science and technology.

George Rathmann president of this private sector foundation will be at the meeting

• The Commerce Department is also contributing to mathematics and science education. In its Technology Heroes program, it is using the recipients of the National Medal of Technology as role models to inspire our young people. At the same time, the private sector Foundation for the National Technology Medal is fostering a greater understanding of the vital role that technology plays in our global economy. I offer my appreciation to the foundation's chairman, George Rathmann, for his leadership in founding this organization.

V. Conclusion

• In honoring you today, we honor the twin American ideals of innovation and entrepreneurship. No nation is better prepared to lead the world into the technological frontiers of the 21st century. That is our heritage, and the men and women we honor today prove that innovation and excellence are still vital parts of American life.

• Through your work and your ambitions, you have pointed the way to the future. We may not know exactly what that future will bring, but we know that it holds great promise for all of humanity.

DRAFT

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release August TK, 1991

ESTABLISHMENT OF PRESIDENTIAL FACULTY FELLOWS PROGRAM

FACT SHEET

The President today announced a new award program that will recognize, honor, and support outstanding young scientists and engineers in America's colleges and universities. Known as the Presidential Faculty Fellows (PFF) Program, it will provide awardees with $100,000 each year for five years.

By supporting young faculty members in science and engineering, the program will foster innovative and far-reaching developments in science and technology, increase the attractiveness of careers in science and engineering, recognize the interdependence of teaching and research in achieving excellence, and highlight the importance of science and technology to the nation's future.

The program has the following features:

- Nominees will be judged on the basis of their competence and leadership in research, as demonstrated by their research accomplishments, publications, recognition by the community, and other noteworthy achievements, and on the basis of their competence and leadership in teaching, as evidenced by the design of new courses and curricula, published books and articles, service to the community, and other important educational contributions.

- Up to 30 PFF awards are planned each year, to be divided equally between engineering and science disciplines. Nominees may work in any discipline of science or engineering normally supported by the National Science Foundation. Recipients may use the awards for research and teaching purposes as they decide.

- The President or Chief Academic Officer of any U.S. university or college offering a baccalaureate or graduate degree in science or engineering may nominate up to two young faculty members who have received their first faculty position within the last four years.

DRAFT

• The National Science Foundation will manage the program, administer the evaluation process, and fund the awards, with final award decisions being made by the White House. The first awards will be made in Fiscal Year 1992.

#

DRAFT

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release August TK, 1991

The President today announced a new award program to recognize and support the scholarly activities of some of the nation's most promising young scientists and engineers.

The program will provide awardees with $100,000 each year for five years. Known as the Presidential Faculty Fellows (PFF) Program, it will represent the Federal government's most prestigious award for young U.S. science and engineering faculty.

"By establishing this new program, I hope to encourage outstanding young scientists and engineers who demonstrate exceptional promise in research, teaching, and academic leadership," the President said. "These awards recognize one of this nation's most precious resources -- our young scientists and engineers at the leading edge of their fields. They also demonstrate the vital interdependence of teaching and research, an interdependence that will be critical for America to continue to lead the world in science and technology."

Up to 30 PFF awards are planned each year, with nominees to be judged on the basis of their competence and leadership in research and teaching. Nominees may work in any discipline of science or engineering normally supported by the National Science Foundation. Recipients may use their awards for research and teaching purposes as they decide.

The National Science Foundation will manage the program, administer the evaluation process, and fund the awards, with final award decisions being made by the White House. The first awards will be made in Fiscal Year 1992.

#

9 September 1991

MOT - OLDEST ? YOUNGEST
STAPP - BASICALLY SAVED BELUGAS AMOS #LIVES SAVED

MEMORANDUM FOR DAN MCGROARTY

FROM: JEANNIE BUNTON

SUBJECT: NAT'L MEDAL OF SCIENCE AND TECHNOLOGY

GENERAL INFO:

0 284 National Medals of Science awarded since Kennedy named Dr. Theodore von Karman first recipient in 1962; 8 posthumous awards, (Kennedy remarks enclosed);

0 50 individuals and 2 companies have received the MOT, first medals awarded in 1985, (Reagan remarks enclosed);

THIS YEARS RECIPIENTS INCLUDE:

0 recipients are well-published, hold honorary degrees, are visiting professors at universities int he United States, England and Europe, have teaching experience, and continue to be involved in the classroom

0 ~~five~~ 6 Nobel Laureates -- Elion (1988 co-winner); Luria (1969); Schawlow (1981), and Seaborg (1951), Weinberg (1979); deceased ? YES add Herschbach (1968 co-winner) deceased

0 seven MOS recipients were nominated for the Medal for the first time,

0 Four recipients are Phi Beta Kappa;

NEAT IDEAS YOU TOSSED OUT:

0 "not only are they inventors, but they invented their own fields, some have invented their own languages (Hopper - COBOL, and Breslow - "anti-aromaticity";

0 comparisons or parallels - atmosphere (ecologically) to atmosphere (outer space); computers to G-force testing to Voyager missions

MEDAL OF TECHNOLOGY:

