

BIOLOGY

RNA world begins to add up

The essence of life is the ability of the individual organism to propagate or copy itself. Fans of the RNA world hypothesis, a scenario in which life began with RNA and later added DNA and proteins to its repertoire, are therefore seeking to create self-replicating RNA molecules to mirror those with which life on Earth might have originated. To self-replicate, an RNA strand would need to string together nucleotides, its subunits. In modern organisms, this job is handled by proteins called RNA polymerases.

Eric H. Eklund and David P. Bartel, both of the Whitehead Institute for Biomedical Research in Cambridge, Mass., now describe in the July 25 *NATURE* an RNA strand that performs like these polymerases. It “does the same thing, in a chemical sense, as the protein enzymes. . . . It’s the same reaction we find in nature,” says Bartel.

The RNA enzyme, or ribozyme, was identified in a soup of randomly generated strings of RNA nucleotides. The researchers first showed that the ribozyme can attach a single nucleotide onto a short strand of RNA called a primer. The nucleotide added—one of four types found in RNA—was determined by a template strand of RNA weakly bound to the primer. The ribozyme linked the correct nucleotide about 90 percent of the time, the researchers report.

Additional experiments demonstrated that the ribozyme can make use of longer templates to add three and even six nucleotides onto the primer RNA strand. The latter feat took 6 days in the test tube, notes Bartel. Since the ribozyme is some 100 nucleotides long, it can’t copy itself, notes Bartel. “This is very far from self-replicating RNA. It shows RNA can catalyze the necessary reaction, but it doesn’t yet show RNA can copy itself.”