

This is of great importance for the entire volume, as much of it deals with the content and interpretation of commentaries on Ptolemy. Having shorn himself of false premises, Langermann explores Ptolemy's proof for the sphericity of the heavens. Examining a unique manuscript by Ibn al-Haytham (965–1040) held at the Topkapi Library, Langermann quotes from it extensively. The Arabic scholar wrote about how he approached his commentary on the *Almagest*:

Eloquence does not consist in expressing a few concepts with many words. Instead, eloquence is the clarification of many concepts with measured words, because excessive verbiage leads comprehension astray. (page 162).

Words from a millennia ago that retain their force as it relates to academic writing today:

Ibn al-Haytham offers a logical, well-organized exposition, drawing alternatively on astronomical, mathematical, optical and philosophical arguments, as the issue may require. (page 163).

Langermann completes his study by a close reading of two other Arabic manuscripts in one of this book's most fascinating chapters.

Henry Zepeda looks not at the texts, but the glosses written on the manuscripts by others. In these liminal spaces, he finds gold:

The lesser-known commentaries written in Latin provide us with more representative evidence of what medieval students of Ptolemy thought – e.g., which parts they were interested in, why they read it, in what contexts they studied Ptolemy, how it was taught, and whether they agreed with his methods and results. (pages 225–226).

Some of these glosses are quite extraordinary: one geometrical figure shows that instead of being spherical, "... the heavens could indeed be square-shaped." (page 234). A chapter by Carlos Steel persuasively makes the provocative case that Medieval astrologers had anticipated by some centuries Galileo's method of approximation. And yet another chapter stirs things up in its look at the controversy between Johannes Regiomontanus (1436–1476) and George of Trebizond (1395–1486) over their competing translations of the *Almagest*. "The tensions between them," writes Michael Shank, "is often overlooked even though this controversy had profound consequences for the history of as-

tronomy." (page 307). This is still a work in progress, as Shank tells us that his transcription of the *Defensio* written by Regiomontanus against George consists of 900 typescript pages "... from which I continue to purge errors." (page 309). The *Defensio* exists complete in only one manuscript, held by the Russian Academy of Sciences in St. Petersburg. One hopes this immensely important text will someday be published in English.

There is much else of great value in this important book, which is essential for any medievalist. Studies of the Medieval Period have often been relegated to a lower order of importance, not just in astronomy but in other fields as well. In fact,

... the roots of modernity may go back to Greek and Roman elements, but their fusion appears to have occurred in the twelfth and thirteenth centuries. (Huff, 2023).

As the multiple reviews of Medieval astronomy books in this issue of the *JAHH* show, it is a vital area of study that is finally getting its due.

The next volume in the PAL series will be published in Hullmeine (2024). Brepols is doing a great service to the history of astronomy by undertaking to publish the series; this initial publication is beautifully produced as a large and weighty book, priced within reach of individual scholars.

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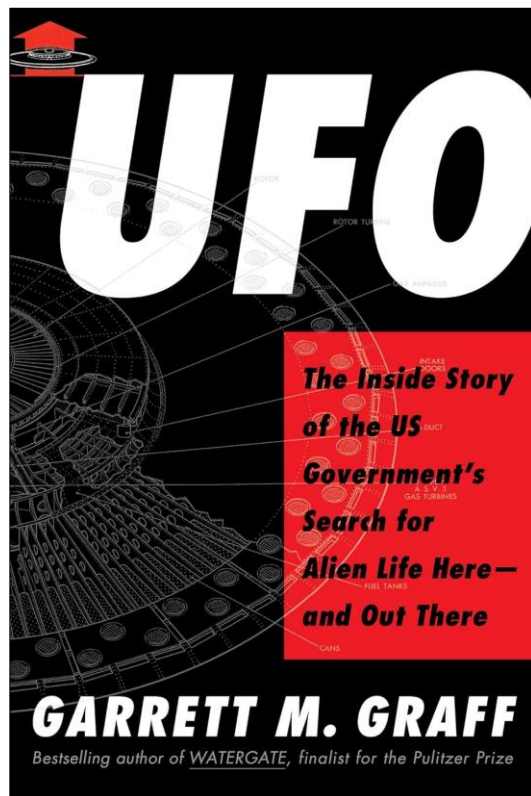
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UFO: The Inside Story of the US Government's Search for Alien Life Here – and Out There, by Garrett M. Graff (New York, Avid Reader Press, 2023), Pp. xxii + 518. ISBN 978-1982196776 (hardback), 155 × 235 mm, US\$ 27.43.

