THE HUMBLE APPROACH INITIATIVE

A symposium sponsored by the John Templeton Foundation

Participants

Exploring Exoplanets: The Search for Extraterrestrial-Life and Post-Biological Intelligence

> 5, 6, and 7 September 2015 Kavli Royal Society International Centre Chicheley Hall, Chicheley, England

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

Co-Chairs

Purpose

"If atom stocks are inexhaustible,

Greater than power of living things to count,

If Nature's same creative power were present too

To throw the atoms into unions-exactly as united now,

Why then confess you must

That other worlds exist in other regions of the sky,

And different tribes of men, kinds of wild beasts."

Lucretius De Rerum Natura, Book II Trans, Alban Dewes Winspear he premise with which we begin is that the discovery of "exoplanets" (more than 1,800 to date) beyond our solar system has given a new boost to scientists engaged in the search for extraterrestrial life even as SETI, which has been looking in our cosmic neighborhood for radio signals originating from other civilizations for half a century, finds itself more and more dependent on private support for the deployment of the next generation of radio telescopes. But is the null hypothesis that life outside of Earth is most likely to be found on "habitable worlds" correct? Are planets and moons with surface liquid water and atmospheres of light gases the places to look for alien intelligence? Is biology universal? With technologies available soon that may enable scientists to identify the conditions conducive to life on other planets, the question of where to look becomes a critical one.

Approach

The purpose of this symposium is to probe the assumption that, if it exists, life elsewhere in the universe has a biochemistry similar to our own. Some scientists have speculated that any sufficiently advanced alien civilization might well be capable of augmenting itself by using technology to overcome its biological limitations. The symposium will also, therefore, explore the possibility of what has been termed "post-biological" intelligent life, and engage in conversation those who have come to believe that if we were to contact a 10-million-year-old civilization, we would very likely not be dealing with flesh and blood biological organisms, but some super-redesigned information management system. What, then, is the societal importance of such a prospect? If much of what has been written about "the singularity" when humans transcend biology is superficial, it is also the case that the philosophical, ethical, and theological implications of the discovery of extraterrestrial life have too often been shrugged aside.

Among the specific big questions to be explored are these:

Are we alone in the universe? With vast numbers of places in the universe to look for life, what should guide our search? Should we be looking for a galactic technological zone even as we continue to search for galactic habitable zones suitable for biological life? How might the discovery of civilizations more advanced than our own affect life on Earth? What might such an encounter tell us about our future? What would it mean for a species to be usurped by its own artificial progeny? In what way would the discovery of a post-biological culture impact our fundamental ideas in science, philosophy, and religion?

The probe for answers brings researchers from astronomy, chemistry, cosmology, evolutionary paleobiology, and physics together for conversation with philosophers and theologians in a beautiful Midlands manor house surrounded by a one-hundred-acre park west of the River Great Ouse. It is owned by the Royal Society.

home I approach I co-chairs I participants







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Home

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"So? Where is everybody?" Enrico Fermi

he symposium is part of the John 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 Eiseley'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. Paul C.W. Davies, a theoretical physicist, cosmolo

Above: Radio telescopes listen for extraterrestrial signals. Credit: sdecoret / shutterstock.com

home I approach I co-chairs I participants





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Home

Approach

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Paul C.W. Davies Martin J. Rees Paul C.W. Davies, a theoretical physicist, cosmologist, and astrobiologist, is Regents' Professor and founding director of BEYOND: Center for Fundamental Concepts in Science at Arizona State University (ASU). He is also co-director of ASU's cosmology initiative and was for five years principal investigator in the Center for the Convergence of Physical Science and Cancer Biology. He is also visiting professor of bioengineering at Imperial College London. For three decades, he has been a leading communicator on science through books and broadcasts for general audiences. Educated at University College London, where he achieved first-class honors in physics and went on to earn a Ph.D. in theoretical physics in 1970, Dr. Davies held academic appointments in astronomy, physics, and mathematics at the universities of Cambridge, London (King's College), Newcastle, and Adelaide. He was then professor of natural philosophy in the Australian Centre for Astrobiology at Macquarie University before joining the ASU faculty in 2006. His research has spanned the fields of cosmology, gravitation, quantum field theory, and astrobiology, with particular emphasis on black holes, the origin of the universe, and the origin of life, on which he has published several hundred papers in scientific journals. For the past decade, he has chaired the Search for Extraterrestrial Intelligence Post-Detection Science and Technology Taskgroup of the International Academy of Astronautics, which is dedicated to reflecting on the societal consequences of the discovery of evidence for extraterrestrial intelligence. He received the 1995 Templeton Prize, the 2001 Kelvin Medal of the UK Institute of Physics, the 2002 Michael Faraday Prize of the Royal Society, the Robinson Cosmology Prize, and the Bicentenary Medal of Chile. He has honorary doctorates from Macquarie University and Chapman University and is a fellow of University College London. He was made a Member of the Order of Australia in the 2007 Queen's birthday honours list. The asteroid 1992 OG was officially named (6870) Pauldavies in recognition of his work on cosmic impacts. Dr. Davies's books have been influential in the scientific community, especially The Physics of Time Asymmetry (1974) and Quantum Fields in Curved Space (1982). His popular science books include The Mind of God (1992), About Time (1995), How to Build a Time Machine (2002), The Goldilocks Enigma: Why the Universe is Just Right for Life (2006), and, most recently, The Eerie Silence: Renewing Our Search for Alien Intelligence, which was published by Houghton Mifflin Harcourt (USA) and Penguin Books (UK) in 2010 to critical acclaim for its deep questioning of the assumptions that aliens would be like us and that life must always evolve on planets that can support it. He has also edited a number of volumes, including (with Philip Clayton) The Re-Emergence of Emergence (2006), (with Niels Gregersen) Information and the Nature of Reality: From Physics to Metaphysics (2010), and (with Charles Lineweaver and Michael Ruse) Complexity and the Arrow of Time, which was published in 2013 by Cambridge University Press. Dr. Davies has extensive experience in television and radio, including the presentation of two Australian television series entitled The Big Ouestions. His work in astrobiology was the subject of a BBC television documentary, The Cradle of Life.