0 18 recipients (2 posthumous) awarded by Commerce;

0 Oldest - Admiral Grace Hopper, 89 or 90 years old, (may not be attending), ~~invented the term~~ "bug" as relates to computer programming problems, worked with first large-scale digital computer - Mark 1, wrote its programming manual, led the development of the first English language compiler which was a major input to COBOL;

0 Youngest - the Pegasus Team, mid 40s, invented, developed and produced the ~~Pegasus~~ Rocket, the world's first privately

developed space launch vehicle. First all-new unmanned launch vehicle to be developed in the U.S. in 20 years;

OTHER NOTABLE INFO:

0 Dr. Carl Djerassi invented the first oral contraceptive for which won the National Medal of Science in 1973;

0 Robert Galvin - first to win both the Malcolm Baldridge award and the National Medal of Technology;

0 Stephen Bechtel - presently playing a major role in the reconstruction of Kuwait;

0 Col. John Stapp - G-force testing for manned space flights, was subject of his own experiments because students wouldn't do it;

0 Dr. Kenneth Iverson - revitalizing the domestic specialty steel industry;

MEDAL OF SCIENCE:

0 20 MOS recipients (1 posthumous) awarded by NSF;

0 Oldest - Folke Skoog, 83, C. Leonard Prof. of Botany Emeritus, Univ. of Wisconsin, awarded for pioneering work on plant hormones, discovered a major class of plant hormones;

0 Youngest(s) - George H. Heilmeier, 55, former White House Fellow (70-71) served as special assistant to the Secretary of Defense, Sr. VP and Chief Technological Officer at Texas Instruments, awarded for technological competitiveness, pioneered work on liquid crystal displays at RCA, Director of the Defense Advanced Research projects, served on advisory committee to NASA, twice received the DOD Distinguished Civilian Service Medal - the highest civilian award in DOD;

and -

Edward Stone, 55, Prof. of Physics, CIT (commencement address there), for the Voyager Space mission, also active in television science program planning;

OTHER NOTABLE INFO:

0 Mary Eden Avery - cutting trip to Crimea short to receive award;

0 Ronald Breslow - bringing 84 year old dad along, introduced the concept of BIOMETIC CHEMISTRY, a term he introduced, coined the term "anti-aromaticity"

- 0 Gertrude B. Elion - 1988 NOBEL (co-winner), will be named to the Women's Hall of Fame in a November ceremony to be held in the District for her pioneering work that helped develop drugs to combat leukemia, malaria, herpes, and immune system disorders. Techniques she helped devise led to the development of the AIDS drug AZT, Presidential appointee on National Cancer Advisory Board;

- 0 G. Evelyn Hutchinson (posthumous) nephew flying in from London to accept award;

- 0 Elvin A. Kabat - former students include one Nobel Laureate;

- 0 Arthur Schawlow - invented the laser, for which won a Nobel prize in Physics 1981, 73 California Scientist of the Year, 2 awards established in his name

- 0 H. Guyford Stever - former director of NSF, former President's science advisor (76-77 Nixon and Ford) "nice to be on receiving end instead of handing them out", chair the White House Energy R&D Advisory Committee;

- 0 Glen T. Seaborg - member, President's Science Advisory Committee (59-61);

- 0 Paul Marks - former member of the President's Biomedical Research Panel;

TALKING POINTS FROM OSTP:

- 0 Neato quotes by Huxley and Oppenheimer

- 0 para on administration commitment is pretty good

- 0 para on new Fellows announcement: first awards will be made in fiscal 92, up to 30 PFF planned each year, Federal Government's most prestigious award for young U.S. science and engineering faculty, $100,000 a year for five years to be used for research or teaching;

- 0 para on Heroes program - the foundation president (George Rathman) will be in the audience

OMB:

- 0 Budget includes a $661 million (a 28% increase over 91 funding) for precollege math and science ed. programs;

- 0 $76 billion in 92 for research and development, including R&D facilities;

- 0 18% increase for NSF to a total of $2.7 billion, continuing the commitment to double the NSF budget between 1987 and 1994;

SEE NEXT PAGE

0 $638 million (increase of $149 million or 30%) over 91 for new initiative in high performance computing and communications;

0 increase of $225 million or 13%, to $1,941 million for math and science education. ~~28% of $146 million targeted to precollege level;~~ Of the total increase, $146 million, a 28% increase, is targeted toward the precollege level.

POTUS REMARKS FROM 89 and 90:

0 in each speech recognizes four recipients - that's all.

MEDAL OF SCIENCE AND TECHNOLOGY
Notes 9/9/91

Pending Acknowledgements:

Bromley, Mosbacher (both on dias with POTUS)

Dr. William Massey, dir. NSF will sit with medalist, unless he is asked to present (Mosbacher doens't wnat to do it this year) extremely tentative

would be nices: (mentions that is)

George Rathman, president of the private sector foundation Heroes program (Commerce lobbied hard for a mention - brought up volunteerism and POLs)

NOTE: The President's letter to Secretary of Health, Education, and Welfare Anthony J. Celebrezze was also made public. In the letter the President asked the Secretary to provide every possible help to the Commissioners in order that Washington might become an example and a showplace to the rest of the world. He also stated that he was pleased to learn that the National Institute of Mental Health was planning to use demonstration funds in its 1964 budget as a first step in financing one or more model comprehensive community mental health centers operated by the District of Columbia health department.

