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Distinguished Scientist Lecture Series Program 1980-1981

Bard College

The DISTINGUISHED SCIENTIST

Lecture Series

Lectures by Eminent Scientists • Seminars on Their Life's Work

Sponsored by The Bard College Center
with Support from the National Science Foundation

Cover: Claudius Ptolemaus and Boethius; portion of a fresco drawing by Raphael showing philosophers of different periods.

The Distinguished Scientist Lecture Series

1980-81

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

"While I have spent most of my life as a research scientist, I have learned to appreciate the point of view of the historian of science as well. He wants to know the various influences at work in the scientist's thinking, the intermediate steps in his experimentation, and he may even have some interest in the false trails - - the disappointments before the right trail was found. With an understanding of all that, I have tried to think over the past, to figure out the influences, the effect of the various teachers I had and the training I received, to see how these things led me to the style of work which I followed later in life."

Paul Dirac
Nobel Laureate Physicist

In the spring of 1980, Paul Dirac, one of the founders of 20th century physics, came to Bard College 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.

With support from the National Science Foundation, the 1980-81 series includes 10 lectures by some of the most eminent scientists of our time. Six of the year's speakers are Nobel Laureates and the others are scholars and researchers of comparable stature. They will speak about their own work in a non-technical, personal context - - lectures modeled after Dirac's. In addition to the lecture, each program includes a seminar for high school science teachers 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 - - the series provides a rare opportunity for first-hand contact with the 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.

Schedule of Lectures

October 18, 1980
Mark Kac, Mathematician
"Chance and Regularity"

November 1, 1980
Eugene Wigner, Physicist
"Problems of Quantum Mechanics Measurement Process"

December 13, 1980
Edward Teller, Physicist
"The Persian Gulf - - If It's Still There"

February 21, 1981
Arthur Kornberg, Biologist
"DNA Replication"

March 14, 1981
I. I. Rabi, Physicist
"Molecular Beams, Experimental Discovery, and Theoretical and Mathematical Insights"

March 28, 1981
George Wald, Biologist
"Life in the Universe"

April 11, 1981
Rosalyn Yalow, Medical Researcher
"Radioactivity in the Service of Man"

April 25, 1981
Willis E. Lamb, Physicist
"Simple Problems in Physics"

May 9, 1981
E. Bright Wilson, Chemist
"Recent Developments in Molecular Spectroscopy and Some of Their Implications"

May 23, 1981
Carl Djerassi, Chemist
"The Politics of Contraception"

Carl Djerassi, Chemist

Dr. Djerassi was born in Vienna, Austria, received his Ph.D. from the University of Wisconsin, and began his career as a research chemist for the Ciba Pharmaceutical Company. He has held a variety of positions with the Syntex Corporation - - associate director of chemical research, vice-president of research, and director. He is now president of the Zoecon Corporation, which manufactures and markets pet care and agricultural products.

Dr. Djerassi taught at Wayne State University and is currently professor of chemistry at Stanford University. Among his awards and honors 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. In 1978, Dr. Djerassi was elected to the National Inventors Hall of Fame.

Dr. Djerassi is an authority on the reproductive systems of humans, animals, and insects, and has played a major role in the development of the oral contraceptive. He has written extensively about his areas of interest: the chemistry of natural products such as antibiotics, alkaloids, and steroids; the synthesis of medicinals such as antihistamines and steroidal anti-inflammatory agents; and the applications of physical measurements and computer techniques to organic chemical problems.

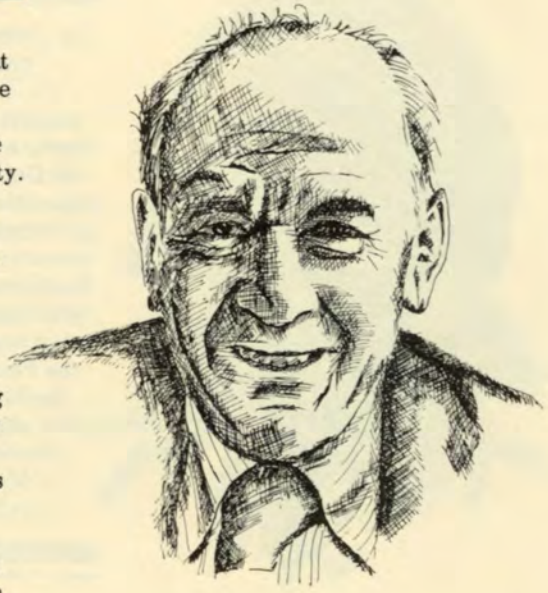
In his lecture, Dr. Djerassi will discuss "The Politics of Contraception."

