Contact: Mary Ann Meyers, Ph.D., Senior Fellow

ABOVE: Superimposed on an early map of the New World are, from the top, a circuit board, an artist's concept of the space telescope to be used in NASA's Space Interferometry Mission, and CERN's Large Hadron Collider housed under a mountain in Switzerland.

Images courtesy freephoto.com, NASA/JPL, and Yale University Press

Purpose

The purpose of this symposium is to provide the John Templeton Foundation with strategic ideas for developing a research agenda on the culture, workings, dynamics, and effective structuring of exceptionally creative domains. The particular focus of the conversation at the Institute for Advanced Study in Princeton is on institutions and organizations linked to science and technology that are responsible for new discoveries and insights. Of special interest is the subset effective in generating a high flow of technology transfer, where novel ideas are transformed into wealth-creating companies through an entrepreneurial process—and on the geographical regions that seem to foster the concentration of these highly creative technological industries. Key questions include: What characterizes a creative environment? What environments most effectively nurture the highest levels of scientific creativity? What is the sequence and range of steps leading to the creation of a high-creativity institution? What are the "dynamics of success"? Do structures like organizational governance and operating principles matter? To what degree is autonomous self-governance in research institutions important? What effect does government funding and regulation have on creativity? To what extent does freedom of inquiry matter? The study of failures and declines, as well as successes, will be highly illuminating. What are the dynamics that portend fiascos in attempts to build creative institutions? When and how does an institution lose its creative edge? How do geographically large, amazingly creative domains such as Silicon Valley come to be and how can they be developed elsewhere? How are gifted young people most effectively encouraged and prepared to pursue careers in math, science, technology, or technologically-based industry that are marked by exceptional creativity? The symposium is designed to illuminate how we can best inspire, encourage, and build the culture of innovation that will produce highly creative scientific enterprises leading not only to new tools for examining the world but also new ways of looking at the world. The Templeton Foundation hopes to develop a research funding project in this area that will promote novel forms of multidisciplinary scholarship and could lead to a deepening of extant analyses of the kind of creativity associated, for example, with regions of the world such as Budapest in the "golden years" between 1900 and the outbreak of the First World War and the southern part of the San Francisco Bay area

beginning in the mid-1950s, with companies such as Bell Labs and Genentech, with research institutions and universities such as the Niels Bohr Institute at the University of Copenhagen between World Wars I and II and MIT and Stanford today, and with laboratories such as the Cavendish Laboratory at Cambridge University, the IBM Zurich Research Laboratory in Rüeschlikon, Switzerland, and The Whitesides Research Group at Harvard. The discussion taking place at one of the world's leading centers for theoretical research and intellectual inquiry is the starting point for a possible new philanthropic initiative. Among the bold entrepreneurs and reflective scholars gathered together in Princeton is a long-time Institute faculty member, Freeman Dyson, a working physicist "more impressed by our ignorance than our knowledge," who has written that "during the last hundred years we have made tremendous progress in our understanding of nature, but there is no reason to fear that our progress is coming close to an end."

John Templeton Foundation

Exceptional Creativity in Science & Technology

A symposium sponsored by the John Templeton Foundation

30 November and 1 and 2 December 2008
Institute for Advanced Study, Princeton, New Jersey

Approach

The symposium is part of the Templeton Foundation's Humble Approach Initiative. The goal of the initiative is to bring about the discovery of new spiritual information by furthering high-quality scientific research. The "humble approach" is inherently interdisciplinary, sensitive to nuance, and biased in favor of building linkages and connections. It assumes an openness to new ideas and a willingness to experiment. Placing high value upon patience and perseverance, it retains a sense of wondering expectation because it recognizes, in Loren Eisley's haunting phrase, "a constant emergent novelty in nature that does not lie totally behind us, or we would not be where we are." A fundamental principle of the Foundation, in the words of its founder, is that "humility is a gateway to greater understanding and open[s] the doors to progress" in all endeavors. Sir John Templeton believed that in their quest to comprehend foundational realities, scientists, philosophers, and theologians have much to learn about and from one another. The humble approach is intended as a corrective to parochialism. It encourages discovery and seeks to accelerate its pace.