For the President's special message to the Congress on mental illness and retardation, see Item 50.

67 Statement by the President on the Science Advisory Committee Report "Science, Government, and Information." *February* 17, 1963

[Released February 17, 1963. Dated January 10, 1963]

ONE of the major opportunities for enhancing the effectiveness of our national scientific and technical effort and the efficiency of Government management of research and development lies in the improvement of our ability to communicate information about current research efforts and the results of past efforts.

This report of the Science Advisory Committee draws attention to the importance of good communication to modern scientific and technical endeavor. It makes a welcome contribution to better understanding of the problems of scientific and technical communication both within the Government and outside of Government and of the steps that can be taken to meet these problems.

As the report points out, strong science and technology is a national necessity and adequate communication is a prerequisite for strong science and technology.

The observations of the Committee deserves serious consideration by scientists and engineers engaged in research and development and by those administering the large Government research and development programs.

JOHN F. KENNEDY

NOTE: Excerpts from this statement, the text of which is printed in the report, were released by the White House on February 17, 1963. The release also listed the members of the Panel on Science Information, which conducted the year-long study under the chairmanship of Alvin M. Weinberg, Director of the Oak Ridge National Laboratory.

The report "Science, Government, and Information" is dated January 10, 1963 (Government Printing Office, 52 pp.).

JFK

68 Remarks Upon Presenting the National Medal of Science to Theodore von Karman. *February* 18, 1963

Gentlemen:

Dr. von Karman, it is a great pleasure for me to select you as the first recipient of the National Medal of Science. I know of no one else who more completely represents all of the areas with which this award is appropriately concerned—science, engineering, and education.

This Nation, and indeed the entire free world, holds you in the highest esteem and respect for your devoted service, for your scientific achievements, and for your warmly human gifts as a teacher and counselor. Your assistance to the United States Air Force and to the NATO Advisory Group for Aeronautical Research and Development

have been outstanding. We also are deeply indebted to you for your continuing efforts in the promotion of international cooperation in science and in engineering.

It is hard to visualize what the world would be like without aircraft and jet propulsion, or without the vision we have, just entering the realm of reality, of exploring space. I am especially glad to present this first National Medal of Science to one of the pioneers who has helped make all of this new and exciting age possible.

The citation says: "The National Medal of Science is awarded by the President of the United States to Theodore von Karman for his leadership in the science and engineering basic to aeronautics, for distinguished counsel to the Armed Services and for promoting international cooperation in science and engineering."

NOTE: The President spoke at noon before an invited audience in the Flower Garden at the White House. The text of Dr. von Karman's response was also released.

69 Letter to the President of the Senate and to the Speaker of the House Transmitting a Proposed Urban Mass Transportation Act. *February* 18, 1963

Dear Mr. ————:

I am submitting with this letter a draft bill, the "Urban Mass Transportation Act of 1963," to establish a long-range program of assistance to urban areas in solving their mass transportation problems. The bill is based on the mass transportation legislation which I proposed last year and which was formally reported—but not brought to a vote of the full Membership—in both Houses.

Urban mass transportation is one of the most urgent problems facing the Nation and this Congress. As I said in my recent Message on the State of the Union, "Nearly three-fourths of our citizens live in urban areas, which occupy only 2 percent of our land, and if mass transit is to survive and relieve the congestion of these cities, it needs Federal stimulation and assistance."

It is a Federal responsibility, particularly in this field, to encourage balanced use of all modes of transportation to the end that there may be satisfactory service at minimum cost. A long-range program of Federal assistance for mass transportation is urgently needed, so that local communities may freely decide for themselves the proper balance of local public investment in highways and in mass transportation systems, whether rail or bus.

As indicated in the attached letter from the Housing and Home Finance Administrator, language is being prepared dealing with the subject of protecting the rights and interests of employees who might be adversely affected by projects undertaken or assisted by the mass transportation program and will be transmitted to the appropriate committees at the earliest possible opportunity. It is our expectation that the Secretary of Labor will discuss this very important subject in detail in testimony on the bill.

Enclosed also are a section-by-section summary of the bill and an outline of its major features.

Sincerely,

JOHN F. KENNEDY

NOTE: This is the text of identical letters addressed to the Honorable Lyndon B. Johnson, President of the Senate, and to the Honorable John W. McCormack, Speaker of the House of Representatives. The draft bill and the section-by-section summary were not made public.

NATIONAL MEDAL OF SCIENCE: Established by P.L. 86-209 of August 25, 1959, as amended (42 U.S.C. 1881), to provide recognition to individuals who make outstanding contributions in the physical, biological, mathematical, engineering, behavioral, or social sciences.

Not more than twenty individuals shall be awarded the Medal in any one calendar year. The President's Committee on the National Medal of Science receive, on behalf of the President, the recommendations made by the National Academy of Sciences.

