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Distinguished Scientist Lecture Series Program 1991-1992

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The Distinguished Scientist

Lecture Series

1991 | 1992

Sponsored by The Bard Center

THE DISTINGUISHED SCIENTIST

Lecture Series

1991-1992

FALL

October 19, 1991

LEON COOPER

**Science and Science Policy in the
21st Century: A Modest Proposal**



November 16, 1991

GENE E. LIKENS

**Human-Accelerated
Environmental Change**



SPRING

February 15, 1992

ROBERT E. TARJAN

Data Structures



March 7, 1992

JAMES D. WATSON

**1991-1992 Abe Gelbart Lecture:
The Human Genome Project**



April 11, 1992

IRVING R. EPSTEIN

**Can Simple Chemical Reactions
Tell Us How the Leopard Got
Its Spots?**



THE BARD CENTER

**Annandale-on-Hudson
NY 12504**

FORMAT OF THE LECTURES

HISTORY OF THE SERIES



Each lecture will begin at 2 p.m. in the F.W. Olin Auditorium on the campus of Bard College (see map on page 40). Admission is open to the public without charge. There will be a reception after each talk in Kline Commons (see map), where the audience will have an opportunity to meet the day's speaker and ask further questions.

In addition to the main lecture, there are three other activities available only to those that register at least two weeks in advance. The day begins at 9:30 a.m. with a complimentary Continental breakfast in the faculty dining room of Kline Commons. At 10:30 a.m., in Olin Auditorium, a Bard faculty member will introduce the topic for the day. After the morning lecture, there will be a complimentary luncheon for registered participants back in the faculty dining room of Kline Commons. Finally, participants will join the public for the main lecture at 2 p.m.

To register for the whole day's activities, please call Ms. Heidi Ham, The Bard Center, 914-758-7481, between 3 and 5 p.m.

Please register at least two weeks in advance. Seating at meals is limited.

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

His talk combined scientific analysis with the history of science and personal reminiscences 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 Center Distinguished Scientist Lecture Series. The first two years of the Distinguished Scientist Lecture Series were supported by the Pre-College Teacher Development in Science Program of the National Science Foundation.

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.

To date, including the 1991-92 lectures, audiences will have heard 79 eminent scientists, including 42 Nobel Laureates and four Fields medalists, speak on scientific issues of current and timeless concern.

LEON COOPER



Physicist

Science and Science Policy
in the 21st Century: A Modest
Proposal

October 19, 1991

Leon Cooper was born and bred in New York City, attending the Bronx High School of Science and Columbia University (B.A. '51, Ph.D. '54). After receiving his Ph.D., Dr. Cooper became a member of the Institute for Advanced Study in Princeton. Following short residencies at the University of Illinois and Ohio State University, he proceeded to Brown University in 1958 and became the Henry Ledyard Goddard University Professor there in 1966 and the Thomas J. Watson, Sr. Professor of Science in 1974. He is long time co-chairman of Brown University's Center for Neural Sciences, the successor to the Center for Neural Studies, of which he was the first director, with an inter-disciplinary staff drawn from the departments of Applied Mathematics, Biomedical Sciences, Linguistics, and Physics. He is also co-founder and co-chairman of Nestor, Inc., an industry leader in neural network systems applications.

In recognition of his work Dr. Cooper has received, in addition to the Nobel Prize, the Comstock Prize (with J.R. Schrieffer) of the National Academy of Sciences, the Award of Excellence of the Graduate Faculties Alumni of Columbia University, the Descartes Medal of the Academie de Paris, Universite Rene Descartes, and the John Jay Award of Columbia College.

His work:

For his studies on the theory of superconductivity, completed when he was in his twenties, Dr. Cooper shared the Nobel Prize in Physics in 1972 with John Bardeen and J.R. Schrieffer. For the past twenty years he has been doing leading work on animal nervous systems and the human brain, working towards a scientific model of how the mind works.

Leon Cooper is the Thomas J. Watson, Sr. Professor of Science at Brown University.



Ecologist

Human-Accelerated
Environmental Change

November 16, 1991

Dr. Likens obtained a B.S. degree from Manchester College in 1957, and his MS. and Ph.D. degrees from the University of Wisconsin, Madison in 1959 and 1962. An instructor and associate professor at Dartmouth College (1963-1969), Dr. Likens moved to Cornell University in 1969, where he was promoted to full professor in 1972 and appointed Charles A. Alexander Professor of Biological Sciences in 1983. Before joining the New York Botanical Garden, Dr. Likens was Chairman of the Section of Ecology and Systematics at Cornell. In addition to his roles with the Botanical Garden, Dr. Likens retains faculty appointments at Yale University (Professor of Biology), Cornell (Adjunct Professor of Ecology and Systematics), and Rutgers University (Professor in the Graduate Field of Ecology).

Dr. Likens is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, and the Royal Swedish

Academy of Sciences (foreign member). He is a Fellow of the American Association for the Advancement of Science, a recipient of both a NATO Senior Fellowship and a Guggenheim Fellowship, and the first recipient of the G.E. Hutchinson Award for excellence in research. In addition to numerous other prizes and awards, Dr. Likens has received five honorary doctorates.

His work:

Dr. Likens is an ecologist best known for his discovery of acid rain in North America. He is a co-director of the Hubbard Brook Ecosystem Study, a multidisciplinary ecological analysis of forest, stream, and lake ecosystems in the White Mountains of New Hampshire. An advisor at state, national, and international levels on the ecological effects of air pollution and acid rain, Dr. Likens is author, co-author, or editor of over 300 research articles and ten books.

Gene E. Likens is Vice President of the New York Botanical Garden, and Director of the Institute of Ecosystem Studies at the Mary Flagler Cary Arboretum, Millbrook, New York.



Computer Scientist

Data Structures

February 15, 1992

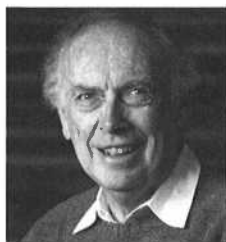
Professor Tarjan received his B.S. degree in mathematics from the California Institute of Technology in 1969 and his M.S. and Ph.D. degrees in computer science from Stanford University in 1971 and 1972, respectively. He was an assistant professor at Cornell University (1972-73), a Miller Fellow at the University of California at Berkeley (1973-75), and assistant professor (1975-77) and then associate professor (1977-80) at Stanford University. He was affiliated with At&T Bell Labs from 1980 to 1990, most recently in the capacity of Distinguished Member of the Technical Staff. In 1985 Professor Tarjan was appointed the James S. McDonnell Distinguished University Professor of Computer Science at Princeton. In addition to his faculty appointment at Princeton University, Professor Tarjan is the co-director of the Center for Discrete Mathematics and Theoretical Computer Science, located at Rutgers University, and also Adjunct Fellow of the NEC Research Institute of Princeton, New Jersey.

Professor Tarjan was a Guggenheim Fellow in 1987. He was awarded the Nevanlinna Prize in Information Science in 1983 by the International Mathematical Union and received the A.M. Turing Award of the Association for Computing Machinery in 1986. Professor Tarjan is currently a member of the National Academy of Sciences, the National Academy of Engineering, and the American Philosophical Society.

