Was  
Darwin  
Wrong?

# Does Protein Specificity Destroy the Theory of Evolution?

by Gert Korthof.

12 Sep 1997 (updated 13 Jan 2003)

*"I did not set out in this book to destroy Darwinism"*

**Darwinism relies exclusively on random mutations, natural selection and time to explain life. Critics try to prove that these 3 factors cannot possibly do what Darwinists claim. David Foster is one of the critics who calculated the probability of the origin of life by chance.**

I will only discuss the chapters on Darwin's theory of evolution and on specificity of proteins and DNA. [\(1\)](#)

In the Chapter 'Monkeys and typewriters', Foster refutes an argument he attributed to Thomas Huxley: "six monkeys typing randomly for millions of millions of years would type all the books in the British Museum." It was supposedly what Darwinists claimed about the powers of chance in evolution. It is great fun that Foster did calculate the probability: "Huxleys six typing monkeys typing for the duration of the universe would type 36 letters of sense in one of the books in the British Museum" (p57). This is caused by the extreme high number of permutations of a single line of text of 50 characters:  $8.5 \times 10^{49}$  (based on an alphabet of 26 letters). However Huxley could not have told the story about typewriters in 1860, because typewriters did appear 14 years later (in 1874) on the market! [\(11\)](#)

Furthermore in 1860 it was not known that genetic information is a linear arrangement of a small number of symbols, so the whole argument could

not have arisen in Darwin's time. So although Foster was wrong in attributing the argument to Huxley/1860, he correctly pointed out *the computational limits* of a random process producing meaningful information.

By **specificity** Foster means information content of proteins and DNA. Proteins contain information because there is a linear arrangement of 20 different amino-acids. The possible arrangements can be calculated and are of astronomical magnitude. The sequence of the basic elements of proteins is biological important: it enables a subclass of proteins, enzymes, to selectively speed up specific biochemical reactions resulting in increased amounts of a specific product. This idea is still central to biochemistry. However it is important to know that non-specific enzymes exists (for example some proteases). The example Foster uses is **hemoglobin**. It consists of a chain of 564 amino-acids. Since there are 20 possible choices for each position, a protein of only 3 amino-acids long has  $20 \times 20 \times 20 = 8000$  possible configurations. On the basis of this kind of reasoning Foster calculates the specificity as  $10^{650}$ . That means there are  $10^{650}$  possible linear arrangements of the amino-acids, of which hemoglobin is only one. Trying out all these possibilities to find the right one takes longer than the age of our universe. Of course the sum of the specificity of all proteins of an organism is much higher. The same holds for



## The Philosophical Scientists

by David Foster.  
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New York  
179 pages.  
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Contents: (partial)

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- Part Two. The symmetrical Paradox.
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- Part Five. Where Angels fear to tread.
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No index.

No Reference list.

the DNA. So life cannot evolve by chance, Foster concludes.

However in a postscript to the chapter Foster mentions the discovery of neutral (non-specific) amino-acids. This lowers the amount of significant amino-acids to 516 and lowers the actual specificity of hemoglobin. This is the only correction Foster permits himself. The problem with Foster's calculation is that he assumes that (1) the whole protein must be created in one step out of nothing, and (2) that the total sequence is unique and has no repeated units and (3) that each amino acid is specific and irreplaceable. These assumptions are wrong. Totally absent in Foster's attempt to refute neo-Darwinism is any evolutionary **mechanism** to produce information: mutation and natural selection. As if proteins are created by throwing the dice. The second assumption is wrong because human hemoglobin is made up of 4 subunits, two alpha subunits of 141 amino acids and two beta subunits of 146 amino acids (2). That reduces the number of unique amino-acids to  $141+146=287$ . The fact that hemoglobin consists of sub-units also suggests a *mechanism* of origin: duplication and variation of sub-units. His third error is his number of non-specific amino-acids. The hemoglobins of different species can differ as much as 81% (3). Since the whole protein is functional, only 19% of the sequence seems to be significant. What really matters is not the sequence but the 3-dimensional structure of the protein. For example hemoglobin of mouse and men match for 80% on the level of the sequence, but are identical when viewed as 3-dimensional structures (13). This lowers drastically the number of specific amino-acids and increases the probability that hemoglobin could evolve by a stepwise selection of random mutations.