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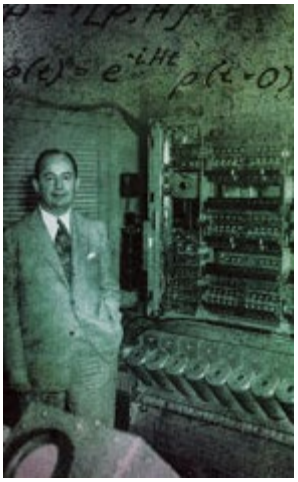
Chair



John von Neumann with the Electrical Numerical Integrator and Calculator (ENIAC), 1945.

Baruch S. Blumberg is renowned for identifying the Hepatitis B virus (HBV) and developing a diagnostic test and vaccine for HBV, the DNA virus that attacks the liver. His work has had a far-reaching impact on public health around the globe. With Carleton D. Gajdusak, he shared the 1976 Nobel Prize in Physiology and Medicine for "discoveries concerning new mechanisms for the origin and dissemination of infectious diseases." Dr. Blumberg is University Professor of Medicine and Anthropology at the University of Pennsylvania as well as senior advisor to the president at Fox Chase Cancer Center where he had held the title Distinguished Scientist. He also has served as master of Balliol College, Oxford, and as founding director of the NASA Astrobiology Institute (NAI) at the Ames Research Center in Moffett Field, California, on the southern edge of San Francisco Bay. Dr. Blumberg's leadership skills were initially honed in the military. Commissioned as a deck officer in the United States Navy during World War II, he was the commanding officer of a landing ship when he left active duty in 1946. Having earned an undergraduate degree in physics at Union College, he began graduate studies in mathematics at Columbia University and, switching to medicine, earned an M.D. at Columbia's College of Physicians and Surgeons in 1951. He served an internship and residency at New York's Bellevue Hospital and took a clinical fellowship at the Columbia Presbyterian Medical Center. Going on to Oxford University, where he was a member of Balliol, he received a Ph.D. in biochemistry in 1957. Dr. Blumberg then joined the National Institutes of Health as chief of the Section on Geographic Medicine and Genetics. He came to Fox Chase in 1964 as the associate director of clinical research. Named vice president for population oncology in 1984, he was appointed Distinguished Scientist in 1989, when he returned to Balliol for a five-year term as master. He had earlier served as its George Eastman Visiting Professor, and he has been a visiting professor at numerous other institutions around the world. After teaching in Stanford's Program in Human Biology, he accepted appointment to the NAI where from 1999 to 2002 he established a basic science organization to study the origins of life and to test the hypothesis that life exists elsewhere than on Earth. Dr. Blumberg is a fellow of the American College of Physicians and the Royal College of Physicians, as well as a member and the current president of the American

Philosophical Society. He was elected to the National Inventors Hall of Fame and is the recipient of twenty-four honorary degrees, along with Japan's Showa Emperor Memorial Award and the Fries Prize for Improving Health among other honors. He is the author of some 450 scientific papers. Co-author (with Toby K. Eisenstein and Irving Millman) of Hepatitis B: The Virus, the Disease and the Vaccine (2003), Dr. Blumberg's other books include *Australia Antigen and Hepatitis* (1972), *Hepatitis B and the Prevention of Cancer in the Liver* (2000), and *Hepatitis B: The Hunt for a Killer*, which was published by Princeton University Press in 2002.

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Timothy E. Bresnahan
Peter H. Diamandis
Freeman J. Dyson
George Dyson
Susan Hackwood
J. Rogers Hollingsworth
Andrew Robinson
Gino C. Segré