His work:

Professor Tarjan is well known for his pioneering work on the design and analysis of algorithms and data structures and is widely published in these and related fields. His current research interests continue to include the design and analysis of data structures and combinatorial algorithms, discrete optimization, and computational complexity.

Robert E. Tarjan is the James S. McDonnell Distinguished University Professor of Computer Science at Princeton University.



Molecular Biologist

1991-1992 Abe Gelbart Lecture:
The Human Genome Project

March 7, 1992

Born in Chicago, Illinois, in 1928, Dr. Watson received a B.S. (1947) from the University of Chicago and a Ph.D. (1950) from Indiana University, both in zoology. Following a National Research Fellowship in Copenhagen and a National Foundation of Infantile Paralysis Fellowship at the University of Cambridge, England, he spent two years at the California Institute of Technology. He joined the Harvard faculty in 1955 and became Professor in 1961, resigning in 1976 to become Director of Cold Spring Harbor Laboratory. In 1988 he was also appointed Associate Director for Human Genome Research of the National Institutes of Health.

Dr. Watson was awarded the John Collins Warren Prize of Massachusetts General Hospital (1959), the Eli Lilly Award in Biochemistry (1960), the Albert Lasker Prize, awarded by the American Public Health Association (1960), the Research Corporation Prize (1962), the John J. Carty Gold Medal of the

National Academy of Sciences (1971), and the Presidential Medal of Freedom (1977).

His memberships include the American Academy of Arts and Sciences (1958), the American Society of Biological Chemists (1958), the National Academy of Sciences (1962), the American Association for Cancer Research (1972), and the American Philosophical Society (1977). He holds honorary affiliations with the Danish Academy of Arts and Sciences (1963), Clare College, Cambridge University (1968), Athenaeum, London (1980), the Royal Society, London (1981) and the Academy of Sciences, USSR (1989).

Dr. Watson has received honorary degrees from fourteen universities and has published five books: *Molecular Biology of the Gene*, *The Double Helix*, *The DNA Story*, *Molecular Biology of the Cell*, and *Recombinant DNA: A Short Course*.

His work:

James D. Watson is best known for his discovery of the structure of deoxyribonucleic acid (DNA), for which he shared with Francis Crick and Maurice Wilkins the 1962 Nobel Prize in Physiology or Medicine. The "Watson and Crick" model of DNA structure led inevitably to a revolution in biology which culminated in the development of modern recombinant-DNA techniques.

James D. Watson is the Director of the Cold Spring Harbor Laboratory and Associate Director for Human Genome Research of the National Institutes of Health.



Chemical Physicist

Can Simple Chemical Reactions
Tell us How the Leopard
Got Its Spots?

April 11, 1992

Born in New York City, Professor Epstein received a B.A. in Chemistry and Physics in 1966, an M.A. in Chemistry in 1968 and a Ph.D. in Chemical Physics (with W.N. Lipscomb) in 1971, all from Harvard University. He also holds a Diploma in Advanced Mathematics from Oxford University, where he studied as a Marshall Scholar with the late C.A. Coulson. He was a NATO Postdoctoral Fellow at the Cavendish Laboratory, Cambridge University, in 1971, and an NSF Faculty Professional Development Fellow in the laboratory of Manfred Eigen at the Max-Planck-Institut für Biophysikalische Chemie in Göttingen in 1977-78. He has received Woodrow Wilson, Guggenheim and Humboldt Fellowships as well as a Dreyfus Foundation Teacher-Scholar Award. He has taught at Brandeis since 1971, and served as Chemistry Department Chairman from 1983 to 1987.

Dr. Epstein organized and chaired the first Gordon Research Conference

on Oscillating Chemical Reactions in 1982. He currently serves on the Science Council, New England Region, of the Weizmann Institute, and is an editor of *Chaos: An Interdisciplinary Journal of Non-linear Science*.

His work:

Dr. Epstein's research interests revolve around nonlinear dynamical behavior in systems of chemical and biological interest. His group developed the first systematic approach to designing new chemical oscillators, and they have pioneered in the discovery and mechanistic analysis of oscillating chemical reactions. Author of more than 175 publications, Dr. Epstein's current research interests include the behavior of systems of coupled chemical oscillators and the study of neural oscillators, both singly and in coupled networks.

Irving R. Epstein is Helena Rubinstein Professor of Chemistry and a member of the Center for Complex Systems at Brandeis University.

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GILBERT STORK



Synthetic Organic Chemist

April 27, 1991

Quinine, a Forty-Year
Construction Problem

Born in Brussels and educated in France before receiving his Ph.D. from the University of Wisconsin, Dr. Stork taught at Harvard for several years before moving to Columbia where he was Eugene Higgins Professor of Chemistry at the time of his talk at Bard. Dr. Stork has received numerous prizes and awards in recognition of his exploration of new and interesting methods in the designs for syntheses of complex natural products. He is a member of both the National Academy of Sciences and the American Academy of Arts and Sciences.

KURT MISLOW



Organic Chemist

March 16, 1991

On Quantifying Chirality

At the time of his lecture at Bard Dr. Mislow was Hugh Stott Taylor Professor of Chemistry, Emeritus, at Princeton University. Widely known for his theories of stereochemistry, he had recently become interested in the concept of quantifying chirality. Dr. Mislow has served on the advisory boards of seven journals, and has received many awards for his work, including the Prelog Medal and the William H. Nichols Medal. He is a member of both the National Academy of Sciences and the American Academy of Arts and Sciences.

DAVID BALTIMORE



Molecular Biologist

December 8, 1990

Antibody Gene Formation

Shortly before speaking at Bard, Dr. Baltimore had been appointed President of Rockefeller University. He shared, with Renato Dulbecco and Howard Temin, the 1975 Nobel Prize in Physiology or Medicine for the discovery of reverse transcriptase, an enzyme found in retroviruses that has had great utility in genetic engineering. Dr. Baltimore is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, and the Institute of Medicine.

WINSTON J. BRILL



Biotechnologist

November 17, 1990

Biotechnology and Plant Agriculture

Shortly before speaking at Bard, Dr. Winston Brill formed Winston J. Brill and Associates to assist corporations in improving research productivity and creativity. Dr. Brill has published extensively and has several patents in the area of agricultural applications of biotechnology, particularly in the use of genetic engineering to understand and manipulate nitrogen fixation in plants. Dr. Brill has served on several national committees concerning recombinant DNA and was elected to the National Academy of Sciences in 1989.

ARTHUR M. JAFFE



Mathematical Physicist

October 27, 1990

Towards the Reunification of Modern Mathematics and Physics

At the time of his lecture, Dr. Jaffe was dividing his time between mathematics and physics as the Landon T. Clay Professor of Mathematics and Theoretical Science at Harvard University. Especially known for his work in field theory, Dr. Jaffe has received major awards in mathematics and physics, including the Dannie Heinemann Prize, and is chief editor of *Communications in Mathematical Physics*, editor of *Progress in Physics*, and editor of *Selecta Mathematica*.

SIDNEY ALTMAN



Molecular Biologist

September 8, 1990

Understanding Life in the Laboratory

The year before speaking at Bard, Dr. Altman had been serving as ninth Dean of Yale College when he received the 1989 Nobel Prize in Chemistry for his work on ribozymes (enzymes that use RNA for their catalytic functions). While Dean he worked to broaden the role of science in the liberal arts curriculum. At the time of his talk he had returned to the faculty as Sterling Professor of Biology at Yale. In addition to the Nobel Prize, Dr. Altman has received many awards, including election to the National Academy of Sciences in 1990.