Readers of this journal will be aware that UFO's are having a moment, or maybe more than a moment. Revelations since 2017 of U.S. military involvement in data collection over the past several decades, U.S. Congressional hearings on what are now called

Unidentified Anomalous Phenomena (UAPs), and even official NASA involvement, have brought the subject to the forefront of scientific attention in a way not seen in more than 50 years (Cooper et al., 2017; NASA, 2023; U.S. House of Representatives, 2022). With the stigma now largely removed, reports of unusual sightings in the skies are commonplace from military and commercial pilots as well as the general public. The volume at hand is thus a timely addition to what has historically been a large and checkered literature. That said, it does not rise to the level of analysis of David Jacobs' *The UFO Controversy in America* (Jacobs, 1975), Curtis Peebles' *Watch the Skies!* (Peebles, 1994),



or Greg Eghigian's forthcoming volume on the subject that promises a balanced global history of UFOs (Eghigian, 2024). The author is not a historian but a New York Times bestselling author of books on Watergate and the 9/11 attacks, and a journalist with extensive reporting on U.S. intelligence, national security, and the military. He is thus well-placed to write this book from those points of view, and as he notes in his Introduction, the volume is in any case not intended to be a comprehensive history despite its 50 pages of notes, but

... an effort to tell the story of how the US government, military, and leading scientists have approached these questions over our collective lifetime.

(page xxi).

He does so in episodic fashion in 51 chapters that average less than 10 pages each.

Graff divides his book into three parts: the Saucer Age (1947–1960), the Space Age (1960–2000), and the Interstellar Age (2000–present). Qualms about periodization notwithstanding, in my view this seems a rather artificial way to parse the history of the debate. It is true that 1947 is generally considered the beginning of the modern debate with the reported sightings of a formation of objects by an experienced rescue pilot, Kenneth Arnold, in Washington state—and all that followed. But the Space Age is usually seen as beginning in 1957 and not ending in 2000, and his choice of the year 2000 to inaugurate a third era is based largely on a French report about UFOs that hardly seems earthshaking and is not interstellar in any way. Earlier work on the history of the extraterrestrial life debate (Dick, 1996) demarcated three UFO eras: 1947–1965, with the first modern reports and U.S. Air Force involvement; 1965–1969, a period of peak scientific engagement with Congressional hearings, the landmark Condon Report, and various scientific symposia; and the decades following 1970, during which there was a decline in scientific interest in the extraterrestrial hypothesis, although an increasing interest among social scientists in the cultural meaning and impact of the debate.

Almost three decades later, I would now argue that 2017 marks the beginning of a fourth era in terms of scientific respectability with the revelations of U.S. Government involvement, multiple Congressional hearings, and participation of respectable scientists and scholars such as those on the appointed NASA team, Department of Defense officials, as well as such high-profile figures as Avi Loeb, who heads Harvard's Galileo Project (Loeb, 2023). (The latter is ironic considering that Loeb's predecessor as Chair of the Harvard Astronomy Department, Donald Menzel, was the most severe critic of UFOs back in the 1950s and 1960s). Whether this newfound respect will represent an epistemic break from previous analyses remains to be seen. The signal-to-noise ratio for UFO evidence remains very low, with perhaps 3% of reports unexplained. While it is reasonable to argue that these 3% should be the subject of closer study, whether these UFOs relate to national intelligence, anomalous physical phenomena or the extraterrestrial hypotheses is wholly undetermined. In my view the new evidence in the form of U.S. Navy videos and Congress-

sional testimony is not compelling, certainly not for a hypothesis as extraordinary as aliens.