His Lecture: "The Politics of Contraception"

Mark Kac, Mathematician

Dr. Kac was born in Krzemieniec, Poland and received his Ph.D. there at the John Casimir University. He came to the United States in 1938 under a Parnas Foundation fellowship to do re search at the Johns Hopkins University. From 1939 to 1961, he was a member of the mathematics faculty at Cornell University and since 1961, has been a professor of mathematics and theoretical physics at Rockefeller University. He was a member of the Institute for Advanced Study (1951-52), and has served as a visiting professor or lecturer at the University of Leiden, Oxford University, the Université Libre of Brussels, the Rijks Universiteit at Utrecht, and the Scuola Normale Superiore in Pisa.

Dr. Kac has twice won the Chauvenet Prize of the Mathematical Association of America, and he is the recipient of the 1976 Alfred Jurzykowski Foundation Award in Science and of the 1978 Birkhoff Prize, given jointly by the American Mathematical Society and the Society for Industrial and Applied Mathematics.



Dr. Kac is an authority on probability theory, particularly its use in mathematical analysis and statistical physics. He has published many articles and two books, **Probability and Related Topics of Physical Sciences** (1959) and, with S. Ulam, **Mathematics and Logic: Retrospect and Prospects** (1968).

Dr. Kac will speak on "Chance and Regularity" in nature as well as in mathematics.

His Lecture: "Chance and Regularity"

Arthur Kornberg, Biologist

Dr. Kornberg was born in New York City, and received his M.D. from the University of Rochester. He spent several years as a medical officer with the National Institutes of Health and then became professor and head of the Department of Microbiology at the Washington University School of Medicine. In 1959, he became chairman of the Department of Biochemistry at the Stanford University School of Medicine, serving for 10 years in that capacity before taking his current position as professor in the department. 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, the National Medal of Science, and the Nobel Prize in medicine.

Dr. Kornberg's most notable achievements have grown out of his research into the structure and dynamics of DNA - - the substance of which all genes are made, the chemical bearer of hereditary characteristics. Using the model of a DNA molecule developed by Nobel Prize winners Francis Crick and James Watson, Dr. Kornberg was able, in 1957, to produce a chemically more exact, but genetically inert replica of the natural substance. For that work, he was awarded the 1959 Nobel Prize in medicine and physiology, with Dr. Severo Ochoa. In 1967, working with a team of biochemists at Stanford, Dr. Kornberg became the first to synthesize biologically active DNA outside a living cell.

The creation of artifical DNA is a major step toward finding techniques to control virus diseases and cancer through the manipulation of DNA and other nucleotides. Dr. Kornberg's current research involves further exploration of DNA replication. His lecture will focus on work being done to discover the nature of the molecular events and the regulatory controls that determine the start of a cycle of DNA replication - - a problem basic to all cellular growth and fundamental to an understanding of cancer.

His Lecture: "DNA Replication"

Willis E. Lamb, Physicist

Dr. Lamb was born in Los Angeles and received his Ph.D. at the University of California at Berkeley. He has been a professor of physics at Columbia, Stanford, and Yale, and was Wykeham Professor of Physics and Fellow of New College at Oxford University. He is now professor of physics and optical sciences at the University of Arizona. He has been a visiting lecturer or professor at Harvard, University of Colorado, Kyoto University and the Tate Institute of Fundamental Research in Bombay, India, and was a Fulbright lecturer at the University of Grenoble. He has won the Rumford Premium of the American Academy of Arts and Sciences, the Guthrie Award from the Physical Society of London, and the Nobel Prize in physics.

Dr. Lamb was awarded the 1955 Nobel Prize in physics along with Dr. Polykarp Kusch for his discoveries regarding the structure of the hydrogen spectrum. Using very fine microwave spectroscopy, he was able to demonstrate a small but clear deviation from the long-standing predictions of the very successful Dirac theory in quantum mechanics. This so-called "Lamb shift" exerted a critical influence on the development of quantum electrodynamics.

Dr. Lamb will speak on "Simple Problems in Physics," examining the complex questions inherent in apparently simple physics problems.

His Lecture: "Simple Problems in Physics"

I.I. Rabi, Physicist

Dr. Rabi was born in Raymanon, Austria, and came to the United States when he was one year old. He received his Ph.D. from Columbia University and then, after two years of study in Munich, Copenhagen, Leipzig, and Zurich, returned to Columbia as a professor of physics. In 1940, Dr. Rabi took a leave of absence from Columbia to serve as associate director of the Radiation Lab at M.I.T., where he worked on the development of radar. During this period he served on the General Advisory Committee of the U.S. Atomic Energy Commission. He later conducted research at the Brookhaven National Laboratories on the peacetime uses of atomic energy. He has been science advisor to the government under a succession of presidents. Among his many awards and honors are the Atoms for Peace Award and the Nobel Prize in physics in 1944.

