Autocatalysis – August 19, 2015

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1 Papers

1.1 Autocatalytic Sets and the Origin of Life by Wim Hordijk, Jotun Hein and Mike Steel[1]

- Origin of life research: common element seems to be the emergence of an autocatalytic set or cycle at some stage.
- Hypercycle is a subset of autocatalytic sets
- Kauffman's idea that in sufficiently complex chemical reaction systems, autocatalytic sets will arise almost inevitably was disputed by pointing out that this requires an (unrealistic) exponential growth in catalytic activity with increasing system size. It was argued back by Kauffman?
- It is at least plausible that autocatalytic sets indeed played a role in the emergence of proteins and DNA from an RNA world

2 Against autocatalysis

29. Lifson, S. On the crucial stages in the origin of animate matter. J. Mol. Evol. 1997, 44, 18.

3 Experimental support

Simple autocatalytic sets 31. Sievers, D.; von Kiedrowski, G. Self-replication of complementary nucleotide-based oligomers. Nature 1994, 369, 221224.
32. Ashkenasy, G.; Jegasia, R.; Yadav, M.; Ghadiri, M.R. Design of a directed molecular network. PNAS 2004, 101, 1087210877.
33. Hayden, E.J.; von Kieddrowski, G.; Lehman, N. Systems chemistry on ribozyme self-construction: Evidence for anabolic autocatalysis in a recombination network. Angew. Chem. Int. Ed. 2008, 120, 85528556.

References

[1] Wim Hordijk, Jotun Hein, and Mike Steel. Autocatalytic Sets and the Origin of Life. *Entropy*, 12(7):1733–1742, June 2010.