The recipient receives a medal and a citation signed by the President.

SENT BY:Xerox Telecopier 7021 ; 9- 5-91 ; 17:54 ; 2028953261→ 2024568218:# 1

The Congress of the United States, by House Joint Resolution 655, has designated February 16, 1985, as Lithuanian Independence Day and authorized and requested the President to issue a proclamation in observance of this event.

Now, Therefore, I, Ronald Reagan, President of the United States of America, do hereby proclaim February 16, 1985, as Lithuanian Independence Day. I invite the people of the United States to observe this day with appropriate ceremonies and to reaffirm their dedication to the ideals which unite us and inspire others.

In Witness Whereof, I have hereunto set my hand this sixteenth day of February, in the year of our Lord nineteen hundred and eighty-five, and of the Independence of the United States of America the two hundred and ninth.

RONALD REAGAN

[*Filed with the Office of the Federal Register, 11:06 a.m., February 19, 1985*]

Note: The proclamation was released by the Office of the Press Secretary on February 19.

Remarks at the Presentation Ceremony for the National Technology Awards

February 19, 1985 NO MENTION OF SPECIFIC RECIPIENTS

The President. Thank you very much. I hope you haven't said everything. [*Laughter*]

Secretary Baldrige. No, I haven't. [*Laughter*]

The President. All right.

Well, Secretary Baldrige and ladies and gentlemen, good afternoon and welcome to the White House.

You know, one of the last times that this grand old mansion played host to an event concerning technology was back in '76—1876. President Rutherford B. Hayes was shown a recently invented device. "That's an amazing invention," he said, "but who would ever want to use one of them?" He was talking about a telephone. I thought at the time that he might be mistaken. [*Laughter*]

But in those days, most Americans were tied to the land. And the most familiar means of transportation were the sailing ship and the horse. Then, advances like the telephone and the electric light, the internal combustion engine, transformed our nation, enabling us to achieve the highest standard of living in the world; to lead longer, richer, and fuller lives; and to share our bounty with millions beyond our borders.

Today we see all around us the beginnings of a second transformation, a quantum technological leap that's making possible still greater prosperity and individual fulfillment than we've ever known. This new technology is affecting every aspect of our lives. In manufacturing, lightweight and inexpensive materials like fiber composites and ceramics are taking the place of costly metals. In transportation, cars and airplanes are being equipped with inexpensive microchips that keep track of maintenance needs and enable engines to run better on less fuel. In the home, computers are putting art, literature, and vast sums of information at families' fingertips.

Perhaps the most exciting advances are taking place in medicine. A diagnostic process, for example, has been made faster, safer, and more accurate by the advent of technologies like cat scanning and the use of soundwaves. Biotechnology is enabling us to produce human growth hormones more easily and inexpensively—a godsend to children whose growth might otherwise be impaired. Research is advancing against cancer, and new drugs are combating high blood pressure, diabetes, and heart disease. Countless medical breakthroughs have meant that, for the past decade, the life expectancy of Americans has gone up.

As technology goes on providing new

goods, services, and techniques of production, our entire economy is expanding and worker productivity is up. At one semiconductor plant in Pennsylvania in 1957, workers produced five transistors a day for $7.50 apiece. And they now produce over a million for less than a penny apiece.

Perhaps the best news of all concerns new job formation. Employment in the computer industry has skyrocketed. Computers and robotics are also bringing new efficiency to our older industries, helping them modernize their plants and compete better. And today American cars are once again as advanced as those built anywhere on Earth.

Economic growth is our most powerful tool for reducing poverty and fostering vigor and self-esteem among the millions in America's work force. I expect today's burgeoning technology to work hand in hand with the incentives in our tax reform plan to keep our economy growing and creating ever-wider opportunities for all Americans.

Our administration has made a firm commitment to technological progress. Both of them are probably true, but one we view as nothing less than a commitment to human creativity and imagination. While we're cutting back, wherever possible, unnecessary government spending, we're continuing our strong commitment to basic research and development.

We have cut personal income tax rates; we plan to cut them again. This could spur savings, and higher savings could, in turn, boost the capital formation so important in funding new high-technology ventures. And we've rolled back needless government regulations to help provide the freedom needed by those at the frontiers of technology to experiment with new hypotheses and techniques.

In space, we're opening the way to private enterprise; the space shuttle program is already working closely with private industry. And in 1985 NASA is scheduled to deploy eight commercial communications satellites. Space technology will continue to grow even more rapidly as we pursue our plans to launch a permanently manned space station—and to do so within a decade.

In defense, we're putting technology at the service of a decade's old dream: the elimination of nuclear weapons. Our Strategic Defense Initiative represents, perhaps, the most dramatic and wide-reaching research effort to explore the means for making nuclear weapons obsolete.

Let me make one thing plain: The Strategic Defense Initiative is not a bargaining chip. It's an historic effort on behalf of our national defense and peace throughout the world, and we intend to see it through.

