Editorial*

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Does life exist only on Earth? Why does it not exist on other planets in the solar system? Or does it? Did living organisms become extinct on Mars in a cataclysmic event as dinosaurs did on Earth 65 million years ago? While questions like this require one to look for signs of carbon-based life, one wonders if life can arise without carbon or heterocyclic biological molecules we see on the Earth. Closer to home, we wonder how life arose on Earth! Origin of life on Earth presents some of the longest standing and fascinating set of questions for biologists. Three billion years ago, biomolecules would have arisen in the bubbling water with the Sun signing overhead. While the formation of genetic material, amino acids, and ATP can be recreated in a test tube in a laboratory, we still don't know how a cell formed in the primordial soup. So, we bypass this question and ask the next question. How did complexity arise in a living cell?

Aristotle separated living organisms into two kingdoms—plants and animals—as early as 300 BC. Beginning from the description of animalcules by Dutch scientist Anton van Leeuwenhoek in the 17th century, it increasingly became clear that a large diversity of small and single-celled organisms also existed. These would later be separated into prokaryotes and unicellular eukaryotes. These were better identified only in the 17th and 18th centuries. The former, Monera, included eubacteria and archaea, while the latter included yeast and algae. How did the structurally and functionally eukaryotic cells arise? This issue of *Resonance* is focused on the contributions of Lynn Margulis towards understanding the origin of eukaryotic cells. She championed the idea that mitochondria (and plastid) in eukaryotic cells arose by the engulfment of a specialized prokaryotic cell by a larger cell. This encom-

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passes the endosymbiotic theory of the origin of mitochondria in all eukaryotic cells and chloroplast in algae and plants. Although symbiogenesis was proposed by her predecessors in Russia, Germany, and the US, they failed to convince the scientific community because of the language barrier or their inability to provide a logically compelling series of evidence of the origin of eukaryotic cells. The general article in this issue, 'The Origin of Eukaryotic Cells' describes the untiring efforts of Lynn Margulis to champion the idea of endosymbiosis while rescuing her predecessors from oblivion. Her attempt to include endosymbiosis is presented in a classic article titled 'Whittaker's Five Kingdoms of Organisms: Minor Revisions Suggested by Considerations of the Origin of Mitosis', in this issue. I hope you will also enjoy reading the article-in-box, a celebration of the life and work of Lynn Margulis, who never gave up on her quest to champion endosymbiosis.

Lynn Margulis also worked with the US Space Agency called NASA. Not only did she help with the analyses of geochemical events on Precambrian Earth but also worked with scientists directly involved in the search for extra-terrestrial intelligence (SETI). Fittingly, we bring you a fascinating article, 'A Ride to Exoplanets' on methods to detect life, elements, and technology, on extrasolar planets, by an aspiring undergraduate and her mentor, Simran Kaur and Varinderjeet Kaur from Khalsa College, Patiala. We hope you enjoy these and other articles in this issue of *Resonance*.