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Home Approach

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Paul C.W. Davies Martin J. Rees England's Astronomer Royal Martin J. Rees, professor of cosmology and astrophysics emeritus at Cambridge University, is one of the world's leading theoretical astrophysicists. He is a fellow and the former master of Trinity College, Cambridge, and for many years, he was the director of Cambridge University's famed Institute of Astronomy. From 1992 until 2003, he was the Royal Society Research Professor at Cambridge and an official fellow at King's College, Cambridge. Dr. Rees's contributions to our understanding of the origin and nature of the universe have been exceptionally broad-based. For three decades, he has explored the concept of the multiverse and the role of anthropic reasoning. He has added to our knowledge about the birth of stars and galaxies, demonstrated how deep-space quasars, the highly energetic cores of active galaxies, seen through the Hubble Space Telescope, might be powered by massive black holes, and expounded theories that explain the mysterious explosions known as gamma-ray "bursters." His work has both helped to elucidate the physical principles driving the global properties of the universe and provided complementary information about structure at small distances. Going up to Cambridge from the Shrewsbury School, he studied mathematics at Trinity College and earned a Ph.D. in theoretical astronomy in 1967. He was a fellow of Jesus College, Cambridge, a research fellow at California Institute of Technology, and a staff member of Cambridge University's Institute of Theoretical Astronomy before becoming a professor of astronomy at the University of Sussex in 1972. He returned to Cambridge the next year as Plumian Professor of Astronomy and Experimental Philosophy, a position from which he resigned in 1991 to devote more time to research and writing. A fellow and former president of the Royal Society, Dr. Rees also has served as president of the Royal Astronomical Society, the British Association for the Advancement of Science, and the (UK) Association for Science Education and as a trustee of the British Museum. He is currently a trustee of the Institute for Advanced Study in Princeton and of the Cambridge Gates Trust. He is a foreign honorary member of the American Academy of Arts and Sciences, a foreign associate of the U.S. National Academy of Sciences, an officer in the French Ordre des Arts et des Lettres, a foreign member of the American Philosophical Society, the Royal Swedish Academy of Sciences, the Italian Accademia Nazionale dei Lincei, and the Japan Academy, an honorary fellow of the British Academy, the Indian Academy of Sciences, the Academy of Medical Sciences, and of Jesus College, Cambridge, an honorary member of the Russian Academy of Sciences and the Norwegian Academy of Science and Letters, and a member of the Accademia Europaea and the Pontifical Academy of Sciences. Dr. Rees was appointed to the House of Lords in 2005 as a non-party-political peer. He was knighted by Queen Elizabeth II in 1992 and appointed to the Order of the Merit in 2007. He was awarded the Templeton Prize in 2011 and has won a dozen major scientific prizes, including: the Dirac Medal and Prize of the ICTP (Abdus Salam International Centre for Theoretical Physics), the Heineman Prize of the American Astrophysical Society (AAS) and the American Institute of Physics, the Gold Medal of the Royal Astronomical Society, the Balzan Prize for High Energy Physics, the Newton Prize of the Institute of Physics, the Bohdan Paczyński Medal awarded by the Polish Astronomical Society, the Bruce Medal of the Astronomical Society of the Pacific, the Bower Prize of the Franklin Institute, the Bruno Rossi Prize given by the High Energy Astrophysics division of the AAS, the Peter and Patricia Gruber Foundation Cosmology Prize, the Albert Einstein World Award of Science, the Royal Society's Michael Faraday





Prize for science communications, the Crafoord Prize of the Swedish Academy of Science, and the Caird Medal of the National Maritime Museum. He holds honorary degrees from fourteen universities, and asteroid 4587 is named after him. The author of some 500 research papers and three technical books, the first of his seven volumes for a lay audience, *Before the Beginning* (1997), was both an overview of and meditation on what is known and what is merely conjectured about our universe in which he suggested that the universe we observe may be part of a multiverse. His latest books are *Just Six Numbers: The Deep Fores That Shape the Universe* (2000); *Our Cosmic Habitat* (2001); *Our Final Century?* (2003); *From Here to Infinity: Scientific Horizons* (2011), an expansion of his Reith Lectures for BBC Radio 4; and *What We Still Don't Know*, which is forthcoming from Penguin Press.

home I approach I co-chairs I participants