The story of American technology is long and proud. It might be said to have begun with a blacksmith at his bellows, hammering out fine tools, and the Yankee craftsman using simple wood planes, saws, and mallets to fashion the fastest sailing ships on the ocean. And then came the railroad men, driving spikes across our country.

And today the story continues with the workers who built the computer in a child's room; the engineers who designed the communications satellite that silently rotates with the Earth, shining in the sunlight against the blackness of space; and the men and women of skill and determination who helped to put American footprints on the Moon.

In a few moments, 14 Americans will become the first recipients of the National Technology Awards, and you are heroes, each one of you, just as surely as were Thomas Edison and Alexander Graham Bell. You sing the songs of a people using their hands and minds in freedom, the songs of Americans at work making their lives even more full. And it's only fitting that our nation should pay you honor. And on behalf of the American people, I congratulate you.

Thank you, and God bless you. And, Mac, you take over.

Note: The President spoke at 1:33 p.m. in the East Room at the White House. Following his remarks, the President and Secretary of Commerce Malcolm Baldrige presented the awards to Joseph F. Sutter of Boeing Commercial Airplane Co.; Bob O. Evans, Frederick P. Brooks, Jr., and Erich Bloch, formerly of IBM Corp.; Allen E. Puckett and Harold A. Rosen of Hughes Aircraft Co.; Marvin M. Johnson of Phillips Petroleum Co.; John T. Parsons and Frank L.

Stulen of John
and Stephen G.
er, Inc.; Ralp

Remarks to
February 19,

Thank you v
ception for a h
flyboy. [*Laught*
Well, at daw
United States
island in the
heard of the p
by 2½ miles, a
extinct, unknow
0700 hours to
to the ships: La
No one, not
the Navy corp
from the Amt
knew that wh
would forever
Jima, and the
American histo
Today Iwo
other names li
tysburg—remer
Americans wer
in battle, but
upon to endu
the sake of free
Every one of
you 40 years
our nation's he
in every gener
themselves so
freedom and
and endure. T
ance—as capt
of your flag-ra
mains a beac
America's yo
future Americ

Stulen of John T. Parsons Co.; Steven P. Jobs and Stephen G. Wozniak of Apple Computer, Inc.; Ralph Landau, formerly with Halson S.D. Group, Inc.; and Ian Ross and William O. Baker of AT&T Bell Laboratories, Inc.

Remarks to Veterans of the Battle of Iwo Jima
February 19, 1985

Thank you very much. That's quite a reception for a horse cavalryman and a Navy flyboy. [*Laughter*]

Well, at dawn, 40 years ago today, 450 United States Navy ships stood off a tiny island in the Pacific. Few Americans had heard of the place. It measured 4⅔ miles by 2½ miles, ash-covered beaches and one extinct, unknown volcano. And at 7 o'clock, 0700 hours to you, a command was passed to the ships: Land the landing force!

No one, not even you, the marines and the Navy corpsmen who stepped ashore from the Amtracs at 2 minutes after 9, knew that what you were about to do would forever enshrine the island, Iwo Jima, and the volcano, Mount Suribachi, in American history.

Today Iwo Jima is remembered with other names like Saratoga, the Alamo, Gettysburg—remembered, not simply because Americans were again conspicuously gallant in battle, but because our sons were called upon to endure unspeakable hardship for the sake of freedom.

Every one of you present today, and all of you 40 years ago, have a special place in our nation's heart, reserved only for the few in every generation called upon to sacrifice themselves so that a great nation's ideals of freedom and peace may live and prosper and endure. The manner of your performance—as captured in Joe Rosenthal's photo of your flag-raising at Mount Suribachi—remains a beacon, indeed a birthright, for America's young people and for every future American.

The other day, I came across a description of Iwo written by the then-Private First Class Russell Werts. And it ended in the following note: ". . . our troopship started to pull away from Iwo and head for Guam. As I stood by the rail and watched the little island fade in the distance, a feeling of loneliness came over me. It was as if a part of me was left behind, as if an Iowa farm boy was waving goodbye. We would never meet again. Somewhere in that jagged jungle of rocks, he forever walked with the ghosts of Iwo. . . ."

Well, I would like to say to Russell, and to each of you who willingly gave your youth to the Nation, that you receive in kind a place in the American heart and the national memory that endures so long as this nation and the ideals for which it stands endure. We're very grateful to you.

And we're deeply honored to have you here today. The White House really belongs to the American people. And I couldn't help but reflect today that seldom in history has any President been in the company of more deserving Americans.

I hope that each of you enjoyed being here as much as Nancy and I am delighted to have you. And on behalf of all Americans, we salute today, you, the men of Iwo. God bless all of you.

Note: The President spoke to former members of the 28th Marine Regiment at 4:45 p.m. in the East Room at the White House. In his opening remarks, the President referred to his own and the Vice President's military service.

The National Medal of Technology:

Inspiring a New Generation of American Innovation

For when it comes to leadership in science and technology, best in America means best in the world."
—President George Bush

America and technology. For decades they have been synonymous. Today, however, technological innovation — the development and commercialization of new technologies — has accelerated to unprecedented levels and has become increasingly complex, integrated, costly and time sensitive. As a result, it has created the opportunity for foreign countries to become major players in the global economy.