STEPHEN SMALE



Mathematician

April 28, 1990

The Nature of the Computer: A Non-Traditional Point of View

A Fields Medalist for his fundamental contributions to the field of differential topology, Dr. Smale has made equally significant contributions to the fields of dynamical systems and computational complexity. A former member of the Institute for Advanced Study at Princeton and visiting professor in South America, Paris, and New Haven, at the time of his talk Dr. Smale had been on the mathematics faculty of the University of California, Berkeley, for 26 years. Dr. Smale has received many awards for his wide-ranging and incisive research.

ROBERT GALLO



Medical Researcher

April 7, 1990

Retroviruses in Cancer and AIDS

Dr. Gallo is one of the foremost virologists in the United States and a noted leader in cancer and AIDS research. At the time of his talk Dr. Gallo was Chief of the Laboratory of Tumor Cell Biology of the National Cancer Institute. Dr. Gallo has served on many international boards and has represented the United States in international meetings on AIDS. By studying reverse transcriptases in human cancer cells and in retroviruses, Dr. Gallo's lab played a critical part in clarifying the role of a retrovirus in causing AIDS.

SAUL WOLFE



Organic Chemist

March 17, 1990

Drug-Receptor Interactions: A Chemist's Approach

Author of over 200 scientific papers and holder of over 30 patents (including one for the commercial production of the drug ampicillin), Dr. Wolfe had been at Queen's University, Canada, for 28 years at the time of his talk. He has pioneered strategies using biotechnology to reduce the time involved in the synthesis of new drugs and has also addressed theoretical aspects of drug-receptor interactions. He has received the Merck Award for outstanding achievement in organic chemistry and the Queen's University Prize for Excellence in Research.

NORMAN F. RAMSEY



Physicist

November 18, 1989

Time and the Physical Universe

In the month before his talk at Bard, Dr. Ramsey received the Nobel Prize in Physics for his contributions to both theoretical and experimental developments in particle physics and molecular beams, including the invention of the hydrogen maser. He was Higgins Professor of Physics at Harvard at the time of his talk. Executive secretary of the group of scientists who established Brookhaven National Laboratory, for many years he was also president of the Universities Research Association, which operates Fermilab.

DAVID BRYANT MUMFORD



Mathematician

October 14, 1989

What is 'Seeing' and How Come Computers Can't Do It While We Can?

At the time of his lecture, Dr. Mumford was a MacArthur Foundation Fellow and Higgins Professor of Mathematics at Harvard University. He has also been a member of the Institute for Advanced Study at Princeton and a visiting professor in Tokyo, Bombay, and Paris. Among the many honors for his important contributions to the field of algebraic geometry, Dr. Mumford received the Fields Medal in 1974. He had recently undertaken a study of the complex mechanisms underlying avian and human visual perception.

MILDRED S. DRESSELHAUS



Physicist

September 23, 1989

Frontiers of Materials Research

Institute Professor at MIT at the time of her lecture, Dr. Dresselhaus has held many positions there and has been a visiting professor at universities around the world. She has received many honors, has been President of the American Physical Society, a member of the editorial board of *Physical Review B*, and has served on boards and committees concerned with women in science and engineering. Dr. Dresselhaus has developed and used a wide range of techniques to study condensed matter physics.

JIN H. KINOSHITA



Biochemist

May 20, 1989

A New Approach to Control Diabetic Complications

Dr. Kinoshita was Scientific Director of the National Eye Institute of the National Institutes of Health (NIH) at the time he gave his lecture. A 1944 Bard College, Columbia University graduate, his research interests have focused on the biochemistry of the lens of the mammalian eye, in particular the relationship of lens carbohydrate metabolism to the development of cataracts.

RAUL J. FLEISCHMAJER



Biochemist, Dermatologist

March 11, 1989

Collagen: The Great Biological Architect

At the time he spoke at Bard, Dr. Fleischmajer was chairman and a professor of the department of dermatology of the Mount Sinai School of Medicine, New York City. His research has focused on the biochemistry of skin, particularly its lipid metabolism and protein structure. He has served as chief editor of *Progress in Diseases of the Skin*, and the *International Journal of Dermatology*.

DANIEL CARLTON GAJDUSEK



Virologist

December 3, 1988

The Ordered and Disordered Brain in Isolated, Primitive Populations

Dr. Gajdusek was a co-recipient of the Nobel Prize in Physiology or Medicine in 1976 in recognition of his study of viruses, particularly slow and unconventional viruses. His research has also encompassed protein physical chemistry, autoimmune diseases, neurological degenerative disorders, human evolution, child behavior, and learning in primitive cultures. At the time of his lecture he was chief of the Laboratory of Central Nervous System Studies.

ANTHONY S. FAUCI



Immunobiologist

November 12, 1988

Current Issues and Future Directions in the Scientific Response to the AIDS Epidemic

Dr. Fauci is a leading AIDS researcher and has been instrumental in developing strategies for the therapy and immune reconstitution of patients with this disease. At the time of his lecture he was Director of the National Institute of Allergy and Infectious Diseases (NIAID) of the National Institutes of Health (NIH).

WALTER H. STOCKMAYER



Physical Chemist

October 15, 1988

Dynamics of Chain Molecules

At the time of Dr. Stockmayer's lecture he was the Albert W. Smith Professor Emeritus at Dartmouth College. He has worked on a variety of theoretical problems in the dynamics and statistical mechanics of macromolecules, including light scattering, chain transformations, and chain dynamics. Dr. Stockmayer is associate editor of *Macromolecules*, has been elected to the Academy of Arts and Sciences (1946), and in 1987 received the National Medal of Science.

DANIEL E. KOSHLAND, JR.



Biochemist

April 30, 1988

Chemistry of a Simple Behavioral System

When he lectured at Bard, Dr. Koshland was a professor of biochemistry at the University of California at Berkeley, editor of *Science* magazine, and chairman of the editorial board of the *Proceedings of the National Academy of Sciences*. As a founding member and chairman of the Academy Forum, a committee of the National Academy of Sciences, he helped develop policy on issues that pose dilemmas between science and society.

SIR HANS KORNBERG



Biochemist

April 9, 1988

The Bacterial Cell Membrane: Berlin Wall of the Cell

When he lectured at Bard, Dr. Kornberg was the Sir William Dunn Professor of Biochemistry, University of Cambridge, and Master of Christ's College, Cambridge. Among Dr. Kornberg's career accomplishments was the School of Biological Sciences, which he established during his fifteen years at the University of Leicester. At the time of his lecture, he was also academic governor of the Hebrew University of Jerusalem and Scientific Governor of the Weizmann Institute. Dr. Kornberg was honored with a Knighthood in 1978.