Still, there are reasons why this volume should be of interest to historians of astronomy. While Graff's Part I on the Saucer Age is a reasonable rehash of 'flying saucer' history that has been written many times before, readers of this journal will find Part 2, "The Space Age", of more interest. It includes chapters on the Search for Extraterrestrial Intelligence, Frank Drake's interstellar message sent from Arecibo Observatory in 1974, the exploration of Mars, and the role of astronomers such as J. Allen Hynek, Donald Menzel, Drake, Carl Sagan, Joseph Shklovskii, Jill Tarter, and others. These chapters are largely accurate snapshots in which history is presented briefly and loosely chronologically as the book proceeds. But they are interspersed with chapters dealing with the highlights of UFO events. This makes sense only on the unjustified assumption that these events have something to do with the extraterrestrial hypothesis. I must say it is jarring to see the juxtaposition of these two themes, UFOs and SETI, where Frank Drake's project Ozma in the early 1960s is followed by the so-called 'swamp gas' incident in Michigan in 1966, and Sagan's popular *Cosmos* book and TV series in 1980 and the work of Jill Tarter are followed by a discussion of crop circles, even if only to say that some of the latter were explained as hoaxes in the 1990s. In my 30 years involved with the SETI community, those scientists were ever at pains to avoid the whole UFO debate (at least until recently), having enough trouble with upholding the scientific legitimacy of their own work.

And it must be said that the methodologies of SETI and astrobiology science are miles away from the procedures of UFO enthusiasts, not to mention the often-far-out claims of the latter. To take only one example, the quality of the data for SETI and astrobiology is generally very good, if inconclusive and open to interpretation, whereas UFO data is very poor, based on differing eyewitness accounts, blurry photographs and videos, and notoriously subjective interpretations. No matter how often one rehashes poor data, the outcome is unlikely to be conclusive. Even Navy videos, though coming from technically competent pilots and often held up as the best evidence, have been shown to be open to mundane explanations having to do with equipment and other factors (Shermer, 2021; West, 2021).

In Part III Graff covers the most recent events, including the much-ballyhooed Navy videos, again interspersed with brief vignettes of more scientific endeavors such as the work of Jill Tarter in the wake of the termination of the NASA SETI program, the \$100 million SETI project known as Breakthrough Listen funded by Russian entrepreneur Yuri Milner, and research on astrobiology and the origins of life. Again, the juxtaposition of real science and rife speculation is jarring, and the coverage of astrobiology and SETI is incomplete, to say the least. To his credit Graff concludes that multiple claims of Government coverups regarding UFOs are unreasonable, arguing that in his experience with national security and military reporting it is highly unlikely the U.S. Government could keep such an existential secret for so long. Rather, if there is any coverup, it is because "... the government is uncomfortable in telling us it doesn't know anything at all ..." about the reported phenomena (page xxii). Having worked for the U.S. Government for 30 years, this conclusion rings true to me.

Aside from analyzing the differing roles among astronomers, their sometimes conflicting arguments, and their approaches to these anomalies (if indeed they approach them at all), there are other reasons historians of astronomy should be interested in the UFO debate. Though Graff does not discuss this aspect, there are interesting historical reports of anomalies in the skies—almost certainly not arriving aliens, but intriguing accounts nonetheless. For example, the German astronomer and scholar Wilhelm Schickard, a contemporary of Kepler, wrote a 33-page treatise in 1630 describing in detail an unexpected phenomenon in the northern sky that he observed for several hours (Müller, in press). A study of such historical accounts strikes me as an interesting project, having nothing to do with extraterrestrials or Erich von Däniken's ancient astronauts, but with the observational claims of astronomers in the context of their times, and the role of anomalies in astronomy and science in general. Anomalies in the past have played an important role in advancing scientific discovery, not to mention their role in Thomas Kuhn's *Structure of Scientific Revolutions* (Kuhn, 1962: Chapter 6), and there are lessons to be learned for the UFO debate in how to navigate such anomalies (Dick, in press).

Finally, one can reasonably ask what use Graff makes of the work of historians of science in his chapters on SETI and astrobiology. In the 500 pages of this book, Har-

vard historian Karl Guthke gets two paragraphs in connection with his cultural and literary history of other worlds (Guthke, 1990), David DeVorkin gets a few sentences for his history of the V-2 rocket in connection with James van Allen and Hynek (DeVorkin, 1987), and Notre Dame historian of science Michael Crowe gets one footnote for his massive lifelong work on the extraterrestrial life debate (Crowe, 1986). Although he does make good use of archives and interviews for his UFO history, when it comes to science Graff is much more prone to using popular works such as Dava Sobel's collaboration with Frank Drake (Drake and Sobel, 1992) or Sarah Scoles' life of Jill Tarter (Scoles, 2018), drawing heavily on them for his explications of SETI. This is disappointing, but not fatal. It perhaps points to a failure of the author to more deeply research his subject, but also a failure of historians of astronomy and their publishers to get their work into the mainstream.

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