

Beginning of Transcription

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From: Catherine Woodgold (*an588_at_freenet.carleton.ca*)

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Today I succeeded in imagining intermediate steps in the evolution of transcription of proteins. Of course, I don't know whether that's how it happened. Or whether others have described it similarly in the past. I'd be interested in suggestions of books that talk about this sort of thing.

I imagine that the first life involved replication of RNA but not manipulation of proteins. I imagine it could have progressed through the following steps:

— The RNA is shaped to attach to short, commonly-available proteins which increase its stability, or its ability to cause the disintegration of other RNA strands, or its ability to replicate.

— The RNA is shaped to attach to two short, commonly-available proteins, which it attaches together to make a protein that's useful to it.

— The RNA not only attaches to proteins, but lets them go again after joining them together, leaving them to perform useful functions.

— The RNA is shaped to attach to individual amino acids which it joins together.

— A piece of RNA might have the same base repeated several times at its ends, and might create an enzyme that tears bases off the ends of RNA strands but only if they have some other base near the ends.

— For one of the amino acids which is rarer and/or more difficult to form an RNA receptor for, the RNA uses other amino acids to form a receptor.

— Having developed rather complex mechanisms for specifying the various amino acids, the RNA forms elegant, simple control procedures to specify when to use those mechanisms, thus

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only having to have one copy of the mechanism specifying amino acid X even if X is used multiple times.

— Up to here, a given bit of RNA could specify a given protein, directly or indirectly. But then it begins to rely on some proteins already being there — like compilers for the C programming language that are themselves written in C. The first one couldn't have been written in C, but it's OK to lose the copies of that first one as long as there's always a compiled compiler around. Similarly, the original mechanism for specifying amino acid X using only other amino acids could be lost, and a method that uses X in forming the receptor for X could remain. *>From then on, the RNA by itself would be helpless; it would have to have a copy of the protein it makes, too. At first, perhaps the original method for only one of the amino acids is lost; the others are still specified completely, if indirectly, from the RNA.*

— I'm a little hazier here, but: methods for specifying the proteins more and more concisely would develop, eventually settling on the optimal 3 bases per amino acid code.

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Cathy