HERBERT A. HAUPTMAN



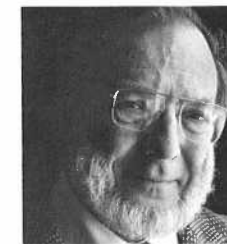
Mathematician

March 12, 1988

The Phase Problem of X-Ray Crystallography

At the time of his lecture, Dr. Hauptman was president and research director of the Medical Foundation of Buffalo and Research Professor of Biophysical Sciences at SUNY Buffalo. Dr. Hauptman and Jerome Karle received the Nobel Prize in Chemistry in 1985 for work in the "direct method," an analytical technique to determine the three-dimensional structure of molecules. His awards include the Norton Medal and the Gold Plate Award of the American Academy of Achievement. Dr. Hauptman has written extensively on crystallography and phase determination.

MICHAEL ELLIS FISHER



Physicist

February 27, 1988

What's Mathematical Physics to Physics?

Dr. Fisher had recently been appointed the Wilson H. Elkins Professor in the Institute for Physical Science and Technology, of the University of Maryland at the time of his lecture. Honors for Dr. Fisher's work include the Wolf Prize in Physics, two Guggenheim fellowships, the Irving Langmuir Prize in Chemical Physics, and the Guthrie Medal and Prize of the Institute of Physics (United Kingdom).

GEORGE E. PALADE



Biologist

February 13, 1988

Traffic Problems and Their Solution in Animal Cells

Dr. Palade was senior research scientist and special advisor to the dean at Yale University School of Medicine when he spoke at Bard. In 1974 he received the Nobel Prize in Physiology or Medicine for his discoveries with A. Claude and C. DeVue on the structural and functional organization of the cell. Honors for Dr. Palade's work include the National Medal of Science, the Henry Gray Award, the Schleiden Medaille, the Brown Hazen Award, the Dickson Prize, and the Horowitz Prize.

SERGE LANG



Mathematician

October 31, 1987

Concrete Cases Purveying Political Opinions as Science

At the time of his lecture, Dr. Lang had been a professor of mathematics at Yale University since 1972 and had taught at Columbia University, the University of Chicago, Princeton, and Harvard. A member of the National Academy of Sciences and the American Mathematical Society, he received the Prix Carriere from the Academie des Sciences, Paris, and the Cole Prize from the American Mathematical Society. Dr. Lang has published more than 60 articles and written 32 mathematical books. His research has been primarily in algebraic geometry and number theory.

HERBERT C. BROWN



Chemist

October 17, 1987

Discovering and Exploring the New Borane Continent

Dr. Brown was Wetherill Research Professor Emeritus at Purdue University at the time of his lecture. He received the 1979 Nobel Prize in Chemistry for his explorations of organic boranes. Other honors include the Nichols Medal, the ACS Award for Creative Research, the Linus Pauling Medal, the National Medal of Science, the Priestley Medal, and the Perkin Medal. *Hydroboration, Boranes in Organic Chemistry* and *The Nonclassical Ion Problem* are among the books Dr. Brown has written.

RICHARD AXEL



Molecular Biologist

April 25, 1987

Genes Mediating a Complex Behavior in a Simple Organism

Dr. Axel was a professor in the Department of Pathology and Biochemistry at Columbia University when he lectured at Bard. His work has focused on the control of gene expression in normal and transformed cells. He has received the Young Scientist Award of the Passano Foundation, the Alan T. Waterman Award and the Eli Lilly Award for his achievements. Since 1976 he had been associate editor of *Cell* magazine.

WILLIAM A. FOWLER



Astrophysicist

March 7, 1987

The Quest for the Origin of the Elements

Dr. Fowler was the Institute Professor of Physics, Emeritus, at the California Institute of Technology at the time of his lecture. In 1983 he was awarded the Nobel Prize for Physics for his studies of nuclear reactions important in forming the chemical elements of the universe. He has chaired the Physics Section of the National Academy of Sciences and the Nuclear Science Advisory Committee of the National Science Foundation. In addition to the Nobel Prize, his other awards include the National Medal of Science and the NASA Apollo Achievement Award.

JOSEPH L. GOLDSTEIN



Biochemist

February 21, 1987

Toward a Molecular Understanding of Cholesterol and Atherosclerosis

Dr. Goldstein was Regental Professor, Professor of Internal Medicine, and Chairman of the Department of Molecular Genetics at the Health Science Center of the University of Texas at the time of his lecture. In 1985 he and Michael S. Brown were co-recipients of the Nobel Prize in Physiology or Medicine for their work in characterizing the genetics and molecular biology of low-density lipoproteins and their role in atherosclerosis. His other honors include the Pfizer Award, the New York Academy of Sciences Award, and the Albert D. Lasker Award.

MARIAN KOSHLAND



Immunologist

December 13, 1986

The Immune System: A Model for Studying Differentiation

Dr. Koshland was a professor of bacteriology and immunology at the University of California at Berkeley when she lectured at Bard. She has also been a fellow in bacteriology and immunology at Harvard University, a member of the executive committee of the National Science Board, and a member of the 1975 President's Biomedical Research Panel in immunology and microbiology. Her research has focused on the mechanisms of antibody synthesis.

JOHN WILLARD MILNOR



Mathematician

November 15, 1986

Some Simple Dynamical Systems

Dr. Milnor held the Veblen Chair at the Institute for Advanced Study, Princeton, at the time of his lecture. Honors for his work in algebraic topology have included the Fields Medal, the National Medal of Science, and the Steele Prize. Formerly Henry Putnam University Professor at Princeton University, he has been a member of the Institute since 1963.

SUBRAHMANYAN CHANDRASEKHAR



Astrophysicist

October 25, 1986

On Gravitational Collapse, Black Holes, and Colliding Waves

Distinguished Service Professor at the Yerkes Observatory when he lectured at Bard, Dr. Chandrasekhar was awarded the Nobel Prize in 1983 for his important theoretical studies of the physical processes in the structure and evolution of stars. He has also received the Gold Medal of the Royal Astronomical Society, the National Medal of Science, and the Heinemann Prize of the American Physical Society. It has been said that his research has "made black holes possible."

DAVID HUNTER HUBEL



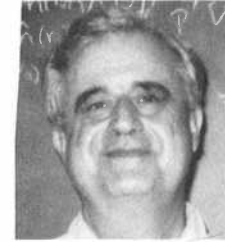
Neurophysiologist

October 11, 1986

The Visual Pathways and Perception: Evidence for Distinct Subsystems in Vision

At the time of his lecture, Dr. Hubel was the John Franklin Enders University Professor in the Department of Neurobiology at Harvard University. In 1981 he received the Nobel Prize in Physiology or Medicine with Torsten Weisel for their work on information processing in the visual system. Recognition for his work has also included Harvard's Ledlie Prize, the Horwitz Prize of Columbia University, and the Friedenwalk Award.

MARSHALL N. ROSENBLUTH



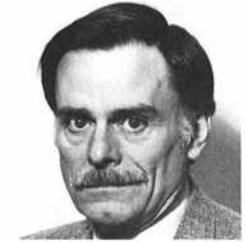
Theoretical Physicist

April 26, 1986

Fusion: Our Energy Future

Dr. Rosenbluth was the director of the Institute for Fusion Studies at the University of Texas at Austin when he lectured at Bard. He has been instrumental in developing the foundations of plasma physics and its relationship to magnetohydrodynamics, and his work has led to a variety of applications in the field of controlled fusion research. Dr. Rosenbluth has been awarded the E.O. Lawrence Prize, the Albert Einstein Award, and the James Clerk Maxwell Prize in Plasma Physics.