In 1930, Dr. Rabi began experiments on the magnetic properties of atomic nuclei. His work in the area helped determine the course of research on the atom throughout the 30's and 40's. He established the need for precise, accurate knowledge of the magnetic and electrical properties of the atom and of the forces which hold nuclei together. Complementing the work of Otto Stern, fellow physicist and Nobel Prize recipient, Rabi began manipulating beams of atoms to study the magnetic structure of nuclei. For developing the molecular beam resonance technique, a major tool in nuclear research, Rabi was awarded the 1944 Nobel Prize in physics. Dr. Rabi's work was fundamental to the subsequent development of lasers and masers, particularly as tools in atomic research.

Dr. Rabi's lecture is titled "Molecular Beams, Experimental Discovery, and Theoretical and Mathematical Insights." He will focus particularly on the connections between theory and experimentation - - how theory points the way to discovery, and how discovery gives rise to new theory.

His Lecture: "Molecular Beams, Experimental Discovery, and Theoretical and Mathematical Insights"

Edward Teller, Physicist

Dr. Teller was born in Budapest, Hungary, and studied in Germany where he received his doctorate from the University of Leipzig. He spent a year in Copenhagen studying under Niels Bohr as a Rockefeller Fellow. In 1935, Dr. Teller left Europe for a professorship in physics at George Washington University. He taught briefly at Columbia University, and in 1942, became a physicist with the Manhattan Project, the government-sponsored research program which developed the atomic bomb. Dr. Teller resumed academic work as a professor of physics at the University of Chicago, before returning to the Los Alamos Scientific Laboratory as its assistant director in 1949. From 1954 to 1975, he was associated with the Lawrence Livermore Radiation Laboratory, and is now its director emeritus. Since 1975, Dr. Teller has been a senior research fellow at the Hoover Institution on War, Revolution and Peace. Dr. Teller has received the Joseph Priestly Memorial Award, the Albert Einstein Award and the Fermi Award. He is the author of several books including **The Legacy of Hiroshima** (with A. Brown), **The Reluctant Revolutionary**, and **Energy: A Plan for Action.**

Dr. Teller's career has included research in chemistry, plasma and nuclear physics, quantum theory, thermonuclear reactions, astrophysics, spectroscopy of polyatomic molecules, and the statistical mechanics of fluids. Dr. Teller is interested in the applications of nuclear energy, particularly as part of a comprehensive energy plan for the United States. Recently he has devoted his energies to a study of America's dependence upon foreign oil and its economic and political implications.

Dr. Teller will speak on "The Persian Gulf: If It's Still There."

His Lecture: "The Persian Gulf--If It's Still There"

George Wald, Biologist

Dr. Wald was born in New York City and received his Ph.D. from Columbia University. He did research with Otto Warburg in Berlin, and in 1934 joined the faculty of Harvard University, becoming a professor of biochemistry. He is currently professor emeritus at Harvard. Among his awards are the Albert Lasker Award of the American Public Health Association, the Rumford Premium of the American Academy of Arts and Sciences, and the 1967 Nobel Prize in physiology.

Dr. Wald's area of expertise is the chemistry and physiology of the human eye; in fact, practically all that is known about the chemical process by which light is transmuted into sight has come directly or indirectly from his work. Dr. Wald's first major achievement was his discovery of the presence of vitamin A in the retina, made in 1932 while he worked in Warburg's laboratory. In 1967, Dr. Wald won the Nobel Prize in physiology, sharing the award with Haldan K. Hartline and Ragnar Granit. He has also been a key figure in the development of government regulations for recombinant DNA research.

Dr. Wald's lecture at Bard is titled "Life in the Universe."

His Lecture: "Life in the Universe"

Eugene Wigner, Physicist

Dr. Wigner was born in Budapest, Hungary, and received the degree of Doctor of Engineering from the Technische Hochschule in Berlin. He taught at universities in Germany for several years, before coming to the United States in 1930 as a lecturer at Princeton University. He has been a professor of physics at the University of Wisconsin, and a professor, lecturer, or research director at the Instituut-Lorentz in Leiden, the University of Massachusetts, Louisiana State University, and other universities and research centers throughout the world. From 1938 to 1971, he was the Thomas D. Jones Professor of Mathematical Physics at the Palmer Lab at Princeton. Among the awards and honors he has received are the Fermi Award, given by the U. S. Congress, the Albert Einstein Award, the National Medal of Science, and the 1963 Nobel Prize for physics.