Participants

David P. Billington is the Gordon Y.S. Wu Professor of Engineering at Princeton University. He studied engineering there as an undergraduate and earned his BSE degree in 1950. As a Fulbright Fellow, he went on to do research and study post-war innovations in bridge construction and structural design theory at the University of Louvain and at Ghent University. Returning from Belgium, he worked for eight years as a structural designer with Roberts & Schaefer Company in New York. He joined the Princeton engineering faculty as an associate professor in 1960 and was appointed a full professor in 1964. He was named to his present chair in 1996. Professor Billington has been a consulting engineer to governments and industry for the past thirty-eight years and served as chair of the ACI (American Concrete Institute)-ASCE (American Society of Civil Engineering) Joint Committee on Concrete Shell-Design and Construction and the ASCE Committee on Aesthetics in Design of Structures. For six years, he was the Andrew D. White Professor-at-Large at Cornell University, and he also has served as Robert Noyce Visiting Professor at Grinnell College and a visiting professor at the Technical University of Delft, the Institute for Advanced Study in Princeton, and the Federal Technical Institute in Zurich, as well as a Phi Beta Kappa Visiting Scholar. A former member of the Executive Council of the Society for the History of Technology, he is a member of the National Academy of Engineering, a fellow of the American Academy of Arts and Sciences, and an honorary member of the ASCE, ACI, and the International Association of Shell Structures. Professor Billington is the recipient of the ASCE's History and Heritage Award and its George Winter Prize, the National Science Foundation's Distinguished Teaching Scholar Award, the John B. McGovern Lecture Award in Science given by the Cosmos Club Foundation, and the Charles Zollman Award of the Prestressed and Precast Concrete Institute in addition to numerous teaching prizes. He holds honorary degrees from Union College, Grinnell, and the University of Notre Dame. In addition to more than 160 articles published in engineering journals, he is the co-author of three books: (with David P. Billington, Jr.) *Power, Speed and Form: Engineers and the Making of the Twentieth Century* (2006), (with Donald C. Jackson) *Big Dams of the New Deal Era: A Confluence of Engineering and Politics* (2006), and, most recently, (with Maria E. Moreyra Garlock)

Felix Candela: Engineer, Builder, and Structural Artist, which was published by Princeton University Art Museum and Yale University Press in 2008. He is the author of seven others, including *Robert Maillart's Bridges* (1979 and 1985), which won the Dexter Prize for an Outstanding Book in the History of Technology, *The Tower and the Bridge: The New Art of Structural Engineering* (1983 and 1985), and *The Art of Structural Design: A Swiss Legac*y, which was published by Princeton University Art Museum and Yale University Press in 2003.

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Timothy E. Bresnahan studies competition in high technology industries. He is a senior fellow at the Stanford Institute for Economic Policy Research. A graduate of Haverford College, he earned his Ph.D. in economics at Princeton University in 1980. He had joined the Stanford economics faculty the previous year as an assistant professor and was appointed a full professor in 1991. He was named to his present chair in 2002. Dr. Bresnahan has served as the Marvin Bower Fellow and a visiting associate professor at the Harvard Business School, a visiting scholar at the Hoover Institution, and a visiting professor at the Instituto de Analisis Economico in Bellaterra, Spain. He spent 1999-2000 as deputy assistant attorney general and chief economist in the Antitrust Division of the United States Department of Justice. A fellow of the American Academy of Arts and Sciences and the Econometric Society, he is the recipient of the Dean's Award for Excellence in Teaching given by Stanford University. He previously served as co-editor of the RAND Journal of Economics and as an associate editor of the Journal of Industrial Economics, the *Quarterly Journal of Economics*, and the *American Economic Review*. The author or co-author of some seventy-five papers published in scholarly journals or as chapters in volumes of collected works, Dr. Bresnahan is the co-editor (with Richard Schmalensee) of *The Empirical Renaissance in Industrial Economics* (1987) and the co-author (with Robert J. Gordon) of *The Economics of New Goods* (1997) and (with Alfonso Gambardella) of *Building High-Tech Clusters: Silicon Valley and Beyond*, which was published by Cambridge University Press in 2004.