JOHN STEWART WAUGH



Chemist

April 19, 1986

Prospects for NMR Spectroscopy at Very Low Temperatures

Dr. Waugh was the Albert Amos Noyes Professor of the Massachusetts Institute of Technology when he spoke at Bard. Known for his fundamental contributions to the field of high-resolution nuclear magnetic resonance spectroscopy in solids, he has received the Irving Langmuir Award and fellowships from the Sloan and Guggenheim foundations, and he has been a fellow of the American Academy of Arts and Sciences and the American Physical Society. He is the author of *New NMR Methods in Solid State Physics* and an editor of numerous technical journals.

GERALD MAURICE EDELMAN



Biochemist

March 8, 1986

The New Embryology: Molecules Regulating Animal Forms

At the time of his lecture, Dr. Edelman was the Vincent Astor Distinguished Professor at the Hospital of Rockefeller University. He received the Nobel Prize for Physiology or Medicine in 1972 for his research into the chemical structure of antibodies. Among his many other awards are the Regents Medal of Excellence from New York State, the Buchman Memorial Award from the California Institute of Technology, the Eli Lilly Award, and the Albert Einstein Memorial Award.

SHELDON LEE GLASHOW



Physicist

December 7, 1985

The Challenge of Particle Physics

When he lectured at Bard, Dr. Glashow was the Higgins Professor of Physics at Harvard University. In 1979, he was awarded the Nobel Prize in Physics for his research on the Weinberg-Salam theory of weak interaction. In addition to the Nobel Prize, Dr. Glashow received the J.R. Oppenheimer Prize, the George Ledlie Prize, and the Castiglione d'Sicilia Prize. A member of the National Academy of Sciences and the American Academy of Arts and Sciences, he has served as president of the International Sakharov Committee.

CHARLES HARD TOWNES



Physicist

November 2, 1985

Evidence for a Black Hole at the Center of Our Galaxy

Dr. Townes was the University Professor of Physics at the University of California at Berkeley at the time of his lecture. In 1964, he received the Nobel Prize in Physics for his fundamental work in the field of quantum electronics. The recipient of the Comstock Award from the National Academy of Sciences and the Rumford Premium Award from the American Academy of Arts and Sciences, among other prestigious awards, Dr. Townes is a foreign member of the Royal Society of London and a member of the National Academy of Sciences and the American Astronomy Society.

CLAIRE M. FAGIN



Nursing Researcher

April 27, 1985

Consumerism and Health: Whose Body Is It, Anyway?

Dr. Fagin was the dean of the School of Nursing at the University of Pennsylvania when she lectured at Bard. Her major area of research is the effects of maternal attendance during children's hospitalization; she has also investigated the cost effectiveness of nursing intervention and nurse-consumer collaboration. Her books include *Nursing in Child Psychiatry* and *Family Centered Nursing in Community Psychiatry*, both chosen as Books of the Year by the American Journal of Nursing.

BENJAMIN WIDOM



Physical Chemist

March 23, 1985

The Critical Points of Phase Transformation

A professor of chemistry at Cornell University at the time of his lecture, Dr. Widom has focused his research on phase transitions and statistical mechanics. Awards for his work include Guggenheim and Fulbright fellowships and the appointment as National Science Foundation Senior Fellow in 1965. He is a member of the National Academy of Sciences, the American Physical Society, and the American Academy of Arts and Sciences.

JULIUS AXELROD



Biochemical Pharmacologist

February 16, 1985

Neurotransmitters and Drugs that Affect the Mind

Dr. Axelrod received the 1979 Nobel Prize in Physiology or Medicine jointly with Ulf von Euler for their contributions to the study of the sympathetic nervous system, which have led to an understanding of the actions of many drugs important in cardiology, psychiatry, and neurology. When he spoke at Bard, he was chief of the section on pharmacology, Laboratory of Chemical Science at the Institute of Mental Health in Bethesda, Maryland.

NICHOLAAS BLOEMBERGEN



Physicist

December 1, 1984

Lasers in Science and Technology

Dr. Bloembergen was awarded the 1981 Nobel Prize in Physics jointly with A.L. Schawlow for their work on the development of laser spectroscopy. The Gerhard Gade University Professor at Harvard University at the time of his lecture, he is the author of *Nuclear Magnetic Relaxation* and *Nonlinear Optics*. Other honors for his work include the National Medal of Science and the Lorentz Medal of the Royal Dutch Academy of Science.

HAROLD A. SCHERAGA



Chemist

November 3, 1984

Molecular Recognition in Proteins

Dr. Scheraga was Todd Professor of Chemistry at Cornell University at the time of his lecture at Bard. His research has focused on the physical chemistry of proteins and other macromolecules, on the chemistry of blood clotting, and on the structure of water and dilute aqueous solutions. His many distinctions include the American Chemical Society's Eli Lilly Award and memberships in both the National Academy of Sciences and the American Academy of Arts and Sciences.

BARUCH S. BLUMBERG



Research Physician

October 13, 1984

Biology of Hepatitis B Virus

Dr. Blumberg was awarded the Nobel Prize in Physiology or Medicine in 1976 for his discovery of new mechanisms for the origin and dissemination of infectious diseases. When he delivered his lecture, he had been University Professor of Medicine and Anthropology at the University of Pennsylvania since 1977 and was Eastman Visiting Professor at Balliol College, Oxford University, and associate director for clinical research and senior member of the Institute for Cancer Research in Philadelphia.

DAVID BOTSTEIN



Biologist

May 5, 1984

Mapping the Human Genome
DNA Polymorphisms

Dr. Botstein was a professor of biology at Massachusetts Institute of Technology when he spoke at Bard. A member of the National Academy of Sciences since 1981, he has received the NIH Career Achievement Award and the Eli Lilly & Company Award in Microbiology and Immunology. Dr. Botstein is the author of *Advanced Bacterial Genetics*, as well as many articles on genetics and molecular genetics.

CHARLES FEFFERMAN



Mathematician

April 14, 1984

Twentieth Century Geometry
October 12, 1985
The Mathematics Behind the
Computer

Herbert Jones University Professor of Mathematics at Princeton University, Dr. Fefferman has focused on Fourier analysis, partial differential equations, and problems involving several complex variables. He was the first recipient of the National Science Foundation's Alan T. Waterman Award and has received the Fields Medal from the International Congress of Mathematicians, among other awards. His honors have come extraordinarily early, beginning with his appointment at the age of 22 as full professor at the University of Chicago.

CHRISTIAN ANFINSEN



Biological Chemist

March 13, 1984

The Formation of Three-
Dimensional Structures of Proteins

Dr. Anfinsen was a professor of biology at Johns Hopkins University when he spoke at Bard. In 1973, he shared the Nobel Prize in Chemistry with Stanford Moore and William H. Stein for their study of the enzyme ribonuclease. He has received the Rockefeller Foundation Public Service Award and a Guggenheim Fellowship, and is a member of the National Academy of Sciences and the Royal Danish Academy, among others.

ARNO A. PENZIAS



Astrophysicist

February 28, 1984

Our Changing View of the Universe

Dr. Penzias was vice-president of Bell Laboratories Research at the time of his lecture. He is best known for his part in the discovery of evidence supporting the "big-bang" theory of the origin of the universe, for which he shared the 1978 Nobel Prize for Physics. He is a member of the National Academy of Sciences, as well as many other scientific organizations, and is the first American to hold an honorary doctorate from the Paris Observatory.

