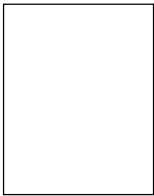


In the Beginning — The Birth of a Living Universe

Evolutionary Ripples

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In the Beginning — The Birth of a Living Universe

John Gribbin

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“Nothing can contribute more to obviate the inconvenience and difficulties attending a vacant or wandering mind than the arrangement and regular disposal of our thoughts in a well ordered and copious common place book” John Locke, ‘Letters on Study’ as quoted in the printed introduction to the common place book used by Erasmus Darwin.

The same could be said of Gribbin’s book. Whether you agree with his conclusion of a ‘living’ universe or not, it’s a book that takes you along. He takes you through the starting on early periods of the Universe to its current state, showing how the laws of physics and chemistry are ‘just right’ for much of what exists to happen. He ends up stating that since this Universe is a black hole that begets other black holes which in turn can be Universes in their own right, the laws of physics and chemistry have the chance of being selected over the evolution of many universes, all in all qualifying the term ‘living’ attached to the Universe. He draws his parallel from the concept of *Gaia* put forward by

James Lovelock in 1970 which considers the entire interlocking and self-regulating ecosystem of our planet as the ‘living’ Earth. Even if you don’t come out of it agreeing that Universes live and evolve, you do take back with you good reasoning and information on a variety of topics. The best part is the almost seamless integration of these varied (?) themes into a flowing whole. Gribbin provides beautiful analogies and explanations in nine chapters.

He starts off with showing why the sky is dark at night, a paradox pointed out by Heinrich Olbers in the 19th century, bringing in the idea of an expanding Universe and that the Universe has a definite origin in time about 15 billion years ago. The next chapter comes off with the tale of footprints of microwave background radiation and the uniform miniscule ripples seen in it in all directions which was detected by the Cosmic Background Explorer (COBE) satellite. He explains how these are evidences for the theory whereby following the Big Bang the Universe expanded steadily from infinitesimal size, but before it got very big underwent a rapid sudden expansion called inflation and then continued at a sedate pace. And being born the Universe will one day die by contraction to the singularity from which it arose.

The third chapter brings up the chemistry of life and touches on astrochemistry to end with the note that “no surprise to modern astronomy to find life like us on a planet like Earth”. The next chapter then puts evolutionary process into perspective showing how the biological diversity on Earth can be



traced back to the benefits of our cyanobacterial ancestors 2 billion years ago. You learn about the Evolutionary Stable Energy – games theory approach - of John Maynard Smith and how given variation and selection and a long enough time span evolution can produce human beings out of single celled bacteria. Life is thus an all or none phenomenon which leads you to the Gaia hypothesis and the next chapter concludes that the answer to how we and the living planet fit into the scheme of things lies in the fact that the Universe may be a descendant of a long line of Universes. The sixth chapter then gives an overview of the Universe with all its vastness and distances involving stars, galaxies and black holes.

The next chapter is a fairy tale chapter and shows how 'Goldilocks' finds porridge, chair and bed that are just right for her, not because they were made for her, but by trying the ones available, belonging to the three bears. Here we are 'Goldilocks' and the Goldilocks effects, as Gribbin refers to them, are the flatness of the Universe; the energies of formation of Carbon atoms; the proportional strengths of the four basic forces of gravity, electromagnetism, strong and weak nuclear forces; and others. He considers might-have-been situations and shows why the production of carbon is good for the Universe. This leads us to star formation, supernovae explosions, the formation of spiral galaxies and the next chapter. There is an effort to show how the galaxies can be considered 'Gaian' maintaining stability from equilibrium and competing with one another so that only the 'fittest' survive. The Universe it turns out is

extraordinarily good at turning matter into black holes. This just leaves us with how to get the black hole of the Universe which churns out black holes. The final chapter takes one through the formation of the Universe via inflation. How quantum fluctuations can produce out of singular nothingness the initial seed which by inflation and expansion bring on universe(s) which form black holes and collapse into singularity and so on add infinitum each time getting a mutated set of physical and chemical laws. One of them then being 'just right' in that we can exist and read all this. A book worth reading and buying.

The Gaian theory of Lovelock revolved around the idea that the Earth's biological and physical components interact in a way that is self-sustaining. Though his theory was not taken seriously by scientists, now *Gaia* and the notion of the superorganism are being viewed in the light of the modern mathematical theory of complexity. Similarly, it is likely that Gribbin's idea of a 'living' Universe may not find the acceptance he asks for and will probably be delegated to the outfield now. Moreover from the point of view of entropy, that decreases for organised systems and increases for the Universe as a whole, and which can be used to characterise evolution - a 'living' Universe will be hard to reconcile. Possibly, the view put forward by Gribbin will be picked up later for the 'holistic' viewpoint of the Universe and its interconnection with life.

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