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A Roadmap toward Synthetic Protolife

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Abstract: The origin-of-life problem remains one of the major scientific riddles of all time and the difficulties in attempts to synthesize simple protolife reflect yet one additional facet of this long-standing problem. In this lecture it will be argued that a strategy for the synthesis of protolife requires the characterization of the physicochemical state of life's primordial beginnings, not just its material composition. It is through the concept of dynamic kinetic stability (DKS) that key elements of that state can be specified – replicative, dynamic, non-equilibrium and energy- fueled. With the recent dramatic discovery that DKS systems are experimentally accessible and show remarkably different physical and chemical characteristics to regular chemical systems, the door to the possible synthesis of simple protolife now appears to be open. Synthesis of a chemical system able to complexify toward more complex forms – toward life - will need to be initiated with the synthesis of a simple energy-fueled dynamic replicative system activated into the DKS state (Figure 1) [1].

References

[1] Pascal R and Pross A (2017) *Synlett* 28:30–35.

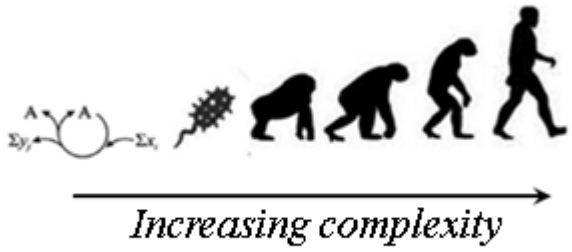

Figure 1 – Schematic representation of the evolutionary process in which a replicative chemical system in the DKS state complexifies toward simple life and then on to more complex life.