

hypotheses which were not specifically anticipated. For example the author describes the test for a correlation between "saintliness" in the previous life and the societal position of the next personality. For those who have never heard of this fascinating work, this is a good introduction and describes a number of informative cases. For those who have, the book includes plenty of discussions of related topics and will surely cause the reader to ponder important issues. I recommend this book. Interested readers will also want to read a number of the works of Ian Stevenson, the originator of this field (Stevenson, 1997a; Stevenson, 1997b).

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The Scientific Legacy of Fred Hoyle edited by Douglas Gough. Cambridge University Press, 2005. 266 pp. \$75.00 (hardcover). ISBN 0-521-824-486.

It is a measure of Fred Hoyle's standing that three biographies have appeared, and two international meetings have been held in his honour, since his death on

August 20th, 2001 at age 86. *Fred Hoyle's Universe* followed from a conference held in Cardiff, while *The Scientific Legacy of Fred Hoyle* emanates from Cambridge, where Hoyle was based from 1945 until 1972. Hoyle's creative output was amazingly prolific and it may be questioned whether any single volume could adequately encompass it. This book doesn't try (although an indication of Hoyle's range is given in the foreword by Martin Rees: for Hoyle was not only an astronomer, he was a wonderful science populariser and the author of some very entertaining science fiction novels). Instead, it is divided into a dozen chapters, each written by a leading authority on various areas in which Fred Hoyle worked. The result is a rounded and authoritative summary, written by his former colleagues or students, covering much of modern astrophysics. The articles are all well written, pitched at the 'easy read' level for professional scientists, and the result is a beautiful and profitable read.

Wal Sargent, in the opening proceedings, gives what he calls a "broad-brush overview" of the main themes of Fred Hoyle's research. He lists these as:

- The accretion of interstellar gas onto stars
- The structure and evolution of stars
- Nucleosynthesis in stars
- Cosmology
- The nature of interstellar dust

These are indeed areas in which Hoyle made outstanding contributions. His work with Lyttleton on stellar accretion has found application in studies of binary stars and black holes; with Lyttleton and Schwarzschild, he pioneered the theory of stellar structure and evolution; with the Burbidges and Fowler, he was able to show that all the elements heavier than helium were created in the hot, dense interiors of stars and dispersed through interstellar space by way of supernova explosions; with Bondi and Gold, he developed the steady-state cosmology in rivalry to the Big Bang one; and he wrote extensively on the formation of interstellar molecules, the composition of interstellar grains and the fragmentation of gas clouds into galaxies and stars.

The seminal nature of this pioneering work is widely recognised. For example, it is often said that Hoyle should have shared a Nobel Prize for his nucleosynthesis work (it went to Willy Fowler, the experimentalist on the team). Most of the articles in the book describe Hoyle's early contributions and show how they have led into the modern studies in these areas. The book will be an excellent resource for physical scientists interested in the history, development and current status of much of astronomy. At £50, however, it will be accessed more often from departmental bookshelves than from private ones.

Hoyle's support for the steady-state theory achieved a high profile and has tended to eclipse, at least in the popular literature, his other substantial contributions in the field of cosmology. Thus in spite of his philosophical distaste for the Big Bang theory, he and colleagues were able to show that the cosmological abundance of the light element helium-4, the most common element after

hydrogen, could be predicted either if the Universe had a hot origin or there had been an early generation of massive objects. They were later to show that primordial nucleosynthesis in a hot early Universe could predict elemental abundances up to oxygen. Jayant Narlikar and John Barrow, in separate essays, show that many of the ideas now regarded as standard in cosmology originated—often decades earlier—with Hoyle. Too often, these ideas have been rediscovered without proper acknowledgement of his earlier work.

In fact, Sargent's list omits the major directions of Hoyle's research over the last thirty years of his life, after he resigned from his Cambridge position in 1972, believing that envious colleagues were trying to push him out. Rees states that "his consequent isolation from the broad academic community was probably detrimental to his own science", and this is a popular view amongst at least Cambridge astronomers at the present time.