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Peter H. Diamandis, a leading space entrepreneur, has played a major role in the development of the personal spaceflight industry through the creation of space-related businesses and organizations. He is the founder, chairman, and chief executive officer of the X PRIZE Foundation, an educational non-profit prize institute that awards the Ansari X PRIZE for private sector manned suborbital spaceflight. It is modeled after the aviation prizes of the 1920s and 1930s that contributed so significantly to the development of the aviation industry. He is also the co-founder (with Eric Anderson) and a director of Space Adventures, Ltd., a private space travel and tourism company that has flown private citizens on Soyuz, the Russian space craft, to and from the International Space Station and is developing commercial spaceports in the United Arab Emirates and in Singapore. In addition, Dr. Diamandis serves as the CEO of Zero Gravity Corporation, a commercial space company developing private, FAA-certified parabolic flight utilizing Boeing 727-200 aircraft. He recently co-founded the Rocket Racing League, which is developing a new motor sport that combines features of Indy car racing and rocket powered flight. A graduate of the Massachusetts Institute of Technology, he studied molecular biology as an undergraduate. He then spent two years as a research affiliate at the MIT Whitehead Biomedical Institute and in its department of applied biology. He did further research at the NASA Johnson Space Laboratory and the MIT Man-Vehicle Laboratory and earned a master's degree in aeronautics and astronautics at MIT in 1987. Dr. Diamandis went on to take an M.D. at Harvard Medical School in 1989 while also doing graduate work in health sciences and technology at MIT. Two years earlier, he had founded the International Space University (ISU), an institution in Strasbourg, France, offering graduate level courses, and served as its first managing director and chief executive officer. He returned as co-chair of ISU's business and management department from 1990 to 1992 and currently serves as a trustee. He was awarded an honorary doctorate from ISU in 2005. Other space technology ventures with which he has been associated as a founder, director, or officer include International Microspace, Inc., a company providing low-cost launch service, Constellations Communications, Inc., a company designing a low-Earth orbit satellite constellation for voice telephony, CTA, Inc., a company developing small

satellite remote sensing and communication tools, Angel Technologies Corporation, a company developing wireless broadband communications networks, BlastOff! Corporation, a company that designed the first private mission to land on the moon, and Desktop.tv, a company that designed a global peer-to-peer television network for broadcasting space-related content to personal computers. A former director of the National Space Society, Dr. Diamandis has been recognized for his contributions to space technology by many awards, including the Arthur C. Clarke Award for Innovation, the Neil Armstrong Award for Aerospace Achievement and Leadership, the *Wired* RAVE Award, the inaugural Heinlein Award, the Lindbergh Award, the World Technology Award presented by the World Technology Network, Russia's Konstantine Tsiolkovsky Award, the Top-25 Young Stars of Space Award presented by the National Space Society, the Space Foundation's Pioneer Award, and the *Aviation Week and Space Technology Laurel*. He holds four patents.

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The English-born American physicist **Freeman J. Dyson** is widely recognized for his contributions to quantum electrodynamics and the theory of interacting electrons and photons — and perhaps even better known for his creative speculations on subjects ranging from space travel to extraterrestrial civilizations. An engaging author, widely sought-after lecturer, and an unusually conscientious citizen of the world, he has been for more than half a century a persistent scientific and political gadfly in the most positive sense of the word. Born in London in 1923, he went up to Cambridge University from Winchester College, and after civilian service doing operations research at the headquarters of the RAF Bomber Command during World War II, he took his B.A. in mathematics at Cambridge in 1945. A fellow at Trinity College, Cambridge, in 1946-47, he was a Commonwealth Fellow at Cornell University and the Institute for Advanced Study in Princeton for the next two years. After another two years as a research fellow at the University of Birmingham, he became a professor of physics at Cornell in 1951. Two years later, he returned to the Institute for Advanced Study where he was a professor of physics until 1994 when he became professor emeritus. He has been a visiting professor at Yeshiva University and the Max Planck Institute for Physics and Astrophysics. During the late 1950s, Professor Dyson helped design the nuclear reactor, Triga, and the Orion space ship at General Atomic Laboratories in San Diego, California. He originated the idea for what is known as the "Dyson sphere," a hypothetical shell of artificial material that an advanced civilization of intelligent beings with an expanding population might build around a parent star. The "colonists," he suggested, would be able to capture almost all of the energy released by the star in the form of electromagnetic radiation, which would then be re-radiated as infrared radiation making the star visible to infrared telescopes. Professor Dyson served as chair of the Federation of American Scientists in 1962-63 and was a member of the National Research Commission on Life Science from 1989 to 1991. The recipient of honorary degrees from seventeen American and European colleges and universities, including Princeton, Oxford, and the Federal Institute of Technology (ETH) in Zurich, he is a Fellow of the Royal Society and a member of the U.S. National Academy of Sciences, as well as a foreign associate of the French