FREDERICK C. ROBBINS



Physician

December 3, 1983

The Impact of Science on Medicine and Health

President of the Institute of Medicine of the National Academy of Sciences and dean emeritus of the Case Western Reserve University School of Medicine when he delivered his lecture at Bard, Dr. Robbins received the Nobel Prize in Physiology or Medicine in 1954, jointly with John F. Enders and Thomas H. Weller, for their work in the cultivation of the poliomyelitis virus in tissue culture, a technique that was to prove important in the development of vaccines for polio.

GERHARD HERZBERG



Physicist, Chemist

November 5, 1983

Spectroscopic Studies of Simple Free Radicals

Dr. Herzberg was Distinguished Research Scientist at the National Research Council of Canada at the time of his lecture. In 1971, Dr. Herzberg received the Nobel Prize for his study of molecular structure. He is an honorary member or fellow of many scientific societies, including the Royal Societies of Canada and London, and holds honorary degrees from universities in Canada and abroad. Dr. Herzberg is the author of many books on molecular and atomic spectroscopy.

CHEN NING YANG



Physicist

October 15, 1983

Albert Einstein and Contemporary Physics

Dr. Yang was the Albert Einstein Professor and director of the Institute of Theoretical Physics at the State University of New York at Stony Brook when he spoke at Bard. In 1957, he was named co-recipient of the Nobel Prize in Physics with Tsung-Dao Lee. In addition to the Nobel Prize, his honors include the 1980 Rumford Prize and the 1957 Albert Einstein Commemorative Award.

ROALD HOFFMAN



Chemist

April 16, 1983

What Chemists Really Do - The Logical Structure of Modern Chemistry

Dr. Hoffman shared the 1981 Nobel Prize in Chemistry with Kenichi Fukui. The John A. Newman Professor of Physical Science at Cornell University at the time of his lecture, he was the only person ever to have received the American Chemical Society award in pure chemistry in two subfields - the A.C. Cope Award in Organic Chemistry in 1973 and the Award in Inorganic Chemistry in 1982.

DUDLEY R. HERSCHBACH



Chemist

April 9, 1983

Single Collision Chemistry

At the time of his lecture, Dr. Herschbach was the Frank B. Baird, Jr. Professor of Science at Harvard University. The major theme of his research has been the molecular dynamics of chemical reactions. He has received the Pure Chemistry Prize of the American Chemical Society, the Linus Pauling Medal, and the Michael Polanyi Medal; in 1986 he was awarded the Nobel Prize in Chemistry.

WILLIAM N. LIPSCOMB, JR.



Chemist

March 19, 1983

How Do Enzymes Work?

Dr. Lipscomb won the 1976 Nobel Prize in Chemistry for his original research on the structure and bonding of boron hydrides and their derivatives. The Abbott and James Lawrence Professor at Harvard University when he spoke at Bard, he has long been the dominant figure in the field of boron chemistry. His numerous other honors include the Alexander von Humboldt-Stiftung Senior Scientist Award and the Peter Debye Award in Physical Chemistry.

PHILIP W. ANDERSON



Physicist

December 4, 1982

Seeing the World Through Spin Glasses

Dr. Anderson shared the 1977 Nobel Prize in Physics with Sir Nevill Mott and John H. Van Vleck for their theoretical investigations of the electronic structure of magnetic and disordered systems. At the time of his lecture, he was the Joseph Henry Professor of Princeton and the director of physics principles research at Bell Laboratories.

ILYA PRIGOGINE



Chemist

November 13, 1982

Probing Into Time

In 1977, Dr. Prigogine won the Nobel Prize in Chemistry for his contributions to non-equilibrium thermodynamics, particularly the theory of dissipative structures. A professor at the Free University in Brussels and the director of the International Institutes of Physics and Chemistry when he spoke at Bard, he received numerous honors including the Rumford Gold Medal of the Royal Society of London and the Descartes Medal of the University of Paris.

KONRAD E. BLOCH



Biochemist

November 6, 1982

On the Evolution of Small Molecules

Dr. Bloch shared the 1965 Nobel Prize in Physiology or Medicine with Feodor Lynen, for their contributions to our knowledge of the complex pattern of reactions involved in the biosyntheses of cholesterol and fatty acids. He was the Higgins Professor of Biochemistry at Harvard University at the time of his lecture. Among his many awards is the Fritzsche Award of the American Chemical Society.

SAMUEL C.C. TING



Physicist

October 16, 1982

Search for the Fundamental Structures of the Universe

In 1976, Dr. Ting was named co-recipient of the Nobel Prize in Physics with Burton Richter. Drs. Ting and Richter, working in separate groups, electrified the world of high energy physics in November 1974 with the discovery of a new particle with remarkable properties. The implications of their experiments continue to stimulate reformulation of our basic understanding of matter.

PAUL BERG



Biochemist

May 22, 1982

Gene Isolation and Manipulation: A New Window on Our Heredity

Dr. Berg won the 1980 Nobel Prize in Chemistry for his studies of the biochemistry of nucleic acids, particularly recombinant DNA. The Willson Professor of Biochemistry at Stanford University Medical Center when he spoke as part of the Distinguished Scientist Lecture Series, he has been active in experimentation designed to explore the chemistry and biology of human and other mammalian chromosomes.

PAUL DIRAC



Theoretical Physicist

May 15, 1982

From Einstein to Anti-Matter

One of the great mathematical physicists of the twentieth century, the late Professor Dirac was one of a select few, including Albert Einstein, Erwin Schrödinger, and Enrico Fermi, whose theories have transformed our understanding of the physical universe. His pioneering work in the quantum mechanics of the atom led him at the age of 31 to share with Schrödinger in 1933 the Nobel Prize in Physics.

TSUNG-DAO LEE



Physicist

May 1, 1982

Is Vacuum a Physical Medium?

At the age of 30, Dr. Lee was named co-recipient of the 1957 Nobel Prize in Physics with C.N. Yang, for discoveries that challenged the principle of conservation of parity, on which much of modern physics had been based. They theorized that in certain cases parity need not be conserved; subsequent experiments proved them right. The Enrico Fermi Professor of Physics at Columbia University when he spoke at Bard, Dr. Lee has received the Albert Einstein Award in Science.

GEORGE C. PIMENTEL



Chemist

April 24, 1982

From Chemical Lasers to the Atmosphere of Mars

The late Dr. Pimentel was the director of the Laboratory of Chemical Biodynamics and a professor of chemistry at the University of California at Berkeley at the time of his lecture. He received many awards including the Distinguished Service Gold Medal from the National Science Foundation. 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.

ABRAHAM PAIS



Physicist

April 3, 1982

Einstein, the Science and the Life

Detlev W. Bronk Professor at the Rockefeller University at the time of his lecture, Dr. Pais had received the J. Robert Oppenheimer Memorial Prize. A founding father of particle physics, he and his colleagues investigated fundamental particle processes at high energies, symmetries of strong and weak interactions, and quantum field theory. He played a leading role in developing an explanation for the behavior of interactions in particle physics.