There is another sort of problem with Foster's calculation: the irrelevance for the origin of life. Hemoglobin does not occur in single cell organisms. But more important: proteins don't necessarily need those 20 amino acids occurring today in proteins. There is evidence that functional proteins could be constructed from less than the current 20 amino acids. Proteins can be constructed from 8-10 different amino acids.

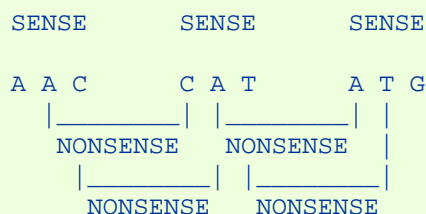
### How many possible oxygen binding proteins are there?

A very important question Foster does not ask is: what are all the possible protein-structures that also could bind oxygen? If there were hundreds or thousands possible structures doing the same as hemoglobin, than it would be much easier to produce an oxygen-binding protein by random variations. This hypothesis can be empirically and mathematically tested. This is exactly what Stuart Kauffman has been doing. (4) The general question is: what is the probability of finding *any one* of a possible set of 2000 enzymes for 2000 particular reactions, which are necessary for life? Not just the one set which happens to be found by evolution.

### Did hemoglobin evolve to carry oxygen?



There is another hidden assumption in Foster's reasoning: hemoglobin was designed for oxygen transport and it must be able to do so right from the start. However the theory that hemoglobin evolved to carry oxygen around the body may need a rethink in light of another way in which molecules related to nitric oxide, NO, released from hemoglobin, help the brain control respiration. Given the results of recent experiments, we may legitimately question whether hemoglobin first evolved to carry oxygen or to ferry NO to key locations in the body. It has been argued that hemoglobin's original task was to enable reactions involving NO and SNOs to occur, and that it's ability to carry oxygen came later. Other work supports this view (14). Hemoglobin has been found in plants(!) and even in bacteria(!) (15). Transport of oxygen cannot be the function of hemoglobin in bacteria. This is a general principle in evolutionary biology: the current function need not be the reason it evolved in the first place.



(figure on page 74)

One example where Foster's lack of biochemical knowledge results in serious errors, is his drawing on page 74 where he displays 3 SENSE codons, and 4 different NONSENSE codes. On the next page he clearly states that there are 20 codons in DNA for 20 amino acids; 40 codons for comma or full-stop effects and 4 unusable codons. However: *the genetic code is commaless and spaceless. There are no equivalents of commas and spaces in DNA.* (7) There are no more than 3 stop-codons or NON-SENSE codes, which function as start/stop for reading, and there are 61 codons which code for amino acids. A surprising aspect of Foster's presentation of the genetic code is that *that* particular view of the genetic code was published by Crick, Griffith and Orgel as "Codes without commas" in 1957 and which received an immediate and almost universal acceptance (8). A coincidence? However the most stunning aspect is, that the hypothesis was refuted by experimental evidence in 1961 ! So, 32 years after the discovery, Foster(1993) still believes in this refuted hypothesis. This must imply that Foster did not touch a biology textbook since the sixties! The discovery of the structure of DNA and of the genetic code are the central discoveries of biology of this century and Foster misrepresents them.

Notwithstanding grave errors, Foster points to the information content of DNA and proteins and does calculate it. The information content of proteins is one of the things one needs to know to estimate how long it will take a random trial and error process to generate it. If time is too short, the information could not be generated by a trial and error process. So the combination of a random trial and error process and the amount of time, are potential falsifiers of Neo-Darwinism. One rarely encounters this kind of approach in textbooks on evolution. (10). The concept of specificity is not explained. The approach is present in Denton(1986),page 323. However if Foster's falsification is meant to be a serious one, he has to use a 'nut-and-bolt' biochemical exactness. Foster fails to do that. He admits he is not a molecular biologist (p60), and this affects the reliability of his conclusions negatively. But also the calculation of the information content of proteins is much better done by Hubert Yockey (9). Foster announced that he did not set out to destroy Darwinism. On page 82 he concludes: **Darwin's theory of evolution is wrong**, because **Darwin totally underestimated the time duration which such a theory would need: trillions of times longer than the existence of the universe.** This proof of the impossibility of evolution reminds me of Zeno's convincing proof of the impossibility of movement (5). How impressive the proof may be, we simply observe movement, so there must be something wrong with Zeno's argument. I found another 'impossibility' in Ian Stewart(12). A protein is a linear chain of amino acids, which has to be folded to work. To determine the optimal fold is called 'the protein-folding problem'. Mathematicians estimated that the calculation of the optimal fold for cytochrome-c would take about  $10^{127}$  years on a supercomputer. Longer than the age of the universe. Impossible. The funny thing is that living organisms can fold a protein containing a thousands amino acids in about a second. So there must be something wrong with the calculation. In Foster's case I reject his calculation because the calculation is too crude (not realistic enough) AND it is hard to work without the Darwinian paradigm. Darwinism survived another impossibility: that of Lord Kelvin's claim that the age of the earth was too short for evolution to occur, which turned out to be wrong (6).