Academy of Sciences and an honorary fellow of Trinity College, Cambridge. Among his other honors are a dozen major science prizes, including the Enrico Fermi Award of the U. S. Department of Energy. In 2000, he was awarded the Templeton Prize. The author of nearly 300 scientific papers, he also has been a frequent contributor to *The New Yorker, The Atlantic Monthly, and The New York Review of Books*. His capacity for luminous exploration of the intellectual challenges and moral dilemmas of modern science first came to the attention of the general public in 1979 when the Alfred P. Sloan Foundation commissioned him to write a memoir of his life in science, *Disturbing the Universe*. He won the National Book Critics Circle Award for Non-Fiction in 1984 for his powerful plea for international control of the world's nuclear arsenal, *Weapons and Hope*. In his probing *Origins of Life* (1986), he suggested careful scrutiny of the notion that life began twice. *Infinite in All Directions* (1988), an explanation of what past and recent scientific theories tell us about the beginning of the universe, its present state, and its likely destiny, won the Phi Beta Kappa Award in Science. His latest books are Imagined Worlds (1997), *The Scientist as Rebel* (2006), and *A Many Colored Glass: Reflections on the Place of Life in the Universe*, which was published by the University of Virginia Press in 2007 and recounts the myriad ways the universe presents itself to us and how, as observers and participants in its processes, we respond to it.

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Gino C. Segré

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George Dyson, a historian and a designer of kayaks, is a widely-acclaimed author who has focused on the history of science and technology. For more than a decade he was a research associate at Fairhaven College, Western Washington University, and also served as a visiting lecturer there. In addition, he has been a director's visitor at the Institute for Advanced Study. Mr. Dyson grew up in Princeton and left high school without graduating to build ocean-going canoes. He briefly attended the University of California, San Diego, and the University of California, Berkeley, before venturing up the Pacific Coast, living in a tree house ninety-five feet up in a Douglas fir between voyages that took him from southern British Columbia to the Gulf of Alaska in his elegant hand-made craft. His first book, *Baidarka* (1986), is an illustrated history of the Aleut kayak builders that demonstrates the author's innovative method for building modern versions of these beautiful and high-performance boats. It has been translated into Japanese and German and featured in television documentaries. Mr. Dyson's second book, *Darwin among the Machines* (1997), winner of the Washington Governor's Writing Award, is an intellectual history that draws together work in computer science, mathematics, and biology to tell the story of the evolution of intelligent machines and artificial life. His latest book, *Project Orion*, which was published by Henry Holt in 2002, examines the still-classified attempt that took place between 1957 and 1965 to build a 4,000-ton nuclear bomb-propelled interplanetary spaceship. The tale of the improbable project, conceived and carried forward by a small group of scientists that included the author's father, was translated into Arabic and Chinese and broadcast by BBC in 2003. Mr. Dyson is currently compiling the history of John von Neumann's electronic computer project (1945-1958) at the Institute for Advanced Study and writing, for Pantheon/Vintage/Random House and Penguin (UK), a book on the project that will illuminate the origins of digital computing and bioinformatics in the aftermath of World War II. He lives in Bellingham, Washington, and hopes to return to building boats when he completes his current manuscript.

John Templeton Foundation

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The executive director of the California Council on Science and Technology (CCST), **Susan Hackwood** is a professor of electrical engineering at the University of California, Riverside (UCR). Her current research interests include multimedia technologies, distributed asynchronous signal processing, and cellular robot systems. Born in England, she graduated with honors from DeMontfort University in Leicester where she also received her Ph.D. in solid state ionics in 1979. Dr. Hackwood did post-doctoral research in solid state device physics at AT&T Bell Laboratories in Murray Hills, New Jersey, and worked on the Bell Labs staff in the field of robotics technology for five years. Joining the faculty of the University of California, Santa Barbara, as a professor of electrical and computer engineering in 1984, she founded and served as co-director of its Center for Robotic Systems in Microelectronics. In 1990, she became founding dean of UCR's Bourns College of Engineering, a post she held for five years until accepting her position at CCST, a non-profit corporation sponsored by California's major academic institutions. Dr. Hackwood has been a visiting scholar at the Anderson School of Management at the University of California, Los Angeles, and at the Sandia National Laboratory in Livermore, California, as well as a visiting associate in engineering at the California Institute of Technology. She currently serves as a member of the president's cabinet and chair of STEM (science, technology, engineering, and mathematics) education at Cal Poly San Luis Obispo. She also chairs the Section on Societal Impacts of Science and Engineering of the American Association for the Advancement of Science (AAAS) and the AAAS's Committee on Science Engineering and Public Policy. She is a member of the corporation of the Charles Stark Draper Laboratory, an independent, not-for-profit research and development enterprise in Cambridge, Massachusetts. A fellow of both the AAAS and the Institute of Electrical and Electronics Engineers (IEEE), Dr. Hackwood is the recipient of the British Council Award for Ambassador of Science, the Bell Lab Award for Technology Transfer, the National Athena Award, and UCR's Women Who Made A Difference Award and the Distinguished Service Award of its Center for Environmental Engineering Research among other honors. She has received honorary degrees from her alma mater and Worcester Polytechnic Institute. Currently a member of the