FRANK H. WESTHEIMER



Chemist

March 20, 1982

Photoaffinity Labeling: Marking the Receptors for Biological Molecules

Dr. Westheimer was Morris Loeb Professor of Chemistry at Harvard University when he spoke as part of the Distinguished Scientist Lecture Series. Among the distinctions received for his work is the National Academy of Sciences Award in Chemical Science. Dr. Westheimer has done research on the mechanisms of the hydrolysis of phosphate esters, photoaffinity labeling, and biochemical oxidation-reduction reactions.

PAUL J. FLORY



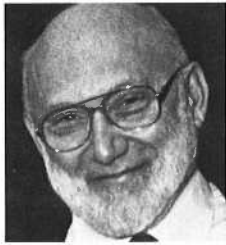
Chemist

February 13, 1982

Spatial Configurations of Macromolecules

Leader in the field of polymer behavior, the late Dr. Flory was the sole recipient of the 1974 Nobel Prize in Chemistry. The J.G. Jackson-C.J. Wood Professor of Chemistry at Stanford University at the time of his lecture, Dr. Flory also received the American Physical Society's High Polymer Physics Prize and the National Medal of Science. His research was in the chemistry and physics of giant molecules, or polymers, which make up such materials as natural and synthetic rubber, fibers, and plastics.

JOSHUA LEDERBERG



Geneticist

October 10, 1981

Styles and Patterns in Biomedical Research

At the age of 33, Dr. Lederberg was named a co-recipient of the Nobel Prize in Physiology or Medicine along with E.L. Tatum and George Beadle. The president of the Rockefeller University at the time of his lecture, Dr. Lederberg pioneered the field of bacterial genetics with his revolutionary discovery that bacterial strains could be crossed to produce an offspring containing a new combination of genetic factors.

CARL DJERASSI



Chemist

May 23, 1981

The Politics of Contraception

Dr. Djerassi was professor of chemistry at Stanford University, a Bard College Center Fellow, and president of Zoecon Corporation when he lectured at Bard. Among his awards are the American Chemical Society Award in Pure Chemistry and the Baekeland Medal. An authority on fertility control in humans and insects, he played a major role in the development of the first oral contraceptive.

E. BRIGHT WILSON



Chemist

May 9, 1981

Recent Developments in Molecular Spectroscopy and Some of Their Implications

Dr. Wilson was professor emeritus at Harvard at the time of his lecture. Since 1977, he had been the chairman of the Committee on Radioactive Waste Management of the National Academy of Sciences. For the past several decades he has worked on the microwave spectroscopy of large molecules and is continuing his studies of the internal and overall rotational motion of chemical structures in gases. Among his many awards is the National Medal of Science.

WILLIS E. LAMB



Physicist

April 25, 1981

Simple Problems in Physics

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

ROSALYN YALOW



Medical Researcher

April 11, 1981

**Radioactivity in the Service of Man
April 15, 1989
Radiation and Society**

Recipient of the 1977 Nobel Prize in Physiology or Medicine, Dr. Yalow was senior medical investigator for the Veterans Administration Medical Center and chairman of the Department of Clinical Sciences at Montefiore Medical Center at the time of her first lecture. She has received awards from the American Diabetes Association and the World Federation of Nuclear Medicine and Biology. Dr. Yalow has been a pioneer in the use of the radioimmunoassay (RIA) in medical research and diagnosis.

GEORGE WALD



Biologist

March 28, 1981

Life in the Universe

Dr. Wald won the 1967 Nobel Prize in Physiology with Haldan K. Hartline and Ragner Granit. A professor emeritus at Harvard University when he spoke at Bard, he has also received awards from the American Public Health Association and the American Academy of Arts and Sciences. Dr. Wald is an expert on the chemistry and physiology of the human eye, especially the chemical process by which light is transmuted into sight.

I.I. RABI



Physicist

March 14, 1981

Molecular Beams, Experimental Discovery, and Theoretical and Mathematical Insights

The late 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 when he delivered his lecture at Bard, he served on the U.S. Atomic Energy Commission, conducted research at Brookhaven National Laboratories on peacetime uses of atomic energy, and advised the government on science under a succession of presidents.

ARTHUR KORNBERG



Biologist

February 21, 1981

DNA Replication

Dr. Kornberg, who won the 1959 Nobel Prize in Physiology or Medicine with Dr. Severo Ochoa, was a professor of medicine at the Stanford University School of Medicine at the time of his lecture. 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.

EDWARD TELLER



Physicist

December 13, 1980

The Persian Gulf - If It's Still There

When he spoke at Bard, Dr. Teller was 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 application of nuclear energy, particularly as part of a comprehensive energy plan for the United States.

EUGENE WIGNER



Physicist

November 1, 1980

Problem of Quantum Mechanics Measurement Process

Dr. Wigner won the 1963 Nobel Prize in Physics. He is best known for his pioneering work in nuclear structure, especially the application of the mathematical system of group theory to atomic and nuclear problems. While at the University of Chicago, he participated with Enrico Fermi in the experiment that produced the first controlled nuclear reaction. He has received the Fermi Award, the Albert Einstein Award, and the National Medal of Science.

MARK KAC



Mathematician

October 18, 1980

Chance and Regularity

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

**BARD COLLEGE
DIVISION OF NATURAL SCIENCES
AND MATHEMATICS**

The faculty of Bard College's Division of Natural Sciences and Mathematics is committed both to the education of the non-scientist in matters scientific, and to the nurturing of a new generation of pre-professional scientists and mathematicians. The Division offers a range of courses under the NATURAL SCIENCE rubric designed to excite the interest of the non-scientist through in-depth exposure to theory in the classroom and practical experience in the laboratory. In addition, it provides its majors with a thorough grounding in fundamental knowledge, while leading the students to think and function independently as scientists and mathematicians. The relatively small size of the Division permits the faculty to coordinate and structure each student's education, developing and relating ideas in a particular discipline while remaining attentive to each student's individual needs and interests.

The success of Bard's science and mathematics graduates results in part from working closely with a superb teaching faculty and from engaging in original research. As juniors and seniors, students work in small seminar discussion groups, advisory conferences, tutorials, and laboratories as they prepare for the Senior Project. Most projects take

the form of original laboratory research, field work, contributions to theory, or an investigation and exposition of a problem in pure or applied mathematics.

Student and faculty research is well supported by laboratories and equipment. The new David Rose Science Laboratories houses teaching space, research facilities for student and faculty work, and computer rooms. The recent receipt of two grants from the National Science Foundation and one from the Keck Foundation have helped to equip the new space. The physics department has a broad base of equipment in research electronics, vacuum systems, and optics, including such specialized equipment as particle detector systems, a 30kG magnet system, a liquid helium cryostat, Schlieren apparatus, and argon-ion, nitrogen, and dye laser systems. The chemistry department has an NMR spectrometer, IR and UV-Vis spectrophotometers, a gas chromatograph integrated with a mass spectrometer, a polarograph, and stopped-flow equipment for chemical kinetics. The biology department is equipped with a cold room, a controlled-environment room, biological containment hoods, an ultra-low-temperature freezer for the preservation of cells, a refriger-

ated high-speed centrifuge, a microcentrifuge, gel electrophoresis apparatuses, UV-VIS spectrophotometers, and numerous microscopes.

