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**Astronomy and Biology revisited**

*From Chandra Wickramasinghe and 12 collaborators*

Charles Cockell’s recent article highlights the growing importance of biology, particularly microbiology, for understanding astronomical phenomena over the widest possible scale in the Universe. A conspicuous failing in this review, however, is the lack of any reference or acknowledgement of the indisputable role of Fred Hoyle (a former President of the RAS) and iconic theoretical astronomer of the 20th century, and one of the present writers (NCW) in taking the first steps in this direction from the early 1970s onwards. At this time an ancestral discipline, “exobiology”, was in existence which attempted the search for life on other planetary bodies, and most importantly focussed on laboratory attempts to synthesize known biochemicals, contributors to primitive biological systems. With negative results being evident in both these ventures, Fred Hoyle and NCW were compelled to explore the radical idea that life was a cosmic phenomenon originating as a one-off cosmic event with its components in the form of microbial entities in various stages of degradation being widely distributed throughout the solar system, the galaxy, and beyond.

From the 1980s onwards a team of us primarily based in Cardiff set out to investigate many aspects of the emerging connection between biology and astronomy – identifying problems in astronomy that required the introduction of biology, as well as problems in biology that had remained intractable until an astronomical perspective was introduced. Such problems included aspects of stellar and planetary formation and of interstellar dust and cometary phenomena in astronomy, as well the broader issues connected with the evolution of life within the context of terrestrial biology. We also began to explore the possibility of microbial ingress to the Earth occurring more or less continuously and of it being verified by means of collections of stratospheric aerosols.

Our scientific contributions over an exceedingly wide range of topics connected with the synthesis of astronomy and biology have been published as peer-reviewed articles in many journals including journals of the RAS[[1]](#footnote-1).

A summary of developments up to the time of Fred Hoyle’s death is described in a guest Editorial written by one of us (NCW) in the International Journal of Astrobiology (IJA, 1(2), 77-78, 2002). From this time to the present day, data from astronomy to biology has continued to provide a formidable body of evidence that vindicates the H-W theory of cometary panspermia – the inexorable connection between astronomy and biology[[2]](#footnote-2).

In conclusion we quote from a lecture delivered by Fred Hoyle on 15 April 1980 in an out-of-town meeting of the Royal Astronomical Society in Cardiff:

“Microbiology may be said to have had its beginning in the nineteen forties. A new world of the most astonishing complexity began then to be revealed. In retrospect I find it remarkable that microbiologists did not at once recognise that the world into which they had penetrated had of necessity to be of cosmic order. I suspect that the cosmic quality of microbiology will seem as obvious to future generations as the Sun being the centre of our solar system is obvious to us to the present generation……”.

A year later in the book “Space Travellers: the Bringers of Life “ by F.Hoyle and C. Wickramasinghe (Univ. Coll. Cardiff Press) the following point was made at the end of its final chapter:

“The potential of bacteria to increase vastly in their number is enormous. It should occasion no surprise, therefore, that bacteria are widespread throughout astronomy. Rather would it be astonishing if biological evolution had been achieved on the Earth alone, with the explosive consequences of such a miracle ever being permitted to emerge into the Universe at large. How could the Universe ever be protected from such a devastating development? This indeed would be a double miracle, first of origin, and second of terrestrial confinement….”

It is precisely at this time that Fred Hoyle and one of us talked about the emergence of a new discipline combining astronomy and biology. In the same book, the authors go on discuss proprietary rights of the emerging synthesis of disciplines:

“Some biologists have probably found themselves in opposition to our arguments for the proprietary reason that it seemed as if an attempt were being made to swallow up biology into astronomy. Their ranks may now be joined by those astronomers who see from these last developments that a more realistic threat is to swallow up astronomy into biology.”

Thus it was from such a conflict that astrobiology was eventually born.

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1. A selection of significant publications up to 2000 are collected in *Astronomical Origins of Life: steps towards panspermia* (ed F. Hoyle and N.C. Wickramasinghe, published by Kluwer Academic Press, 2000). [↑](#footnote-ref-1)
2. Steele, E.J., Al-Mufti, S., Augustyn, K.A., Chandrajith, R., Coghlan, J.P., Coulson, S.G., et al., 2018. Cause of Cambrian explosion - terrestrial or cosmic? *Prog. Biophys. Mol. Biol.* 136, 3-23. [↑](#footnote-ref-2)