editorial board of the IEEE's *Spectrum*, she formerly served as editor of the *Journal of Robotic Systems*, a journal she co-founded, associate editor of *Manufacturing Review*, and as a member of the editorial board of *Mechatronics* and the editorial advisory board of the *International Journal of Environmentally Responsible Manufacturing*. She is the author of more than 140 papers published in technical journals and the co-author (with Gerardo Beni and Steve Belinski) of *Vacuum Mechatronics*, which was published by Artech House in 2001. Dr. Hackwood holds seven patents.

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Emeritus professor of history and sociology at the University of Wisconsin, **J. Rogers Hollingsworth** has also been, for the past eight years, a visiting scholar at the Institute for Nonlinear Science at the University of California, San Diego, and a visiting fellow at the Neurosciences Institute in La Jolla, California. His present research is an attempt to explain the reasons for variation among countries, over time, and in different research organizations in the rate at which major discoveries in biomedical science occur. He is also engaged in a cross-national and historical research project that examines why countries varied in their capacity to be innovative in science-based industries during the twentieth century. A graduate of Emory University, Dr. Hollingsworth earned a Ph.D. in history at the University of Chicago in 1960. He taught at Chicago and at the University of Illinois before becoming an associate professor of history at the University of Wisconsin in 1964 and, five years later, a full professor. In 1985, he also became a professor of sociology. He chaired Wisconsin's graduate program in comparative world history for twenty-three years, and in the course of his career on the Madison campus, he was also professor in the university's Industrial Relations Institute. Dr. Hollingsworth has been the overseas visiting scholar at St. John's College, Cambridge, a visiting fellow commoner of Trinity College, Cambridge, the Torgny Segerstedt Chair at the Swedish Collegium for Advanced Study in the Social Sciences, Andrew Mellon Fellow at the American Philosophical Society, and a fellow of the Netherlands Institute for Advanced Study, the Austrian Academy of Sciences, and the Institute for Human Sciences in Vienna among other institutions. He has served as a visiting professor at Northwestern, Harvard, and universities in Canada, England, Germany, Nigeria, and Japan. Named Distinguished Professor of American Studies by the government of Germany in 1998, he is the recipient of honorary degrees from Emory and the University of Uppsala in Sweden. He is a former president and a lifetime honorary fellow of the Society for the Advancement of Socio-Economics. Dr. Hollingsworth received the Humboldt Research Prize for a career of distinguished research in the social sciences and humanities. A member of the editorial boards of the *Socio-Economic Review*, the *Journal of Socio-Economics*, and the *Canadian Journal of Sociology*, he is the author, editor, or co-editor of eighteen books.

His *State Intervention in Medical Care: Comparisons for Great Britain, France, Sweden, and the United States 1890-1970* (1990) won the Charles H. Levine Prize of the International Political Science Association for the best book in comparative public policy. He has collaborated with his wife Ellen Jane Hollingsworth on many projects, including their forthcoming book, *Fostering Scientific Excellence: Organizations, Institutions, and Major Discoveries in Biomedical Science*, which will be published by Cambridge University Press in 2009. He is a frequent speaker at universities and research institutes on both sides of the Atlantic, generally focusing on organizations that facilitate the making of radical breakthroughs in science and technology, especially those relating to the biomedical sciences and biotechnology. With Karl H. Müller, he recently developed a cross-national, cross-disciplinary, and cross-temporal research program concerned with modeling rare events with large social consequences (e.g., radical breakthroughs in science and technology, epidemics, earthquakes, collapse of stock markets, and terrorist attacks). The project involves collaborative research with epidemiologists, seismologists and earth scientists, mathematical economists, and social scientists. Dr. Hollingsworth and his colleagues have already published five scholarly papers growing out of their research, the most recent in the 24 July 2008 issue of *Nature*.

