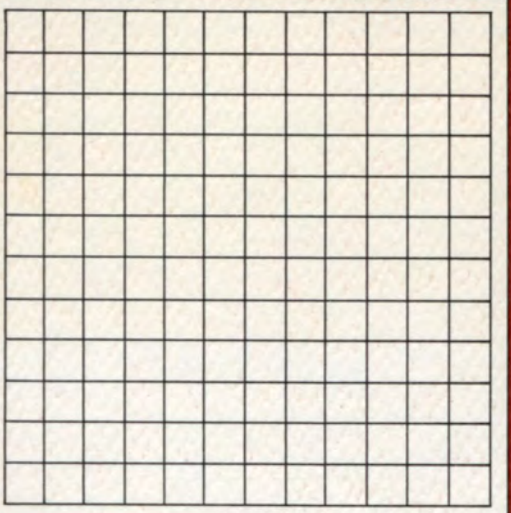
1-1-1981

Distinguished Scientist Lecture Series Program 1981-1982

Bard College



The Distinguished Scientist Lecture Series

Sponsored by The Bard College Center with support from the National Science Foundation and the National Patent Development Corporation

The Distinguished Scientist Lecture Series

The Bard College Center
Annandale-on-Hudson, New York 12504

The Series

The origin of the Distinguished Scientist Lecture Series goes back to the fall of 1979 when Nobel laureate physicist Paul Dirac accepted an invitation from The Bard College Center to deliver a lecture on "The Discovery of Anti-Matter."

His talk combined scientific analysis with scientific history and personal reminiscence to present a view of modern science rarely seen by the general public – science as a record of personal achievement as well as a body of facts and knowledge. Professor Dirac's lecture drew an audience from throughout the East Coast, and its success inspired the establishment of The Bard College Center Distinguished Scientist Lecture Series.

The 1981-82 series is comprised of eight lectures by some of the most eminent scientists of our time, including five Nobel laureates. In addition to the lecture, each program includes a seminar for science scholars and others to further explore the life's work of the day's speaker.

For all those interested in the field of science – students, teachers, researchers, professionals in scientific industries, and lay people – the series provides a rare opportunity for first-hand contact with men and women who have shaped modern science – the chance to see how they think and work, how they view their own achievements, and how they assess the challenges that scientists face, now and in the future.

The Bard College Center

Established in 1978 as the "public arm" of the College, the Bard Center was recently described by the Rockefeller Foundation's Report of the Commission on the Humanities as "a model of mobilizing the resources of the college and the community." Through workshops, national conferences, small-group seminars, lecture series, summer institutes, publications, and exhibitions at the Edith C. Blum Art Institute, the Bard Center explores the emerging issues of today in the sciences, arts, humanities and education – to the benefit of the Bard community, the Hudson Valley region, and educators and policy-makers around the country. The Center's varied efforts are complemented by the work of Bard Center Fellows, who are distinguished artists, scientists, scholars and writers appointed annually to serve as a "public faculty."

Schedule of Lectures

October 10, 1981
Joshua Lederberg
"Styles and Patterns in Biomedical Research"

February 13, 1982
Paul J. Flory
"Spatial Configurations of Macromolecules"

March 20, 1982
Frank H. Westheimer
"Photoaffinity Labeling: Marking the Receptors for Biological Molecules"

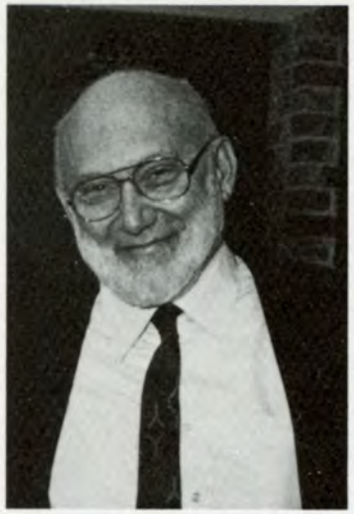
April 3, 1982
Abraham Pais
"Einstein, the Science and the Life"

April 24, 1982
George C. Pimentel
"From Chemical Lasers to the Atmosphere of Mars"

May 1, 1982
Tsung-Dao Lee
"Is Vacuum a Physical Medium?"

