The Math of Life

The genetic code must be considered in a logical and a mathematical context. This must be done both as a dialectical and an algorithmic exercise. The result will be the development of a language that more closely represents the molecular language in nature currently called the genetic code.

Consider the following sentence: f(x) = y. Now consider the following axiom: for every x there can be one and only one y. Think of the sentence as the "purpose" and the axiom as the "rules" of an entire mathematical system. Now consider the kind of language that will develop around finding and describing any solution to the original sentence. There can be many languages, of course, but they all must include components of semiotics, pragmatics, syntax and semantics. Many languages can develop in parallel, but they must all share common features of consistent logic, and none of them can go against the only axiom of this system. This is the context in which we must understand the genetic code, where:

x = DNA
y = Protein
f() = The Genetic Code

The axiom is that for every sequence of DNA there can be one and only one protein. Note that the semiotics of our current language depends entirely on this axiom. The syntax, semantics and even the pragmatics do as well. In the end, there is no dialectical work to be done beyond this, and the algorithmic work merely consists of a single lookup table relating codons to amino acids, combined with a mountain of empiric evidence relating known proteins to unknown proteins. But instead of true, what if the only axiom of the actual system turns out to be utterly false? Clearly, the answer is that the languages of the system become invalid, the semiotics, syntax, semantics and even the pragmatics of science must change entirely. That is precisely what must happen with the genetic code. The correct axiom is that for every x there can be many y. For every sequence of DNA there can be many proteins.

The first practical inference is that the codon table is not what it purports to be. It is not the genetic code. Furthermore, it does not give us the logic of the code that turns nucleotides into protein. The codon table is merely a tiny sliver of the code we seek to understand. The second practical inference is that we should realize that strict logic must lie behind these processes. The only way to consistently achieve the many functions of the code of protein synthesis is through strict molecular logic. In fact, the only way to have a code of protein synthesis is to have a pre-existing molecular logic. In other words, for there to exist a protein code there must first exist a protein logic. To find this logic we must study all of the symbols of the system and determine how they properly fit together. It is a large and complex mathematical game that we must play, but it is not one that we can merely create ad hoc. After all, it is a game that has already been played by nature, one that undeniably works, but one that we have yet to properly comprehend. Just as man has created a robust system of symbols to play the game of mathematics over millennia, nature has created a robust system of symbols to play the game of life. The genetic code is the very heart of that system. Through dialectical and algorithmic

exercises, through wit and metaphor, it is now our job to integrate our understanding of mathematics with our understanding of life.