In short, technological innovation has created a new industrial competition. This competition is changing many things — the way firms are managed, the way industries are structured, the way in which nations deploy their resources, the way in which wealth is created, and ultimately, the balance of power among nations.

For America to maintain and strengthen our historic leadership in science and technology, U.S. companies must continue not only to create new technologies, but learn to translate more effectively those technologies into commercial products as part of a seamless and continuous innovation cycle. To do this, it is essential that we identify and emulate those individuals and companies that have demonstrated how best to develop and commercialize new technologies.

To honor those that embody the American spirit of technological innovation, Congress established the National Medal of Technology. Presented annually since 1985 by the President of the United States, the National Medal of Technology has been awarded to 50 of the nation's top technologists and to two of America's most exemplary companies.

The Medal itself symbolizes the spirit of innovation. With hand outstretched, we see the face of a man observing as a diffuse ray of light strikes his hand and is transformed into a denser, more focused beam. This transformation reflects the role that technologists play in synthesizing many diverse and abstract ideas, harnessing them through their wisdom and intellect, to serve society.

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

The National Medal Of Technology

FACT SHEET

United States Department of Commerce • Washington, D.C. 20230

50 awarded

WHAT IS THE NATIONAL MEDAL OF TECHNOLOGY?

The National Medal of Technology is the highest award bestowed upon American technologists by the President of the United States. Presented annually, the Medal is awarded to provide recognition of extraordinary individuals and companies for their outstanding contributions to improving the well-being of the United States, either through the development or commercialization of technology, or for their contributions to the establishment of a technologically-trained workforce.

WHEN WAS THE MEDAL ESTABLISHED?

The National Medal of Technology was signed into law in 1980 as part of the Stevenson-Wydler Technology Innovation Act. The first Medals were awarded in 1985.

WHO IS ELIGIBLE TO RECEIVE THE MEDAL?

Any U.S. citizen or U.S.-owned company is eligible to win the Medal. Persons connected with Technology Administration or who serve on the the Medal's Nomination Evaluation Committee are not eligible during the period of their service and for a period of five years thereafter.

HOW MANY MEDALS HAVE BEEN AWARDED? HOW MANY ARE GIVEN EACH YEAR?

Fifty individuals and two companies have received the National Medal of Technology. Beginning in 1991, a maximum of six awards will be given per year.

WHO ADMINISTERS THE MEDAL?

The National Medal of Technology is a program administered by the Department of Commerce's Technology Administration and managed by the Assistant Secretary for Technology Policy.

WHAT IS THE NOMINATION/EVALUATION PROCESS?

A steering committee, chaired by the Under Secretary of Commerce for Technology, oversees the solicitation of nominations. In addition to the Under Secretary, the steering committee consists of the Assistant Secretary for Technology Policy, the Director of the National Institute of Standards and Technology (NIST), and the Assistant Secretary/Commissioner of Patents and Trademarks.

Nominations can be made either by individuals or by companies. The nominations are then evaluated by the National Medal of Technology Nomination Evaluation Committee which is appointed by the Secretary of Commerce. Committee members are selected from U.S. industry, government, professional organizations and academia to serve three-year terms. The terms are staggered to ensure continuity of operations.

After evaluating the nominations, the committee recommends a list of recipients in priority order to the Secretary of Commerce. The Secretary then makes his recommendations to the President who, in turn, makes the final selection.

WHEN IS THE DEADLINE FOR SUBMITTING NOMINATIONS?

Nominations for the 1992 Medal must be submitted by September 30, 1991. Nomination applications can be obtained by writing to: Dr. Paul V. Braden, Manager, National Medal of Technology, Room 1418, U.S. Department of Commerce, 14th Street and Constitution Avenue, N.W., Washington, DC 20230, or by calling, (202) 377-5572.

The National Medal Of Technology

AWARDED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

United States Department of Commerce • Washington, D.C. 20230

NOMINATION CRITERIA

A nominee for the National Medal of Technology must:

- be a U.S. citizen;
- consist of up to four U.S. citizens who share an award jointly; and,
- be a U.S.-owned company, defined as a partnership or corporation which carries out a commercial or industrial enterprise, and which is substantially owned by citizens of the United States.

Nominations are solicited in two distinct separate areas:

- contributions to the promotion of technology; and,
- contributions to the promotion of technological manpower (i.e., a technically competent workforce).

PROMOTION OF TECHNOLOGY

The impact of the contribution on the economy, environmental or social well-being of the United States will be in the areas of:

- technology transfer from public organizations;
- promotion of advanced manufacturing technology;
- companies best embodying technology management principles; and
- general product and process innovations.

Nominations submitted for promotion of technology will be judged by:

1. **Demonstrated, successful accomplishments**. The contribution results in a competitive advantage in domestic and/or foreign markets, provides economically feasible environmental protection, or improve health care or safety. Key considerations will be the breadth of influence on a number of industrial sectors and the extent of communications.
2. **Technological merit**. Technology is critical to the contribution. The contribution is ingenious in the use of technology, either new or well established.
3. **Role of the nominee**. Considerations will include risk-taking vision, persistence, management skills, and entrepreneurial or organization skills.

