Another northern land, so remote it was thought to be beyond the North Wind, was Hyperborea. It was said the god Apollo visited there every 19 years. Bilić's opinion is that "… the myth of Apollo's voyage was actually structured on an analogy with the annual solar movement." (page 61). He regards it as an "… unambiguous reference to the Metonic Cycle." (page 62). The tradition of this voyage originates in Greece's Archaic Period, and the author spends an entire chapter tracing the likely times of year associated with Apollo's voyage, as well as the god's association with Syria. He argues that "… both locations are mythic or cosmological, and that both are part of a model accounting for the annual solar motion." (page 69).

From the time of Homer and Hesiod, identical motifs are used in Greek models and annual and daily movements of the Sun, but these are not confined to Greece.

> The existence of similar models in Mesopotamian (and Levantine) tradition—with a similar ambiguity of their referents as either the diurnal or annual solar movement—testifies to their hermeneutic potential and cross-cultural character. (page 107).

There is far more in this book of great interest, including ideas of where the Sun went at night (possibly Ethiopia?), a matter Bilić links to a very early myth used by the seventh-century BCE poet Mimnermus. I highly recommend this masterly analysis of a topic that Bilić admits "… is now considered a subject almost unworthy of serious scholarly engagement." (page 1).

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**_Life and Language Beyond Earth_, by Raymond Hickey (Cambridge, Cambridge University Press, 2023), Pp. xxiii + 671. ISBN 978-1-009-22641-7 (hardback), 157 × 231 mm, US$29.99.**

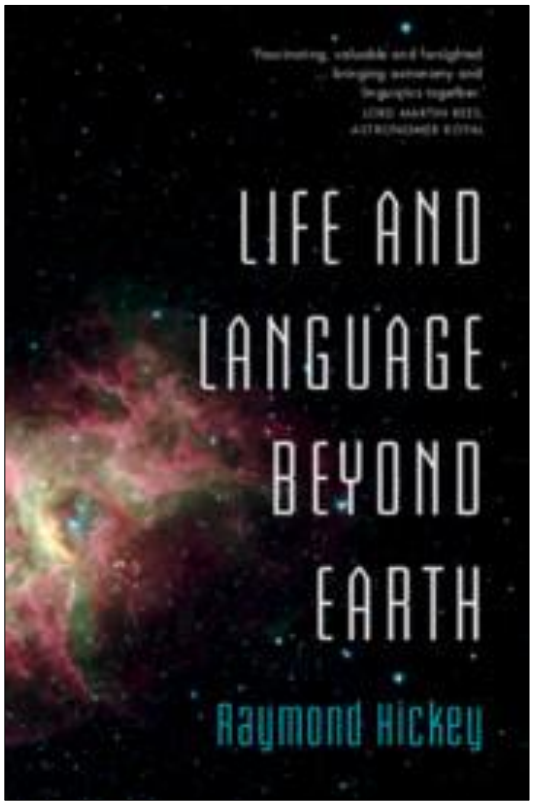
When my book *Life on other Worlds* was published in 1998, Arthur C. Clarke wrote in his endorsement on the back of the book that "I almost wish it would put an end to the outpouring of books on the subject; nothing more need be written, until the feared/long-hoped for moment of Revelation!" Much as I admire Clarke, he was wrong both on the prediction and the merits. In the intervening 26 years scientists and popularizers have ignored his advice in spades, and for good reason. The number of books on life beyond Earth has increased exponentially with new knowledge about origins of life, the discovery of organic molecules in outer space from Mars to giant molecular clouds, the discovery of thousands of exoplanets, and the search for biosignatures and technosignatures, among other advances. Any trace of life is yet to be found, but astrobiology research is now more robust than ever before, funded by NASA and other science agencies around the world. This includes research in the humanities and social sciences, exemplified by the Baruch S. Blumberg NASA/Library of Congress Chair in Astrobiology, which funds research on humanistic aspects of the discipline. The Chair has been held by several historians of science.

These broad discussions confirm what has interested me about astrobiology over many decades: that from an extraterrestrial perspective it allows us to talk about the natural sciences like astronomy, biology, and chemistry; to extend the social sciences to exosociology, exoanthropology, and exolinguistics (Anton, 2023); and to expand our horizons in fields like philosophy and theology, the latter now evolving into a robust field known variously as astrotheology, exotheology, and cosmotheology led by serious scholars and theologians (Davis, 2023a, 2023b; Davis and Faber, 2023; Dick, 2018a, 2023; Peters, 2018). Even if no exobeings are ever found (the author explains on page 7 that he prefers this term over 'aliens' for consistency with 'exoplanets' and to refer specifically to communicating intelligences), these discussions will have been worth it by urging us to see ourselves from an extraterrestrial perspective and by generalizing our ideas in all of these areas.