May 22, 1982
Paul Berg
"Gene Isolation and Manipulation: A New Window on Our Heredity"

Paul Dirac
Date and lecture to be announced



Joshua Lederberg, Geneticist

Dr. Lederberg, Nobel laureate and president of The Rockefeller University, was born in Montclair, New Jersey. He received his B.A. degree from Columbia College in 1944, then entered Columbia University's College of Physicians and Surgeons. After two years he transferred to Yale University, where he received his Ph.D. degree in microbiology in 1947.

In 1958, at the age of 33, he was named a co-recipient of the Nobel Prize in physiology and medicine along with Dr. E.L. Tatum and Dr. George Beadle.

From 1947 to 1959, Dr. Lederberg was professor of genetics at the University of Wisconsin where he served as chairman of the department of medical genetics from 1957-59. In 1959 he joined the faculty of the Stanford University School of Medicine, where he was the Joseph D. Grant Professor of genetics and chairman of the department of genetics. He was concurrently professor of biology and professor of computer science at Stanford. He was named president of The Rockefeller University in 1978.

His Work

Dr. Lederberg pioneered in the field of bacterial genetics. Prior to his discovery that bacterial strains could be crossed to produce an offspring containing a new combination of genetic factors, scientists had known little about the bacterial genetic mechanism and many even doubted that bacteria possessed a genetic mechanism similar to that of higher organisms.

Later, at the University of Wisconsin, he showed that bacterial genetic material was exchanged not only by conjugation (when the entire complement of chromosomes is transferred from one bacterial cell to another) but also by transduction (when only fragments are transferred). This was among the first demonstrations of the manipulation of any organism's genetic material, and it opened prospects of far-reaching genetic experimentation.

His Lecture

"Styles and Patterns in Biomedical Research"

Paul J. Flory, Chemist

Dr. Flory, Nobel laureate and J.G. Jackson - C.J. Wood Professor of chemistry at Stanford University, was born in Sterling, Illinois. He received his B.Sc. degree from Manchester College in Indiana in 1931 and his Ph.D. degree in physical chemistry from Ohio State University in 1934.

His long and distinguished scientific career includes experience in industry, research and the academic community. A leader in the field of polymer behavior, he was the sole recipient of the 1974 Nobel Prize in chemistry.

Before joining Stanford in 1961, Dr. Flory served as executive director of research at the Mellon Institute in Pittsburgh, was on the faculty of Cornell University and the University of Cincinnati, and did research at DuPont, Standard Oil and Goodyear.

His many awards, in addition to the Nobel Prize, include the American Physical Society's High Polymer Physics Prize in 1962, the American Chemical Society's Priestley Medal in 1974, and the National Medal of Science in 1974.

His book, **Principles of Polymer Chemistry,** is a classic in its field, and another book, **Statistical Mechanics of Chain Molecules,** has been translated into Russian and Japanese.

His Work

Dr. Flory has been a leader in research on the chemistry and physics of giant molecules, or polymers, which make up such materials as natural and synthetic rubber, fibers, and plastics. He first entered this field as a member of the research team under Dr. Wallace H. Carothers of DuPont, whose original investigations led to the discovery of nylon.

Dr. Flory's investigations have turned increasingly toward polymers that resemble proteins and other biological materials. He and his collaborators have demonstrated a close resemblance between elasticity of the fibrous proteins in ligaments, blood vessels, tendons, and muscles on the one hand, and of various rubber-like natural and synthetic polymers on the other.

His Lecture

"Spatial Configurations of Macromolecules"

Frank H. Westheimer, Chemist

Dr. Westheimer, Morris Loeb Professor of chemistry at Harvard University, was born in Baltimore, Maryland. He received his B.A. degree from Dartmouth in 1932, his M.A. degree from Harvard in 1933, and his Ph.D. degree from Harvard in 1935.

In 1935-36, he was a National Research Fellow at Columbia under the sponsorship of Professor L.P. Hammett. The following year he was appointed research associate at the University of Chicago, and later assistant professor. During 1944 and 1945 he was a research supervisor at the Explosive Research Laboratory of the National Defense Research Committee; as a result of this work, he was awarded the Army-Navy Certificate of Appreciation and the Naval Ordnance Award. In 1946 he returned to Chicago as an associate professor and became full professor in 1948. He returned to Harvard as a visiting professor in 1953, was appointed professor in 1954, and served as chairman of the department from 1959-62.