PROMOTION OF TECHNOLOGICAL MANPOWER

Nominations submitted for the promotion of technological manpower will be judged on the basis of the contribution made to strengthening a technologically competent workforce.

This achievement will be judged by:

1. alleviation of technical workforce shortages: and,
2. motivation and improved performance of the existing workforce.

PRESIDENT'S COMMITTEE ON THE NATIONAL MEDAL OF SCIENCE
NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

FACT SHEET

What is the National Medal of Science?

It is the Nation's highest scientific honor bestowed by the President of the United States.

How was it established?

By Public Law 86-209, 86th Congress, August 25, 1959. The law also provides that the design of the Medal is based on recommendations by the National Science Foundation and that no more than 20 medals can be awarded in any given calendar year.

How are recipients selected?

Executive Order 10961, signed on August 23, 1961 by President Kennedy, established the Committee on the National Medal of Science. The Committee receives nominations from the National Academy of Sciences and other scientific and engineering sources. The Committee selects its candidates from among these nominations and transmits its recommendations to the President for final decision.

What are the selection criteria?

The total impact of an individual's work on the present state of physical, biological, mathematical, engineering, behavioral or social sciences. In addition, achievements of an unusually significant nature are considered and judged in relation to the potential effects of such achievements on the development of scientific thought. Also, consideration is given to distinguished service in the general advancement of science and engineering when accompanied by substantial contributions to the content of science at some time.

Who provides nominations?

Letters are sent to approximately 150 universities and colleges, approximately 160 scientific, engineering, and other professional societies and organizations, members of the National Academy of Sciences and National Academy of Engineering. Approximately 3,500 letters of invitation are sent each year.

How many new nominations/renominations are received each year?

Approximately 150. Candidates remain eligible for three years following the year of nomination.

How many have been reviewed to date?

Approximately 3,500

How many Medals have been awarded?

284 since 1962.

How are the activities carried out?

The National Science Foundation (under E.O. 10961) provides staff and administrative services necessary for the performance of the functions of the Committee.

12/14/90

Arthur L. Schawlow-
1973 California Scientist of the Year
two awards established in his name; (1) the Laser Institute of America in 1982 for laser applications, to be awarded annually; (2) American Physical Society in 1990 for laser science.

Glenn T. Seabory-
over 50 honorary degrees
member, President's Science Advisory Committee, 1959-61

H. Guyford Stever -
former President's Science Advisor, 1976-77 (Nixon and Ford); and Chairman, FCCSET.
commented that it would be nice to be receiving an award [where he has been presenter in the past].

Steven Weinberg -
numerous honorary degrees

The following are highlights from some of the 1991 MOS recipient's biographical sketches. All recipients are well-published, hold honorary degrees; are visiting professors at universities in the United States, England and Europe. They all have teaching experience and continue to be directly involved in the classroom.

Summary

There are five Nobel Laureates -- Elion (1988 co-winner); Luria (1969) (deceased); Schawlow (1981), and Seaborg (1951); Weinberg (1979).

Seven recipients were nominated for the 1st time for the Medal. Four are members of Phi Beta Kappa (note: number subject to change as I look more closely into bio sketches).

tentative #

Mary Ellen Avery -
Shortening a trip to Russia to attend ceremony.

Ronald Breslow -
Sloan Fellow, 1961-63
Phi Beta Kappa
over 80 honorary degrees and plenary lectures

Belle

Gertrude B. Elion - "techniques she helped devised led to the development of the aids drug AZT."
See Washington Post Article, attached.
1988 Nobel Prize for Physiology or Medicine (shared)
over 10 honoray degrees
Presidential appointee on National Cancer Advisory Board
3 years as chairman of Steering Committee, Scientific Working Group on Chemotherapy of Malaria, World Health Organization
Member, National Inventors Hall of Fame

George H. Heilmeier -
White House Fellow, 1970-71, serving as Special Assistant to the Secretary of Defense
Received 26th Arthur Flemming Award as Outstanding Young Man in Government (1974)
Twice received DOD Distinguished Civilian Service Medal, highest civilian award in DOD.

Elvin A. Kabat -
former students include one Nobel Laureate

Paul Marks-
In 1970's, member of President's Biomedical Research Panel; Cancer Panel; Commission on the Accident on Three Mile Island.

THE WASHINGTON POST MONDAY, AUG 26, 1991

ven have any real villains. Despite the biting tle, the inescapable conclusion of this book is at new technologies and market forces, not reed or stupidity, are killing off network tele-ision.

The other problem is Auletta's anti-histori-al approach. Over and over, he laments the assing of the old order, when the owners upposedly saw the networks as a public trust. ike a lot of other people, Auletta has suc-umbed to a nostalgia for a time that never as. The so-called "golden age" of television, hen Paddy Chayefsky was writing master-ieces like "Marty" for the small screen, exist-d mostly because television sets cost so nuch. Only the affluent, who were likely to be ducated, could afford to buy them, so pro-ramming aimed higher.