The structure of the book consists of six Parts, the first four ranging from the nature of the Universe to the evolution of life, the rise of societies on Earth, and the complexity of the human brain. In addition to providing context, these chapters do a credible job of raising major themes such as the emergence and nature of consciousness, why evolution favored the rise of intelligence beyond what humans needed for practical purposes, the Fermi paradox of why we do not observe extraterrestrials (UFOs notwithstanding), and why the Universe is seemingly fine-tuned for life. Only rarely does one find an author who

can credibly cover such broad areas and do it in a readable manner while raising provocative questions.

All of this is only prelude to the second half of the book, which covers language, linguistics, and communication; the originality of these parts comes from the fact that the author is himself an accomplished linguist, situated at the University of Limerick, Ireland. Here the author discusses the origin and evolution of language, the physiological characteristics that make it possible, language and the brain, and even animal communication. On the all-important question of whether there is a continuum between human systems of communication and that of animals,




he finds the research community divided. This issue is also intertwined with the fraught nature of intelligence, which is discussed here in an even-handed manner. Although the author is very careful to avoid anthropocentrism, he concludes that

> … in terms of structural and functional organization, life and language on exoplanets will most probably share basic similarities with life on Earth. (page 10).

If true, this has important implications in the event of success in the Search for Extraterrestrial Intelligence (SETI), which will surely be followed by attempts at communication, and implications as well for Messaging Extraterrestrial Intelligence (METI) and message construction.

Connected to language, the book makes excursions into many thought-provoking questions: what counting systems would exobeings use? What about their conceptions of space, time, and timekeeping? The nature of their science? Some of these questions revolve around active philosophical questions: is mathematics invented or discovered? Do we have free will? Is our knowledge objective? Contact with exobeings, while likely not offering salvation to our problems as many people perhaps naively suggest, would nonetheless shed light on these perennial philosophical questions (Dick, 2018b).

The book makes no claims about the actual existence of exobeings, but only the possible nature of their communicative abilities. The author briefly addresses the possibility that exobeings might be artificial intelligence, sometimes termed ‘postbiologicals’, an idea that has gained some currency since first seriously introduced two decades ago (Bostrom, 2016; Dick, 2003; Kurzweil, 2006). Contrary to some science fiction scenarios, in his opinion enhancement of human biology is more likely than total replacement by postbiologicals on Earth, even in the long term. But what about in the Universe at large, where exobeings might have been evolving for millions or billions of years? In such a case gene-culture coevolution might have been replaced by algorithm-culture coevolution. Such scenarios are fun to contemplate, and might even change strategies SETI and METI.

Finally and importantly, the author is sensitive to the various scenarios under which we might discover ETI, ranging from a radio signal to detection of a technosignature such as an artifact, to direct contact either on Earth or beyond Earth through space exploration. The question of communication and of the societal impact of finding life is meaningless without specifying the mode of contact. The author is familiar with the expanding literature on this subject (Dick, 2015; 2018b), and makes good use of it in his analysis.

In sum this is a sophisticated, scholarly, and overall very impressive work both for its breadth and depth and the originality of its treatment. Implicitly it makes the case that should ETI ever be discovered, social scientists, linguists, and yes, historians, should be part of the action team to weigh in on possible

communications and the variety of reactions. Historians of astronomy should be interested in books such as this because the extraterrestrial life debate has been one of the major themes in astronomy, especially since the seventeenth-century Scientific Revolution (Connes, 2020; Crowe, 1986; Dick, 1982, 1996). It is closely tied to cosmological worldviews, themes in science and religion, the interplay of observation and theory, the limits of science, and much more. Moreover, historians of astronomy are well situated to analyze the societal impact of astronomy, and on this subject the impact is likely to be great—depending on the discovery scenario.

The detailed index is somewhat unusual in that individual names are grouped under professions such as 'anthropologists,' 'cultural figures,' 'linguists,' philosophers,' and 'scientists.' This may be a product of an AI indexing program, but it works only insofar as one can guess in which category any individual fits. The 30 pages of bibliography will keep any reader busy with follow-up on any of its fascinating themes. Finally, Cambridge University Press is to be congratulated for making this large and weighty volume so affordable.

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## *Cincinnati Observatory: Its Critical Role in the Birth and Evolution of Astronomy in America*, by Stella Cottam and John E. Ventre. (Cham, Springer, 2023). Pp. xi + 266. ISBN 978-3-031-46033-3 (hardback), 160 × 240 mm, US$129:99.

We have Ormsby MacKnight Mitchel to thank for the Cincinnati Observatory. Even though he "… did not have an educational background …" (page 6), Mitchel became Professor of Mathematics and Director of the Observatory. To dedicate the building, he went to the top in asking former U.S. President John Quincy Adams to preside. A fine colour portrait of Adams now graces the entry room of the current building; while it is a replacement of the building he inaugurated in 1842, the original cornerstone he laid is incorporated into the structure we see today, dubbed the Herget Building.