Among his numerous honors, he was a Guggenheim Fellow in 1962, and in 1974 was a Fulbright-Hayes Fellow in Yugoslavia. In 1970 he received the James Flack Norris Award in physical organic chemistry and the Willard Gibbs Medal. In 1980 he received the National Academy of Sciences Award in chemical science.

His Work

Dr. Westheimer's career has included calculations of electrostatic effects and of steric effects in organic chemistry, the determination of the mechanisms of chromic acid oxidation, enzymic and metal-ion promoted decarboxylation, biochemical oxidation-reduction reactions which require diphosphopyridine nucleotide as coenzyme, the mechanisms of the hydrolysis of phosphate esters, and photoaffinity labeling.

His Lecture

"Photoaffinity Labeling: Marking the Receptors for Biological Molecules"

Abraham Pais, Physicist

Dr. Pais, Detlev W. Bronk Professor of The Rockefeller University, was born in Amsterdam, Holland. He received his B.S. degree from the University of Amsterdam in 1938 and his Ph.D. degree from the University of Utrecht in 1942. In 1945, he went to the Institute of Theoretical Physics in Copenhagen, Denmark, as a research fellow with Niels Bohr.

Dr. Pais came to the United States in 1946 to the Institute for Advanced Study in Princeton, New Jersey. He became a professor there in 1950. He joined The Rockefeller University in 1963 and was named Detlev W. Bronk Professor in 1981. He was the James Arthur Balfour Professor at the Weizmann Institute in Israel and has also served as visiting professor at CERN, the European atomic energy center.

In 1979, he received the 11th Annual J. Robert Oppenheimer Memorial Prize, awarded by the Center for Theoretical Studies of the University of Miami.

Among his publications is the book, **Subtle is the Lord...the Science and the Life of Albert Einstein.**

His Work

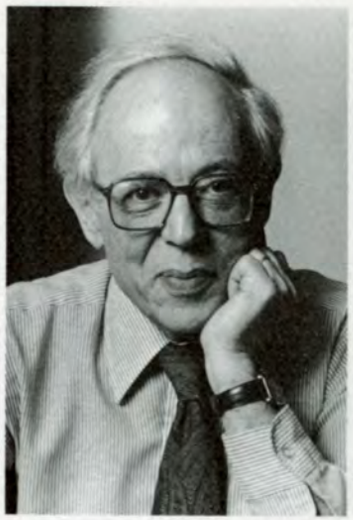
Dr. Pais is an eminent theoretical physicist and a founding father of the field of particle physics. He and his colleagues have investigated fundamental particle processes at high energies, symmetries of strong and weak interactions, and quantum field theory.

He has played a leading role in several developments which aim to provide an explanation for the behavior of the interactions in particle physics. For example, he stated the principle of associated production which was found to govern the behavior of "strange" particles.

A number of his contributions deal with the symmetry principles of physics, such as the SU(6) theory developed around 1965. He is a co-discoverer of the idea of "particle-mixing," which is necessary for the understanding of the so-called neutral K-particle complex.

His Lecture

"Einstein, the Science and the Life"



George C. Pimentel, Chemist

Dr. Pimentel, director of the Laboratory of Chemical Biodynamics and professor at the University of California at Berkeley, was born in Rolinda, California. He received his B.A. degree from the University of California at Los Angeles in 1943 and a Doctor of Philosophy degree in 1949 from the University of California at Berkeley.

Dr. Pimentel served as Deputy Director of the National Science Foundation from 1977 to 1980. He has been a member of the chemistry faculty at Berkeley since 1949.

A Guggenheim Fellow in 1955, he was elected to the National Academy of Sciences in 1966 and two years later was elected a fellow of the American Academy of Arts and Sciences. He received the Alexander von Humboldt Senior Scientist Award in 1974 and was recipient of the E.K. Plyler Prize in Molecular Spectroscopy in 1979. In 1980 he received the Ellis R. Lippincott Medal and the Distinguished Service Gold Medal from the National Science Foundation.

