

SEEING THE FUTURE IN THE PAST: LESSONS FROM ASTROBIOLOGY'S *ANNUS MIRABILIS*, 1957.Jacob Berkowitz, University of Ottawa, Institute for Science, Society and Policy, jb@jacobberkowitz.com

Introduction: This talk is designed as a plenary presentation.

This year, 2017, marks the 60th anniversary of the singular watershed year in the history of astrobiology.

The year 1957 included three scientific and technological events that define astrobiology and have important lessons for its future prospects.

The three advances were: the Moscow-based first International Symposium on the Origins of Life; the publication of the scientific description of stellar nucleosynthesis in the iconic paper B²FH; and the launch of the Soviet Sputnik satellite, heralding the dawn of space-based telescopes.

As astrobiologists envision the detection of another living planet, seeing the connections that link these three historical events is crucial to understanding the nature and promise of the field.

This presentation will tie together the surprisingly close scientific and personal elements that link these three events, describe how they profoundly shaped the next 60 years of astrobiology, and how the past can guide today's astrobiologists in both expectations and vision.

As an astrobiology author and historian my goal is to provide an engaging and entertaining talk that at the same time will provide the scientific audience with new insights into the historical currents in which they're working.

The talk will tie-together AbSciCon 2017's five core themes, describing their historical symmetry and profound and surprising synergistic interaction.

I'll draw on my current research to reveal how these three historical events are linked through a forgotten storyline in the history of 20th century astronomy, one that's central to the origins of astrobiology.

George Ellery Hale built the Mount Wilson and Palomar Observatories with the express goal of extending Darwinian theory into a cosmic context. In 1919, Hale hire two astronomers to lead this effort: Edwin Hubble and Paul Merrill. While Hubble discovered the expanding universe, it was Merrill who provided the observational evidence for cosmic evolution.

Merrill designed the first modern spectrograph and pioneered the detailed study of stellar atmospheres. This work provided the lynchpin observational evidence for stellar nucleosynthesis and pioneered the field of astrochemistry (he's among the first astronomers to use the term) which in turn has been critical to seeing the molecular origins of life as a cosmic phenomenon.

Merrill was president of the American Astronomical Association when Sputnik launched and contrary to the majority voices of fear and distrust at the time, publicly welcomed the advance as a huge step for astronomy. He saw the enormous potential of space-based telescopes, particularly in IR astronomy, opening the way to an understanding of the ecology of stardust, from mass loss to interstellar dust chemistry and the formation of protoplanetary disks.

I will argue that on the 60th anniversary of astrobiology's *annus mirabilis* we're in the midst of another great intersection of a next-generation of space-based technologies, origins of life research, and foundational astrophysical insight--this time not stellar nucleosynthesis but exo solar system synthesis.

I'm the author of *The Stardust Revolution: The New Story of Our Origin in the Stars*, and the upcoming *The Reluctant Prophet: Paul Merrill and the Discovery of the Evolving Universe*.

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One review of *The Stardust Revolution*:

"This is a splendid book, beautifully written and scientifically accurate. Its structure, using the stories of individual scientists to illuminate the quest to understand our cosmic origin, is highly successful. This book can be read with profit and pleasure by anyone from a young student beginning her interest in science to an old astronomer, like this reviewer, who has trod many of these paths for the past half century."
David Morrison, Director, Carl Sagan Center for Study of Life in the Universe, SETI Institute, 2014

I've given oral presentations twice before in AbSciCon history and education-related sessions.