What were these directions of research that isolated Hoyle from the mainstream? In conjunction with Chandra Wickramasinghe, he developed the hypothesis that life arrived—and continues to arrive—as viruses and other micro-organisms from space. The idea met with enormous resistance and still does. Although this work was post-Cambridge, it may be significant that his first novel, *The Black Cloud*—about an alien intelligence imbedded in a cold, dark nebula—was published as early as 1957. In the words of one biographer (Simon Mitton), "His speculations that diseases are seeded by infections from comets added nothing to a reputation that had begun to decline from the mid-1970s". A Cambridge perspective again: the perceived "decline" relates not only to his involvement in the life-from-space thesis but also to his continued development and refinement of alternative cosmologies, and his work with colleagues on anomalous redshifts, leading to the view that many quasars are relatively local objects, ejected from the nuclei of galaxies. Such ideas are not "respectable": I recall attending a crowded seminar on Hoyle's 80th birthday in which, at question time, it became clear that the professors saw it as their duty to protect their students from such dangerous ideas.

What are we to make of the direction of Hoyle's research of his last thirty years? Was he an outstanding scientist who went off the rails, straying into territory where he was unqualified to make judgments? Or was this a man who continued to be ahead of his time to the end of his days? Both perspectives come over strongly in this volume, depending on the writer. Of course, only time will tell. But consider this: Within the last decade there has been a remarkable revival of interest in the panspermia hypothesis. For example, mechanisms have been discovered whereby life-bearing material could be ejected from the Earth, survive and diffuse throughout the Galaxy, transmitted whenever the sun enters a cold, dark nebula. Shades of *The Black Cloud*! And as pointed out by Narlikar and Barrow in this volume, the creation field of the modified, quasi-steady-state cosmology is very similar to that of inflation, and predicts an accelerating Universe, as is apparently observed. In the words of Geoff Burbidge, "... we are told the Big Bang is still okay, now with a finite cosmological

constant, dark energy, quintessence, and what have you. Actually, it's creation (but don't say so)".

Geoff Burbidge's concluding remarks include a potted history of his early interactions with Hoyle—the nucleosynthesis work, the supernova stuff, the founding of the Institute, the Cambridge infighting—and the sense of excitement of those heady days long ago just bubbles to the surface. As does the sense of affection for a great scientist, from his many students and colleagues. Here, for example, is Margaret Burbidge's account of listening to Fred Hoyle, reading his famous paper on the synthesis of the elements from hydrogen: "... I sat in the RAS auditorium in wonder, experiencing a marvellous feeling of the lifting of a veil of ignorance as a bright light illuminates a great discovery". One wonders if astrophysics will ever again go through such a heroic phase, and will ever again benefit from a Fred Hoyle.

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Project Beta: An Adventure in the Disinformation Age by Gregory Bishop. Paraview Pocket Books, 2005. 288 pp. \$14.00 (paper). ISBN 0-743-470-923.

UFO research has been rife with stories of intrigue, conspiracies, counter-conspiracies, government cover-ups and, last but not least, mysterious characters. Gregory Bishop's new book, *Project Beta*, deals with all of this to the most extreme degree as being a chronicle of one of the most infamous series of episodes in the history of the UFO controversy. The author lays out the details of physicist Paul Bennewitz's experiences with government and civilian purveyors of UFO misinformation in the 1980s. The aim of the misinformation was to create paranoia in the mind of Bennewitz and to observe the result of his mental decline, which eventually led to Bennewitz's being committed to an institution. Bishop also discusses the bigger picture of a few individuals attempting to create a new mythology of UFO conspiracy belief from scratch. Some of those people used their positions within the government to lend credibility to their claims, doing so with no official sanctioning of their deeds.

When I was approached to review this book, I was of two minds. Having been involved in observing these events at the time as a researcher, there was a great deal of detail that has never been circulated widely, especially about the mysterious characters that Bishop describes: William Moore, Richard Doty, "The Aviary," and assorted others. This seemed like an opportunity to clear the air about what had happened. On the other hand, I'm not sure I can believe everything Bishop is relating. The reason is given by the author himself. These individuals consistently lied, fed false information to whomever would listen,