His Work

Dr. Pimentel's research has been in the fields of infrared spectroscopy, chemical lasers, molecular structure, free radicals, and hydrogen bonding. His interests have centered on the application of spectroscopic methods to the study of unusual chemical bonding. A major contribution was the development and exploitation of the matrix isolation method for the spectroscopic detection of highly unstable molecules. Application of this matrix isolation method led to the discovery of many unusual and highly reactive molecules that could not otherwise have been detected.

His pioneering development of rapid scan techniques for infrared spectroscopy led to the design of a unique infrared spectrometer for the 1969 Mariner interplanetary spacecraft to determine the composition of the atmosphere of Mars.

His Lecture

"From Chemical Lasers to the Atmosphere of Mars"

Tsung-Dao Lee, Physicist

Dr. Lee, Nobel laureate and Enrico Fermi Professor of physics at Columbia University, was born in China. He received his Ph.D. degree from the University of Chicago in 1950.

Among the youngest men ever to receive a Nobel award, Dr. Lee, at the age of 30, was named co-recipient of the 1957 Nobel Prize in physics with Dr. C.N. Yang.

Before joining Columbia in 1953, he served on the faculty of the University of Chicago and the University of California at Berkeley, and was a member of the Institute for Advanced Study in Princeton, New Jersey.

Dr. Lee received the Albert Einstein Award in Science in 1957, was the Loeb Lecturer at Harvard that year and again in 1964, and held a Guggenheim Fellowship in 1966.

His Work

Dr. Lee, along with Dr. Yang, shared the Nobel Prize in 1957 for their discoveries that challenged the principle of "Conservation of Parity," on which much of modern physics had been based. The principle says that objects which are mirror images of each other must obey the same physical rules. They theorized that in key cases parity need not be observed and a series of subsequent experiments proved them right.

His Lecture

"Is Vacuum a Physical Medium?"

Paul Berg, Biochemist

Dr. Berg, Nobel laureate and Willson Professor of biochemistry at Stanford University Medical Center, was born in New York City. He is a 1948 alumnus of Pennsylvania State University and earned his Ph.D. degree in biochemistry from Western Reserve University in 1952. During the next two years he was a postdoctoral research fellow at the Institute of Cytophysiology in Copenhagen and at Washington University in St. Louis. He remained at Washington University as a scholar in cancer research and then as a faculty member until 1959, when he joined Stanford. He is a former chairman of the department of biochemistry at Stanford's School of Medicine, and is currently a non-resident fellow of the Salk Institute for Biological Studies.

In 1980 he received the Nobel Prize in chemistry for his studies of the biochemistry of nucleic acids, particularly, recombinant DNA. He also received the 1980 Gairdner Foundation and the New York Academy of Sciences Awards in recognition of his outstanding studies of the biochemistry of nucleic acids, and the 1980 Albert Lasker Medical Award for his contributions to basic medical sciences.

His Work

At present, Dr. Berg's research is on the mechanism of gene expression in higher organisms, particularly the interplay of viral and cellular genes in regulating growth and division. Specifically, he has developed new enzymatic and physical approaches to analyzing the structure of simple viral chromosomes and thereby made possible a molecular approach to their genetics. In addition, he and his colleagues have been active in the development of recombinant DNA techniques to introduce new genetic information into mammalian cells with virus DNA vectors. These experiments are designed to explore the chemistry and biology of mammalian and human chromosomes and hopefully to provide the basic knowledge for the prevention, management and cure of hereditary diseases.

His Lecture

"Gene Isolation and Manipulation: A New Window on Our Heredity"

Paul Dirac, Theoretical Physicist

Dr. Dirac, a Nobel laureate, is professor emeritus and a fellow of St. John's College, Cambridge, England, where he was Lucasian Professor of Mathematics from 1932 to 1969. He has been professor of physics at Florida State University since 1971. Born in Bristol, he was educated at the University of Bristol and St. John's College.