Bard's Ecology Field Station, an important research center on the Hudson River, is used year-round as the headquarters of two professional ecological research and education programs: the Hudson River National Estuarine Research Reserve and Hudsonia, Ltd. Through these programs, Bard students assist in environmental monitoring, manage specimen collections and research facilities, and engage in independent or collaborative research with scientists from other institutions. The Field Station serves as a resource and teaching center for undergraduates enrolled in field biology courses, for undergraduates concentrating in the Community, Regional, and Environmental Studies (CRES) program and for graduate students enrolled in Bard's Master of Environmental Studies degree program.

Students interested in attending medical school have the benefit of an atmosphere which emphasizes cooperation rather than competition among students, and have the help of Bard's entire science faculty as well as a premedical faculty adviser. Students interested in combining study in the liberal arts and sciences with engineering may earn a Bachelor of Arts from Bard and Bachelor of Science in Engineering from Columbia University through the Combined Plan. With Duke University, Bard offers a combined B.A. and Master of Science in Forestry and Environmental Studies.

FACULTY

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Chemistry

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Dartmouth College

Physics

Matthew Deady, Ph.D.,
Massachusetts Institute of
Technology
Burton Brody, Ph.D.,
University of Michigan
Peter D. Skiff, Ph.D.,
Louisiana State University

RECENT SENIOR PROJECTS

Chemistry

Alkylative Rearrangement of 1,2-Epoxy-3-alkanol Tosylates Using Organocopper Reagents
by Anita W. Chan, now in a Ph.D. program at Cornell University.

Physics

Electron Paramagnetic Resonance
by Phuoc D. Huynh, now in an M.D. program at the Albert Einstein College of Medicine.

Biology

Site-Directed Mutagenesis of the Zinc Finger in Aspartate Transcarbamoylase
by Jocelyn E. Krebs, now in a Ph.D. program at the University of California at Berkeley.

Biology

Purification and Characterization of Isocitrate Dehydrogenase from Tetrahymena pyriformis
by Rachel S. McGinnis, now in a D.V.M. program at the University of Florida.

Mathematics

Symmetry Groups, Perfect Colorings and Compound Designs: Staying within the (Guide) Lines
by Laura J. Muller, now in a Ph.D. Program at the University of Texas at Austin.

Physics

Chaotic Behavior in Relaxation Oscillation
by Fredrik H.O. Österberg, now in a Ph.D. program at Princeton University.

Chemistry

Synthesis of a Signal Peptide for Affinity Purification of Mitochondria
by Andrew R. Ross, now in a Ph.D. program at the University of Chicago.

Biology

Identification and Characterization of a Gene Essential for Drosophila Development
by Elizabeth C. Woodhouse, now in a Ph.D. program at Johns Hopkins University.

**DISTINGUISHED SCIENTIST
SCHOLARS PROGRAM**

In conjunction with its Distinguished Scientist Lecture Series, Bard College announces ten full-tuition, four-year scholarships to be awarded annually to academically outstanding high school seniors who are committed to majoring in biology, chemistry, physics, or mathematics in their undergraduate studies. Recipients of the scholarships will also be eligible for \$ 1,500 stipends for summer research projects following their sophomore and junior years. Candidates whose needs exceed full tuition will be considered for additional financial aid to assist with room and board expenses. Full tuition scholarships for three years of study are also available to those candidates who enroll in "3-2" programs (in engineering with Columbia University, or in forestry and environmental studies with Duke University).

For more information contact:

Office of Admissions
Box D
Bard College
Annandale-on-Hudson
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914 758 4742

THE BARD CENTER

Established in 1978 as the "public arm" of the College, The Bard Center was recently described by the Rockefeller Foundations'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 Institute for Writing and Thinking, part of The Bard Center, has been recognized as one of the leading institutes for instruction in the methodology of writing. 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."

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

Dimitri Papadimitriou
Executive Director
The Bard Center
Annandale-on-Hudson
New York 12504-5000
914 758 6822

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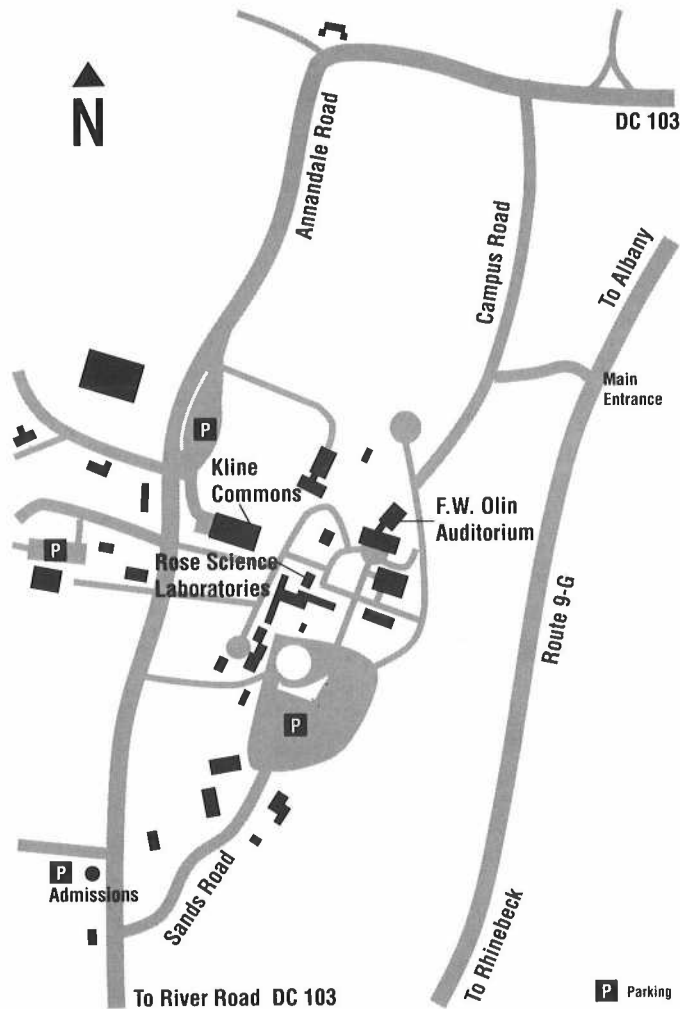
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Bard is located on the eastern shore of the Hudson River, about 100 miles north of New York City and about 50 miles south of Albany, very near the eastern end of the Kingston-Rhinecliff Bridge.

From the New York Thruway take exit 19 (Kingston) and follow signs to the Rhinecliff Bridge. After crossing the bridge take the first left onto Dutchess County 103 (River Road), and follow it north about three miles. At the Annandale triangle DC 103 changes from River Road to Annandale Road as it enters the Bard College Campus. The first right after the Annandale triangle (Sands Road) leads to the main parking lot, and the second right off DC 103 is the entrance to the Kline Commons lot. Either lot is convenient.

From the Taconic Parkway take the New York 199 (Red Hook) exit and follow NY 199 west for about 12 miles to its junction with NY 9G at a blinking red light. Turn right onto NY 9G and follow it north for two miles to the main entrance of Bard College. Turn left into the entrance then left again onto Campus Road, which leads to the main parking lot.

Cover:
Gregor Johann Mendel,
1822-1884

Frank Benedict Design
Incorporated

Livingston, New York
12541-0208