Dr. Wigner is best known for his pioneering work in nuclear structure. Perhaps his most important achievement was the application of the mathematical system of group theory to atomic and nuclear problems. From 1942 to 1945, Dr. Wigner worked at the Metallurgical Laboratory of the University of Chicago, where he participated with Enrico Fermi in the experiment that produced the world's first controlled nuclear reaction. From 1946 to 1947, he served as the Director of Research and Development of the Clinton Laboratories, the headquarters of the Manhattan Project. His book, **Physical Theory of Neutron Chain Reactors**, written with A.M. Weinberg and published in 1958, was largely based on his work during this period.

Dr. Wigner will speak on "The Problems of Quantum Mechanics Measurement Process."

His Lecture: "Problems of Quantum Mechanics Measurement Process"

E. Bright Wilson, Chemist

A native of Tennessee, Dr. Wilson did his undergraduate work at Princeton and received his Ph.D. in physical chemistry from the California Institute of Technology. After three years as a teaching fellow there, he went to Harvard where he became the Theodore William Richards Professor of Chemistry. He is now professor emeritus at Harvard. Dr. Wilson has received the American Chemical Society Award in Pure Chemistry, the Pauling Award, the Rumford Medal of the American Academy of Arts and Sciences, and the National Medal of Science. He is a member of the Commission on Natural Resources and of the corporation of the Woods Hole Oceanographic Institution. Since 1977, he has been the chairman of the Committee on Radioactive Waste Management of the National Academy of Science.

Dr. Wilson is a world authority on molecular spectroscopy, the analysis of spectra as a means of studying the structure and dynamics of polyatomic molecules. In particular he has made seminal contributions to the general theory and practice of vibrational spectroscopy. In 1955, he was co-author of a book on this subject, **Molecular Vibrations**, which remains a classic in the field. He also wrote with Linus Pauling, in 1933, **Introduction to Quantum Mechanics**, one of the earliest and most widely used texts on quantum chemistry.

During World War II, Dr. Wilson served as research director of the Underwater Explosives Research Laboratory in Woods Hole, Mass. From 1944 to 1946, he was a division chief of the National Defense Research Committee, and later was the research and deputy director of the Weapons Systems Evaluation Group of the Department of Defense. For this work, he was awarded the Medal for Merit by the United States government. 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.

Dr. Wilson will speak on "Recent Developments in Molecular Spectroscopy and Some of Their Implications."

His Lecture: "Recent Developments in Molecular Spectroscopy and Some of Their Implications"

Rosalyn Yalow, Medical Researcher

Dr. Yalow was born in New York City and received her Ph.D. from the University of Illinois. She became assistant professor of physics at Hunter College and physicist and assistant chief of the Radioisotope and Nuclear Medicine Service at the Veterans Administration Hospital in the Bronx, New York. She has been chief of the Nuclear Medicine Service at the Veterans Hospital, director of the Solomon A. Berson Research Laboratory, professor at the Mt. Sinai School of Medicine, and Distinguished Professor-at-Large at the Albert Einstein College of Medicine. She is now senior medical investigator for the Veterans Administration Medical Center and chairman of the Department of Clinical Services at Montefioré Hospital and Medical Center. Among other honors, she has received the Albert Lasker Basic Medical Research Award, the Rosalyn S. Yalow Research and Development Award of the American Diabetes Association, the Gratum Genus Humanum Gold Medal of the World Federation of Nuclear Medicine and Biology, and the 1977 Nobel Prize in physiology and medicine.

Dr. Yalow has been a pioneer in the use of radioimmunoassay (RIA) in medical research and diagnosis. RIA is a technique that uses such materials as radioiodine to investigate biological processes. It was introduced a quarter of a century ago in experiments to trace the circulation of insulin in diabetes patients. Subsequently the technique has been used to observe fluctuations in hormone levels of patients and research subjects in a variety of different areas significant to medical and biological science. RIA has been particularly important in the field of public health, where it has been used to diagnose hypothyroidism and to reduce the incidence of hepatitis contracted through blood transfusions.

Dr. Yalow will speak on "Radioactivity in the Service of Man" and will deal particularly with the future of nuclear medicine.

Her Lecture: "Radioactivity in the Service of Man"

Advisor for the Series

Abe Gelbart, a mathematician, is a Bard College Center Fellow, Dean Emeritus of the Belfer Graduate School of Science at Yeshiva University, and former member of the Institute for Advanced Study in Princeton, N.J.. Dr. Gelbart was associated with the journal, **Scripta Mathematica**, first as 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.

Project Director

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 N. Y. State Department of Environmental Conservation on issues concerning the environment and historical preservation.

THE BARD COLLEGE CENTER

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