His pioneer work in the quantum mechanics of the atom won him the Nobel prize in physics, along with Erwin Schrodinger, in 1933 at the age of 31. He was also awarded the royal medal of the Royal Society in 1939. Professor Dirac received the Copley Medal of the Royal Society in 1952 for his contributions to quantum theory, including his formulation with Enrico Fermi of the Fermi-Dirac statistics and his work on the quantum theory of electromagnetic radiation. He has been honored with the Queen of England's Order of Merit and is a member of the Papal Academy.

His major work is **The Principles of Quantum Mechanics,** a classic in its field.

His Work

One of the great mathematical physicists of the 20th century, Professor Dirac is one of a select few, including Albert Einstein, Erwin Schrodinger, Enrico Fermi and others, whose theories have transformed our understanding of the physical universe.

In 1928, Professor Dirac published a version of quantum mechanics that supplemented Einstein's theory of relativity and predicted the presence of anti-matter in the universe. Dirac's equation for the motion of a particle is a relativistic modification of the Schrodinger wave equation, the basic equation of quantum mechanics. For their work, Dirac and Schrodinger shared the 1933 Nobel prize in physics.

His Lecture

Title to be announced

Previous Participants in the Distinguished Scientist Lecture Series

Carl Djerassi, Chemist

Dr. Djerassi is professor of chemistry at Stanford University and president of the Zoecon Corporation, which manufactures and markets pet care and agricultural products. Among his awards are the American Chemical Society Award in Pure Chemistry, the Baekeland Medal, the Chemical Pioneer Award of the American Institute of Chemists, and the Perkin Medal, awarded by the Society of Chemical Industry. An authority on the reproductive systems of animals, humans as well as insects, he has played a major role in the development of the oral contraceptive.

Mark Kac, Mathematician

Dr. Kac is a professor of mathematics and theoretical physics at The Rockefeller University. He has twice won the Chauvenet Prize of the Mathematical Association of America, and is the recipient of the 1976 Alfred Jurzykowski Foundation Award in Science and of the 1978 Birkhoff Prize. Dr. Kac is an authority on probability theory, particularly its use in mathematical analysis and statistical physics.

Arthur Kornberg, Biologist

Dr. Kornberg won the 1959 Nobel Prize in medicine and physiology, with Dr. Severo Ochoa. A professor at the Stanford University School of Medicine, Dr. Kornberg has received the Paul-Lewis Award in Enzyme Chemistry, the Max Berg Award for Prolonging Human Life, the Scientific Achievement Award of the American Medical Association and the National Medal of Science. His most notable achievements have grown out of his research into the structure and dynamics of DNA. In 1967, working with a team of biochemists at Stanford, he became the first to synthesize biologically active DNA outside a living cell.

Willis E. Lamb, Physicist

Dr. Lamb was awarded the 1955 Nobel Prize in physics with Dr. Polykarp Kusch for his discoveries regarding the structure of the hydrogen spectrum. A professor of physics and optical sciences at the University of Arizona, he was a Fulbright lecturer at the University of Grenoble. He has won the Rumford Premium of the American Academy of Arts and Sciences and the Guthrie Award from the Physical Society of London.

I.I. Rabi, Physicist

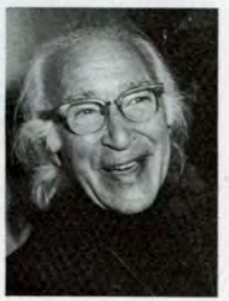
Dr. Rabi received the 1944 Nobel Prize in physics for developing the molecular beam resonance technique, a major tool in nuclear research. A professor of physics at Columbia University, he has served on the General Advisory Committee of the U.S. Atomic Energy Commission, has conducted research at the Brookhaven National Laboratories on the peacetime uses of atomic energy, and has been science advisor to the government under a succession of presidents. Among his many awards and honors is the Atoms for Peace Award.

Edward Teller, Physicist

Dr. Teller is director emeritus of the Lawrence Livermore Radiation Laboratory and a senior research fellow at the Hoover Institution on War, Revolution and Peace. He has received the Joseph Priestley Memorial Award, the Albert Einstein Award and the Fermi Award. Dr. Teller is interested in the applications of nuclear energy, particularly as part of a comprehensive energy plan for the United States.