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Andrew Robinson, a visiting fellow of Wolfson College, Cambridge, is an author who has written extensively about the history of science, archaeology, particularly ancient scripts, and Indian culture. A King's Scholar of Eton College, he earned a baccalaureate degree in chemistry from University College, Oxford, and another in South Asian studies from the School of Oriental and African Studies, London. He worked in publishing, television, and print journalism for two decades, serving as literary editor of *The Times Higher Education Supplement* for twelve years. Among Mr. Robinson's twenty books are biographies of Satyajit Ray (*Satyajit Ray: The Inner Eye*, 1989 and 2004 and *Satyajit Ray: A Vision of Cinema*, 2005), Rabindranath Tagore (*Rabindranath Tagore: The Myriad-Minded Man*, 1995 and 2008), Michael Ventris (*The Man Who Deciphered Linear B: The Story of Michael Ventris*, 2002, which was made into a BBC television program and translated into Greek and Japanese), Albert Einstein (*Einstein: A Hundred Years of Relativity*, 2005, which has been translated into five languages), and Thomas Young (*The Last Man Who Knew Everything: Thomas Young, The Anonymous Polymath Who Proved Newton Wrong, Explained How We See, Cured the Sick, and Deciphered the Rosetta Stone*, 2006). He also wrote widely-praised studies about *The Story of Writing: Alphabets, Hieroglyphs and Pictograms* (1995 and 2007), which was translated into nine languages, and *Lost Languages: The Enigma of the World's Undeciphered Scripts* (2002 and 2009). His most recent book, *The Story of Measurement*, an illustrated guide to the human passion for measuring all things, was published by Thames & Hudson in 2007. Mr. Robinson's research has been supported by the Leverhulme Trust and the British Academy. He currently holds a grant from the John Templeton Foundation to make a comparative historical study of exceptional creativity in the arts and sciences, which is to be published by Oxford University Press in 2010.

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Gino C. Segré

Participants

A noted theoretical physicist from a distinguished family of physicists, **Gino C. Segrè** is professor of physics and astronomy emeritus at the University of Pennsylvania where he taught for forty years. His research has frequently centered on questions of symmetry and symmetry breaking as well as on neutrino physics—work that has led him to probe the subtle links between the sub-atomic world of elementary particles and that of the early state of the universe. His interest in the connection between particle physics and astrophysics is also reflected in his continuing investigations of baryon asymmetry and of pulsar kicks by neutrino emission. In addition to doing science, Dr. Segrè, a nephew of Emilio Segrè who received a Nobel Prize in 1959 for discovery of the antiproton, writes popular books about the history of science that have won wide-spread praise. Born in Italy, he graduated *magna cum laude* from Harvard University, where he was elected to Phi Beta Kappa and Sigma Xi, and earned a Ph.D. in physics from the Massachusetts Institute of Technology in 1963. He went to the European Center for Nuclear Research (CERN) as a scientific fellow and then spent two years as a research associate in physics at the University of California, Berkeley, before joining the Penn faculty as an assistant professor of physics in 1967. Named a professor in 1974, he chaired the physics and astronomy department for five years. Dr. Segrè also has served as director of theoretical physics for the National Science Foundation and as a visiting professor at CERN and at Oxford University. He is a fellow of the American Physical Society and has held fellowships awarded by the National Science Foundation, the Alfred P. Sloan Foundation, the Guggenheim Foundation, the Rockefeller Foundation, and the Liguria Foundation. The author of more than one hundred papers published in scientific journals, he also is the author of *A Matter of Degrees: What Temperature Reveals about the Past and Future of our Species, Planet and Universe* (2002), which demonstrates how the concept of temperature is related to the very presence of life and matter. His most recent book, *Faust in Copenhagen: A Struggle for the Soul of Physics*, which was published by Viking Press in 2007, is an account of a conference at Niels Bohr's Institute for Theoretical Physics in the spring of 1932, a year that marked the beginning of nuclear physics as the result of a rapid succession of scientific discoveries. With Hitler's election as chancellor of Germany the following

January, the period also marked the beginning of the Third Reich.