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The prebiotic soup

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Stephen Fletcher, "The Prebiotic Soup", in *Letters to the Editor*, The Times Literary Supplement, No. 5568/69, 18 & 25 Dec (2009), page 6.

The "Prebiotic Soup"

Sir, – In a recent letter (Letters, December 4), I pointed out that natural selection is a chemical process as well as a biological process, and that it was operating for about half a billion years before the earliest cellular life forms appear in the fossil record. I also pointed out that natural selection does not require DNA; on the contrary, DNA is a product of natural selection. It appears from their recent correspondence (Letters, December 11) that neither John Walton nor Thomas Nagel is willing to assimilate these facts into their world-view. John Walton boldly asserts that the whole of prebiotic chemistry is a myth, while Thomas Nagel objects to the "tone" of my letter. But neither confronts the evidence. I believe they are in the position of someone who has attended a Uri Geller spoon-bending demonstration, and has decided that the laws of metallurgy are in urgent need of repair. The idea that they might have been duped simply hasn't occurred to them.

Readers may recall that the present correspondence was prompted by Nagel's recommendation of *Signature in the Cell* by Stephen C. Meyer as one of his Books of the Year (November 27). Nagel now informs us that he does "not draw Meyer's conclusions". It follows that he has recommended a book whose principal conclusions he disagrees with.

John Walton's letter is largely drawn from creationist propaganda, with all its familiar dissimulation. First, he traduces the life and work of Theodosius Dobzhansky. Actually, Dobzhansky was not an evolutionist *sensu stricto*, nor an atheist. In his essay "Nothing in Biology Makes Sense Except in the Light of Evolution" (published in *The American Biology Teacher*, 35:125–129) he declared, "I am a creationist and an evolutionist. Evolution is God's, or Nature's, method of creation...". In short, Dobzhansky was a deist.

Regarding Dobzhansky's remark in 1965 that "Prebiological natural selection is a contradiction of terms", this was part of a discussion of the nomenclature of selection in the prebiotic soup. Dobzhansky wanted to reserve the term "natural selection" for cellular organisms, and to use a different term for earlier molecular replicators. Contrary to Walton's claim, therefore, Dobzhansky was not denying the existence of selection at the molecular level. He just wanted to call it by a different name. Indeed, he referred to "the probable embryonic stages, so to speak, of natural selection".

Secondly, Walton claims that "Intense laboratory research has failed to produce even one nucleotide (RNA component) under geologically plausible conditions". Again, this is simply not true. For a recent example see "The Synthesis of activated pyrimidine ribonucleotides in prebiotically plausible conditions", by Matthew W. Powner et al, published in *Nature* 459, 239–242 (2009).

Third, at the conclusion of my original letter, I remarked that "before DNA there was another hereditary system at work, less biologically fit than DNA, most likely RNA (ribonucleic acid)". This harmless observation provoked Walton to the outrageous

claim that the whole of prebiotic chemistry is a myth, and that evidence for an RNA world is “entirely imaginary”. He should read Thomas Cech’s 1989 Nobel Prize address, or his 2004 essay *Exploring the New RNA World*, in which Cech showed that RNA molecules are not restricted to being passive carriers of genetic information – they can function catalytically and can participate in cell reactions. Since 2000, the atomic-level structure of the ribosome has also emerged, culminating in this year’s Nobel Prize to Ada Yonath. She has unambiguously identified the prebiotic translation apparatus within the contemporary ribosome. One part of the structure even shows the site where amino acids are strung together to make proteins (the peptidyltransferase centre) and – you guessed it – it is composed of RNA. This establishes RNA as the leading candidate for the genetic material prior to DNA.

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