

Math model reveals insight into how first life forms were 'born'

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An international team of physicists have revealed insights into how the very first life-forms made the jump from the non-living to the living world, by mathematically modelling biological states using energy waves called solitons.

"The model is alive: it oscillates when there isn't enough energy or matter, just like it's breathing. When matter and energy stops flowing through the system, it dies," explains Professor Nail Akhmediev from The Australian National University.

"If these processes happen in simple formations like solitons, we can imagine how the very first basic forms of life were 'born' in nature from non-living elements, such as hydrogen and oxygen."

Professor Akhmediev collaborated with Professor Helmut Brand of the [University of Bayreuth](#) in Germany and Professor Jose Soto-Crespo of the Instituto de Optica in Spain to develop the mathematical model, published in the latest edition of *Physics Letters A*.

Professor Akhmediev says the soliton model can help us understand basic [biological functions](#).

"A soliton – which is a solitary energy wave that doesn't change shape over time – can be used as a model for life because it displays the simplest and most essential functions of life," he says.

"We can apply this model to [complex biological systems](#) such as the transport of nerve and muscle pulses, the processes that occur in [biological membranes](#), and similar phenomena. Having a better understanding of solitons will in turn help us understand how our bodies work.

"At a fundamental level, we are trying to understand how life may have appeared through very simple [physical processes](#). Using this model is a powerful approach that will help in analysing more complex situations."

More information: Research paper: Dissipative solitons with energy and matter flows: Fundamental building blocks for the world of living organisms, www.sciencedirect.com/science/.../S0375960113001606

Provided by Australian National University

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