Even then, news remained a pitiful step-hild, just as it was on radio except during World War II. It was not until the quiz show candals of the late '50s and a suddenly zeal-ous Federal Communications Commission un-ler Newton (television is "a vast wasteland") Minow in the '60s that real money was budg-ted for documentaries and domestic bureaus, nd the evening news grew from 15 minutes o half an hour.

The heyday of news was the '70s, when the echnology improved and the networks were o profitable they didn't care how much mon-y their news divisions spent. (The idea actu-lly was to lose money on news; the owners hought it made a better impression on Con-gress.)

In the end, of course, it was not possible to ide the profits the news divisions were mak-ng by the late '70s, and executives learned to ike the extra revenue. Thus network news egan its slow but steady decline into the ealm of entertainment, several years before he barbarians reached the gate.

The wonder is how much solid fare still gets on the air. "CBS Evening News With Dan Rather" no doubt could draw a larger audience f it copied "A Current Affair." But despite apses in taste from time to time, all three evening newscasts retain a serious, informa-ive cast—to the extent that a 75-second re-port can qualify as serious. Still, there is a ense that these are fragile enterprises and hat sleazy programs like NBC's "Exposé" will ncreasingly monopolize the schedule.

Perhaps the old owners would have fretted more about introducing such cheap fare, but who could doubt that they too would have thrown journalistic principles to the wind giv-en the dwindling audiences and plunging prof-its facing network television today?

And yes, it is sad. For all the drivel on prime-time television, it came as a shock to earn that ABC is weighing the possibility of ot programming a full three hours of prime me every night. It isn't easy to imagine merica without the Big Networks.

Personalities

After a judge reduced his bail by half, funk star **Rick James** posted $500,000 Saturday and was released from a Los Angeles jail, three weeks after being arrested on charges of imprisoning, torturing and sexually assaulting a woman in his Hollywood home. "I just hope the phrase 'innocent until proven guilty' is true," James said on his release. "I've kind of found since I've been in here it's like guilty until proven innocent." James, 43, and his companion, **Tanya Hijazi**, 21, are charged with assault with a deadly weapon (a hot cocaine pipe), aggravated mayhem, torture, false imprisonment and sexual assault. The unidentified woman claimed the couple suspected her of stealing drugs from James's home. James's lawyer, **Robert Sheahen**, has said the woman was a would-be starlet who was using James's name to further her career.

Baker Home From Surgery

Howard Baker, former White House chief of staff for **Ronald Reagan**, was released Saturday from the Mayo Clinic after back surgery and returned home to Huntsville, Tenn., a spokesman said. The 65-year-old former senator underwent surgery Aug. 16 at the clinic in Rochester, Minn., to correct a herniated disc. Spokesman **Ron MacMahon** said Baker was doing well and will recuperate at home. Baker was Senate Majority leader when he retired in 1985, and came out of retirement to serve as chief of staff under President Reagan.

Women's Hall of Fame

Gertrude Belle Elion, co-winner of the 1988 Nobel Prize for medicine, will be named to the National Women's Hall of Fame in a ceremony to be held here in the District in November. The Hall of Fame, based in Seneca Falls, N.Y., will make Elion the 47th woman to be inducted, joining such notables as **Harriet Tubman, Emily Dickinson, Eleanor Roosevelt, Pearl Buck** and **Billie Jean King**. The 73-year-old

GERTRUDE BELLE ELION

Elion is being recognized for her pioneering work that helped develop drugs to combat leukemia, malaria, herpes and immune system disorders. Techniques she helped devise led to the development of the AIDS drug AZT.

The Dire Tour

The British rock group Dire Straits put on its first show in five years in Dublin Friday night, opening the first leg of a mammoth tour, scheduled to stop in 24 countries over two years. "No other band has ever undertaken a tour of this magnitude," said a spokesman for the tour's organizers. The group's last tour five years ago, supporting the 20-million-seller "Brothers in Arms," ended with lead singer and guitarist **Mark Knopfler** saying he was not sure the band would continue. "There is a lot more to life than being in Brussels on a gray day with a gig to do," said the 42-year-old

Knopfle
tour col
Straits a

Citizen

Holly
Newswe
clear th
had fail
proache
movie c
Yeltsin
of the
coordin
et Unic
works
Robert
biker m

DOONESBURY

By G.B. Trudeau

September 12, 1991

MEMORANDUM FOR THE PRESIDENT

THROUGH: DAVID DEMAREST
TONY SNOW

FROM: DAN McGROARTY

SUBJECT: NATIONAL MEDAL OF SCIENCE AND TECHNOLOGY CEREMONY

On Monday, September 16, you will deliver remarks to an audience of approximately 210 at the National Medal of Science and Technology ceremony in the Rose Garden. Secretary Manuel Lujan and Deputy Secretary Henson Moore are expected to attend. The audience will consist primarily of recipients and their family members.

Your remarks (approximately 8 minutes/on cards) highlight the recipients and their cumulative achievements. Then they focus on federal funding for science, technology, and research and development; and the importance of education to our national math and science goals.