

Final frontiers: the hunt for life elsewhere in the Universe

Sohan Jheeta

Received: 18 March 2013 / Accepted: 15 June 2013 / Published online: 2 July 2013
© Springer Science+Business Media Dordrecht 2013

Abstract This paper seeks to review the likelihood of unearthing evidence of the existence of life elsewhere in the Universe. Although it has been demonstrated that life can thrive in the severest of conditions on Earth, detecting its presence in similarly habitable zones elsewhere is proving to be an extremely complex issue. There are many reasons for this, the major ones being that the distances involved are vast; the low potential signal to noise ratio, spatial and spectral resolutions arising from planets with biospheres; and biosignals themselves can be misleading. New telescopes with improved technology are on the horizon which will extend our capabilities, but it is still doubtful that any exploration could venture beyond the borders of our galaxy. Moreover, caution needs to be exercised when assessing the signals emitted by biomarkers as these could be produced abiotically. However, if the focus of the search should be concentrated around the area of M dwarf stars then, as we begin to understand the nature of habitable zones, our chances of eventually achieving our goals will be enhanced.

Keywords Life in the Universe · Biomarkers · Biosignals · Habitable zones · Habitable planets · Earth like planets · M Dwarfs

1 Introduction

Since time immemorial it has been our persistent desire to discover where we come from and, every time we look up at the sky, we've asked ourselves, is there life elsewhere in the Universe. There is no simple answer to either of these questions, but in recent times our desire to find the answers has taken on a new dimension in the form of astrobiology. Astrobiology is a hot bed of research as more and more universities worldwide begin to incorporate this field into mainstream subjects such as biology, chemistry, geology and even medicine; all working to answer the questions posed above. More importantly, astrobiology has brought into focus the nature and origin of life in settings other than Earth. Our knowledge of the diversity of life on Earth has increased significantly since the time of the Viking missions to Mars in the mid-1970s (Soffen 1977) and as a result we now have a better understanding of the extreme conditions under which life could possibly have originated and then evolved. This paper seeks to review the current understanding and explore the potential for further detection of biosignals which could establish the possible existence of life elsewhere in the Universe.

2 Life in the extreme

Life has been found in the most inhospitable and extreme places imaginable on Earth. Micro-organisms (psychrophiles) have been found to exist hundreds of metres below the polar ice cap at $-15\text{ }^{\circ}\text{C}$ as well as in permafrost¹

Sohan Jheeta CBiol MSB AMRSC MInstP FRAS, Space Scientist, STEM Ambassador and is a Visiting Research Fellow at the Open University, England, UK, can be contacted at: sohan7@ntlworld.com.

S. Jheeta (✉)
Department of Physical Sciences, The Open University,
Walton Hall, Milton Keynes MK7 6AA, UK
e-mail: sohan7@ntlworld.com

¹<http://en.wikipedia.org/wiki/Psychrophile>.