George Wald, Biologist

Dr. Wald won the 1967 Nobel Prize in physiology with Haldan K. Hartline and Ragner Granit. A professor emeritus at Harvard University, he has received the Albert Lasker Award of the American Public Health Association and the Rumford Premium of the American Academy of Arts and Sciences. Dr. Wald is an expert on the chemistry and physiology of the human eye. Most of what we know about the chemical process by which light is transmuted into sight has come directly or indirectly from his work.



Eugene Wigner, Physicist

Dr. Wigner won the 1963 Nobel Prize in physics. He is best known for his pioneering work in nuclear structure. One of his most noted achievements was the application of the mathematical system of group theory to atomic and nuclear problems. From 1942-45 he worked at the University of Chicago, where he participated with Enrico Fermi in the experiment that produced the world's first controlled nuclear reaction. He has received the Fermi Award, the Albert Einstein Award and the National Medal of Science.

E. Bright Wilson, Chemist

Dr. Wilson is professor emeritus at Harvard. He has received the American Chemical Society Award, the Rumford Medal of the American Academy of Arts and Sciences and the National Medal of Science. Since 1977, he has been the chairman of the Committee on Radioactive Waste Management of the National Academy of Science. Dr. Wilson is an authority on molecular spectroscopy, the analysis of spectra as a means of studying structure, and dynamics of polyatomic molecules. For the past several decades he has worked on the microwave spectroscopy of large molecules, and is now continuing his studies of the internal and overall rotational motion of chemical species in gases.

Rosalyn Yalow, Medical Researcher

Dr. Yalow won the 1977 Nobel Prize in medicine. She is senior medical investigator for the Veterans Administration Medical Center and chairman of the Department of Clinical Services at Montefiore Hospital and Medical Center. She has received the Albert Lasker Basic Medical Research Award, the Rosalyn Yalow Research and Development Award of the American Diabetes Association, and the Gratum Genus Humanum Gold Medal of the World Federation of Nuclear Medicine and Biology. Dr. Yalow has been a pioneer in the use of radiommunoassay (RIA) in medical research and diagnosis.

Advisor for the Series

Dr. Abe Gelbart, a mathematician, is a Bard College Center Fellow, dean emeritus of the Belfer Graduate School of Science at Yeshiva University, and visiting distinguished professor of mathematics at Bard College. A former member of the Institute for Advanced Study in Princeton, New Jersey, Dr. Gelbart was a Fulbright lecturer in Norway in 1951. He was associated with the journal, **Scripta Mathematica,** first as an associate editor and then, for 14 years, as editor. Dr. Gelbart is the co-developer of the theory of pseudoanalytic functions, the mathematical foundation for modern fluid dynamics. He is currently writing a history of 20th century science.

Project Director

Dr. Michael Rosenthal, a chemist and environmental scientist, is associate dean of academic affairs, chairman of the division of natural sciences and mathematics, and professor of chemistry at Bard College. He has been active in environmental planning and management in the Hudson River Valley and serves as chairman of the Heritage Task Force, a commission which advises the New York State Department of Environmental Conservation on issues concerning the environment and historical preservation.

The Bard College Center

Board of Directors of The Bard College Center

The Hon. Ogden R. Reid, Founding Chairman
Jon Holden Adams
Sally M. Avery
Helen Bernstein
Leon Botstein, ex officio
Jean de Castella de Delley
Eric Goldman
Helen Hayes
John C. Honey
Leon Levy
John V. Lindsay
Roy R. Neuberger
Dimitri B. Papadimitriou, ex officio
Joseph Papp
Martin Peretz
David Rose
John C. Sawhill
Hilton Weiss, faculty

Past and Present Fellows of The Bard College Center

Joseph D. Beasley, M.D.
René Dubos
Robert Duncan
Alf Evers
Frances Fitzgerald
Ferruccio Gambino
Abe Gelbart
John Gerassi
Matti Megged
Toni Morrison
Isaac Bashevis Singer
Elliott Skinner

Inquiries about the Distinguished Scientist Lecture Series and other programs of The Bard College Center should be addressed to:

The Bard College Center
Annandale-on-Hudson, New York 12504
(914) 758-6822

1981-82

The Distinguished Scientist Lecture Series is sponsored by The Bard College Center with support from the National Science Foundation and the National Patent Development Corporation.