## Is DNA programmed from the sun?

This is the title of a weird chapter in *The Philosophical Scientists*. It is Forster's solution to the problem where the huge amount of information in DNA is coming from: beaming information by gamma radiation from the sun. I sum up only a few of the problems his 'solution' faces.

Is the receiving organism just an empty cell with no DNA at all? In any case a recording mechanism is needed to receive and translate the information into DNA-sequences and to incorporate the sequences into chromosomes. A major problem with this hypothetical mechanism is a vicious circle: if the 'receiver-mechanism' is also coded by DNA (and how could it be otherwise?), how did *that* DNA get into the organism? This mechanism does not exist (anymore!) in today's organisms. So a designer should have constructed the mechanism and destroyed it after the information was received. This is a weird way to provide genetic information to organisms. The Designer could as easily put the information right away into the organism: Let There Be DNA! There are also 'minor' problems: how to focus the message to the right organism? How does a proto-organism know which information is meant for it? If there is a continuous flow of information: when to start recording? When to stop? What about organisms that live in total darkness? How could information be stored in the sun anyway? Why was the information in the sun not used for giving birth again to the millions of extinct species?

Foster's book is unfinished. There is no index and no bibliography. Foster uses postscripts to chapters, in stead of integrating it in the chapter. It could have been a great book if he had discussed the chapters on DNA and hemoglobin with a molecular biologist before committing them to print. *The Philosophical Scientists* is a serious error of Barnes & Noble.

■ **About the author:** David Foster, now(1993) retired from a career as a scientific consultant, received his technical training at King's College London and has the degrees of M. Sc. and Ph.D. This is his seventh book.

### Notes:

1. The title of the book refers to A. Eddington, J. Jeans, B. Russell and A.N. Whitehead ('The 1930 Cambridge club').
2. See Michael Behe(1996) 'Darwin's Black Box', page 174 and 206.
3. See Michael Denton(1986) 'Evolution: a theory in crisis', page 284.
4. Stuart A Kauffman(1993) 'The origins of order', page 22 and Stuart A Kauffman(1995) 'At home in the universe', page 44.
5. Zeno was a Pre-Socratic Greek philosopher. He proved that movement is impossible, because one cannot traverse an infinite number of points in a finite time.
6. See Philip Kitcher(1982) 'Abusing Science', page 100,101.
7. See I.M. Lerner & W.J. Libby (1976) 'Heredity, Evolution and Society', page 96.
8. Brian Hayes "[The Invention of the Genetic Code](#)", *American Scientist*, January-February 1998. A very stimulating historical account of ingenious but wrong hypotheses of the genetic code told by a computer scientist.
9. Hubert Yockey: 'Information theory and molecular biology'. See: [review](#) on this site.
10. I found the argument of the improbability of a 100 amino acids long protein arisen by chance, discussed in *The Problems of Biology* by John Maynard Smith, 1986, page 48. JMS rejected the argument.
11. This was pointed out to me by Robert Holloway [ [email](#): 24 June 2000 ]. The 'qwerty'-keyboard was designed by Charles Latham Sholes in the 1870s.
12. Ian Stewart(1998) *Life's other secret*, p64.
13. Prof. Gert Vriend, CMBI, Nijmegen, The Netherlands.
14. Stuart Lipton: "Physiology: Nitric oxide and respiration", *Nature*, **413**, 118-121 (2001) (news and views).
15. Ross Hardison(1999) The evolution of Hemoglobin, [American Scientist](#), March-April 1999.

**Links:**

- [the Quackery and Logic-Chopping of David Foster's \*The Philosophical Scientists\*](#) (part 1-11). A very thorough and devastating review by Richard Carrier. Especially relevant is part 9: The Odds of Life Evolving by Chance. [thank-you for Steve Entringer who notified me that this site had moved. 5-Aug-00].

This book was a gift from Sid King

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