

Astrobiology News August 2016: Astrobiology Primer v2.0

As many of you know, I've been writing short news articles on astrobiology for the monthly CLP e-newsletter for over 3 years. You may also have noticed that these pieces span a very broad range of topics. This is because astrobiology seeks to understand the full story of the evolution of life in the Universe – a huge task, indeed, so I don't worry much about running out of subject matter! More than a collection of different disciplines, astrobiology transcends diverse subjects and explores major existential questions that human beings have pondered for millennia. Moreover, it raises numerous ethical issues that could affect the way we human beings see and conduct ourselves as a species.

The first NASA Astrobiology Workshop was held at NASA Ames Research Center in 1996. It involved over 250 scientists from a broad range of the Earth, space, and life sciences. The workshop produced an ambitious roadmap defining the essential questions that would bring together many seemingly disparate fields of study; fields such as physics, chemistry, biology, astronomy, geology, planetary science, microbiology, atmospheric science, oceanography, each of which has its own emphases and employs its own specialized jargon. The necessity of collaborating across these diverse disciplines eventually led to the production of a general overview of the exciting research areas and how they interrelate, including both the present state of knowledge as well as fundamental questions that astrobiologists are currently pursuing. *The Astrobiology Primer* was crafted ten years ago to address these needs¹. Written by early-career astrobiologists, graduate students new to the field were the principal intended audience, but the community hoped the document would also be useful to a broader range of people for both personal study and teaching.

Since our knowledge and understanding of the Universe evolve continuously, the journal *Astrobiology* has just published *Astrobiology Primer v.2.0*. This long-awaited second edition takes stock of what we've learned during the past ten years and highlights cutting-edge research efforts.² Among its contents is the ongoing quest to answer the elusive question, what is life?^{3,4}, as well as many advances in our understanding of the origin and evolution of planetary systems (including our own), the evolution and interactions of life on Earth, and the search for potential biosignatures that might be indicators of life on remote worlds.

Of course the new primer wouldn't be complete if it didn't devote a chapter to discussing the relevance of astrobiology to the future of life on Earth. Some of the cited applications to solving real-world problems include understanding chlorine's critical role in the depletion of the ozone layer in Earth's stratosphere; the creation of satellites that have enabled tracking of weather, climate, and surfaces changes on the Earth; improved understanding of where earthquakes, volcanic eruptions, and tsunamis are likely to occur and how to better prepare for such events; new laboratory methods that have revolutionized molecular biology and directly

impacted medical research, including the process of sequencing the human genome; and the development of communication technology leading to grid, cloud, and massively parallelized computing.

While pondering how to end this month's news, I received a particularly appropriate email from a colleague announcing that the John W. Kluge Center is now accepting applications for the Baruch S. Blumberg NASA/ Library of Congress Chair in Astrobiology, a one-year research appointment supporting the pursuit of a wide range of issues that could include social, theological, ethical, legal, and cultural concerns that arise from astrobiology. If you know anyone who might be interested in applying, please direct them to the website⁵!

Until next month,

Grace

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¹ <http://online.liebertpub.com/doi/abs/10.1089/ast.2006.6.735>

² <http://astrobiology.com/2016/08/astrobiology-primer-v20-released.html>

³ A popular and widely used “working definition” defines life as a “self-sustaining chemical system capable of Darwinian evolution.”

⁴ Joyce, G. F. (1994) Foreward. In *Origins of Life: The Central Concepts*, ed. By D. W. Deamer and G. R. Fleischaker, Jones & Bartlett, Boston, pp. xi-xii.

⁵ <http://www.loc.gov/loc/kluge/fellowships/NASA-astrobiology.html?loclr=eanfkw>