

Between Necessity and Probability:  
Searching for the Definition and Origin of Life

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# Between Necessity and Probability: Searching for the Definition and Origin of Life

With 58 Figures



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Everything we hear is an opinion not the fact.  
Everything we see is a perspective not the truth.

Marcus Aurelius

# Preface

The most complicated machines are made from words.  
Jacques Lacan

Where does life come from? This is a question that has fascinated mankind since the beginning of time. As soon as somebody or ‘something’ (either life form or machine) becomes aware of itself, it also asks questions about its world and about its own origins. It is no mystery that the oldest myths and legends of human culture are so often centered on genesis motifs. Yet despite tremendous progress in science during the last century, we are still far from understanding the origin of life. Because we do not know exactly what life is (or maybe because we cannot agree upon this issue), a wide variety of theories and pseudo-theories have been proposed about the origin of life. The palette of visions concerning the origin of life has reached out in many directions: life being generated by incomprehensible-to-us mystical forces, spontaneous generation (Buchner 1855), creationism (Bernard 1878b), random genesis, panspermia (Arrhenius cited in Servos 1996), qualitative upgrades of quantitative accumulations (Oparin 1924), gradualist (smooth) ‘upgrades’ from lifeless matter into life, life as an inevitable natural consequence (Klabunovsky 2002), life as an emergent property of matter (Turian 1999), life as an extraterrestrial manipulation or a phenomenon from another physical dimension. Because human knowledge is a shared type of knowledge, our understanding of the world is collective. Therefore, most theories about early life are not fully independent of each other and show significant overlap.

The scientific field studying the physical meaning of life on Earth and in the Universe, its origin and its fundamental properties has been given various names such as prebiology (Rossler 1983), exobiology (Ponnamperuma 1972) or originology (Kompanichenko 1996). Another possible name that might better suggest the physical ambiguity of its study subject is ‘parabiology’. Because this book is a quest and a challenge for the understanding of life anywhere and, whatever its physical substance, I prefer to use the term exobiology. Astrobiology, bioastronomy and artificial life are connected disciplines which, although interested in the same major issues, have more pragmatic purposes such as searching for life elsewhere, the quest for non-terrestrial types of life and the creation of artificial types of life.

Among all sciences, exobiology holds an unmatched record. It has the highest ratio between the number of hypotheses and the number of relevant findings. The reasons are quite simple. Earth is an old planet, almost 4.6 Gyr (giga years). Therefore the Earth we observe today is very different from the Earth in its beginnings. Without a time machine that would allow one to probe the early Earth, we will never be sure whether our models are an accurate representation of the environment in which life originated. Moreover, modern life is not simple but appears as an intricate web of large and complex molecules that seem very unlikely to have appeared spontaneously and that cannot exist independently of each other. For a biochemist or molecular biologist, this ‘Gordian’ knot has no apparent beginning but only endless loops and interdependencies. Therefore, modern life appears as a large collection of interlocked chicken-and-egg paradoxes. Consequently, life cannot be understood through either purely deductive logic or through purely experimental approaches. Facing such an enormous challenge, a society predisposed to philosophical, contemplative and intuition-based approaches is as helpless as a super-technological, pragmatic and deductive society. An integrated and realistic attitude seems the only sound approach toward scientific satisfaction.

Being aware that the vision presented here might contradict certain postulates that other theories about the origin of life consider as fundamental, I support the postulate that life emerged very early in the universe, that life is probably present in other forms in other parts of the universe as well, that life was ‘pushed’ into existence by understandable and foreseeable forces and that an intelligent mind is capable of understanding life as a general concept. Certainly, nothing is forever settled in science and no theory must be taken for granted, irrespective of how much experimental evidence we humans may have for it, and how precise that evidence may be. This is just a reminder of the relativity of our ‘scientific truths’, a warning that “in science one can proclaim a theory about reality as being the latest but never as the last theory.” Consequently, although as an author I might be tempted to envision my opinion as legitimate, the interpretation of the origin, properties, meaning and definition of life presented here can offer no more than what current scientific knowledge would allow. Aware of this unavoidable caveat, I have tried throughout this study to be as open as possible to alternative interpretations. If not deliberate, it might sound ironical that quotes given at the beginning of some chapters are actually contradictory to what the chapters have to say.

Probably every scientific generation before us believed that the end of their quest was in sight. Yet to this day they have all failed to resolve their questions. Over and over, research has demonstrated that the intrinsic complexity of the living state is too overwhelming to resolve. Because later generations will scrutinize life and its origin with more experience and better insight than us, and with an appropriate respect for the magnificence of this subject, the purpose of any sound theory about life cannot be to clarify the

problem, but to point questions in the right direction, to identify a plausible and not an ultimate answer and to navigate on a likeliest path through the fog of often conflicting experimental observations and alternative hypotheses. In exobiology one can never expect ultimate answers, only illumination.

### **Acknowledgements**

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