

Just like old times: Generating RNA molecules in water

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A key question in the origin of biological molecules like RNA and DNA is how they first came together billions of years ago from simple precursors. Now, in a study appearing in this week's *Journal of Biological Chemistry*, researchers in Italy have reconstructed one of the earliest evolutionary steps yet: generating long chains of RNA from individual subunits using nothing but warm water.

Many researchers believe that [RNA](#) was one of the first biological molecules present, before [DNA](#) and proteins; however, there has been little success in recreating the formation on RNA from simple "prebiotic" molecules that likely were present on primordial earth billions of years ago.

Now, Ernesto Di Mauro and colleagues found that ancient molecules called cyclic nucleotides can merge together in water and form polymers over 100 nucleotides long in water ranging from 40-90 °C -similar to water temperatures on ancient Earth.

Cyclic nucleotides like cyclic-AMP are very similar to the nucleotides that make up individual pieces of DNA or RNA (A, T, G and C), except that they form an extra [chemical bond](#) and assume a ring-shaped structure. That extra bond makes cyclic nucleotides more reactive, though, and thus they were able to join together into long chains at a decent rate (about 200 hours to reach 100 nucleotides long).

This finding is exciting as cyclic [nucleotides](#) themselves can be easily

formed from simple chemicals like formamide, thus making them plausible prebiotic compounds present during primordial times. Thus, this study may be revealing how the first bits of genetic information were created.

More information: "Generation of Long RNA Chains in Water" by Giovanna Costanzo, Samanta Pino, Fabiana Ciciriello and Ernesto Di Mauro. Article link: www.jbc.org/content/early/2009/02/02/jbc.M109.041905

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