

Hubert Yockey reply to FTE amicus brief  
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**I am writing to challenge FTE's amicus brief on six points:**

1. Their citation on page 15 of their brief of my 1981 paper published in the *Journal of Theoretical Biology*, "Self-organization Origin of Life Scenarios and Information Theory" to support the idea that "information theorists had determined that the mathematical treatment of these biological texts was identical to that of human written language" appears to be based on two areas of my paper: (1), on page 13, their misunderstanding of a sentence in that paper about the sequence hypothesis; (2) their misunderstanding of a couple of paragraphs on page 24 that used sarcasm to point out that the origin of life isn't just building blocks and the laws of physics and chemistry any more than a message in language results from having all the letters of the alphabet and rules of grammar. (The missing ingredient needed for the origin of living matter is the genome, not Intelligent Design.)
2. Also on page 15 of their brief, FTE's assertion following the one above that "This suggested how to quantify information in long-chain protein molecules and DNA so that we can identify the patterns characteristic of intelligence with a vastly greater precision and level of confidence than before" is wrong.
3. I take issue with FTE's description, "A brilliant but cautious scholar, Thaxton vetted his work through the criticisms of scores of highly qualified scientists, information theorists, and philosophers of science leading to the publication of *The Mystery of Life's Origin* in 1984. As the attached correspondence shows, Dr. Thaxton consulted me in 1982 and 1983 and was impervious to anything that refuted his preconceived conclusions.
4. In Appendix A, the following quotes from *Of Pandas and People* contain statements that are wrong in light of information theory, although they claim information theory as their basis: Quotes D, E, and F.
5. Objections to Darwin's theory of evolution that are based on morphology or the fossil record are quaint relics of how science was practiced in the nineteenth and twentieth centuries. Modern science shows that the genome is the answer to all objections based on gaps at any level. There is no need for a theory of "Intelligent Design" to explain any gaps. Darwin's theory of evolution is among the most well-established theories in science.

6. Evolution and the origin of life are separate questions. My publications on information theory show that the origin of life is unknowable through scientific methods. All that can be taught in the science classroom about the origin of life is why it is unknowable and why past theories, such as chance and self-organization, had to be discarded. There are many things in science and mathematics that are true, but unknowable. The earlier children learn about the scientific and mathematical concept of unknowability, the better they will be able to grasp the concepts that currently are re-shaping mathematics and science.

**Point One: the leaders of FTE, including Charles Thaxton, clearly do not understand my 1981 article**

My 1981 paper published in the *Journal of Theoretical Biology*, “Self-organization Origin of Life Scenarios and Information Theory,” does not support FTE’s assertion in its 11/4/2005 amicus brief, “Yet by the early 1980s . . . information theorists had determined that the mathematical treatment of these biological message texts was identical to that of human written language,” as FTE’s citation of my paper claims.

First, the purpose of my paper was to give evidence why no origin of life theory based on “self-organization” was credible. “Self-organization” scenarios of the origin of life are not founded on science. These scenarios are founded on the Marxist-Stalinist philosophical belief, called dialectical materialism, in the “Law of the Transformation of Quantity into Quality.” They were put forward to bolster Stalin’s totalitarian regime. Stalin ordered a generation of biologists who would not conform their scientific results to his totalitarian philosophy to be murdered or jailed. This illustrates the level of danger that a society faces when it allows science to be governed by beliefs.

FTE is wrong: “the mathematical treatment of these biological message texts” is NOT “identical to that of human written language.”

There are two areas in my 1981 paper that may be the foundation for FTE’s unfounded claim. The first is a sentence on p. 13: “The sequence hypothesis applies directly to the protein and the genetic text as well as to written language and therefore the treatment is mathematically identical.”

Clearly, the FTE leaders did not, and do not, understand this sentence. Let me explain.

The sequence hypothesis is the idea that the information of the genome is programmed in DNA through the sequence of the codons. (Definitions of DNA, the genome, the genetic code and codons follow to ensure clarity.) “Information” is mathematically defined in information theory as any message selected from a set of all possible messages, without regard to meaning. This is because the problems that information theory was created to solve are concerned with how to reproduce a message accurately.

Information theory treats information and meaning as entirely separate (cite Shannon). Information, as defined in information theory, is measurable, and therefore is a suitable

subject for science and mathematics (cite Socrates). However, meaning is not measurable and thus falls in the realms of faith, belief, religion and philosophy.

Information can be measured in all sequences that are digital, segregated and linear. “Digital” means expressed in digits (0, 1, 2, 3, etc.) or letters (in the English language—a, b, c, etc.; in the genome, the codons, UUG, UUC, etc.). “Segregated” means that the units in the sequence are separate from one another. “Linear” means that the sequence is expressed one unit after another, in a line.

Meaning cannot be measured scientifically or mathematically, in a sentence or the genome, because meaning is not digital, segregated or linear.

However, because both language sentences and the genome are digital, segregated and linear, we can measure their information content. Information content is measured in bits or bytes and is the result of an algorithm (i.e., a computational procedure for solving a problem in a finite number of steps).

As an example of how information is measured without regard to meaning, a 100-gigabyte computer hard drive holds the same number of bits of information whether it is blank or filled with vacation photos and naughty limericks. It does not hold more or less information if it is filled with the most profound art and literature, no matter how meaningful they are.

DNA, the genome and the genetic code are entirely different things. DNA is the material molecule in which information is programmed through the sequence of the codons. The genome is the non-material, but measurable, information programmed in the sequence of the codons. All codes are a mapping of one alphabet to another—for example, “A, B, C, etc.” in alphabet I may correspond to “Z, X, Y, etc.” in alphabet II. So the genetic code is the mapping of DNA codons to RNA codons, and RNA codons to amino acids.

The job of the codons is to specify which of 20 possible amino acids goes where in a protein. A protein is a sequence of amino acids that has folded up into a three-dimensional shape around a metal ion pocket. If an amino acid goes in the wrong place in the protein sequence, the protein will not have “specificity,” which means it will not be able to do any biological job.

People who understand the sequence hypothesis, proteins and “the genetic text”—i.e., the genome—know that the only thing that is mathematically identical between proteins, the genome and written language is that they are sequences. As noted above, the mathematical measure of information in sequences has nothing to do with meaning in language, or specificity (i.e., biological capability) in proteins.

I explained these concepts to Dr. Thaxton without success in the attached letters before he wrote “The Mystery of Life's Origin.”

The second area of my 1981 paper that may be the basis for FTE's unfounded claim that "the mathematical treatment of these biological message texts" is "identical to that of human written language" is on page 24:

The sequence hypothesis is equally valid in molecular biology and in ordinary language. We may therefore perform the same thought procedure as above and trace the organization of a treatise or other composition through its sections, paragraphs, sentences and words to its letters. By the same token we assume it to be obvious that knowing the letter frequencies, digram, trigram, n-gram frequencies, rules of spelling, grammar, and composition one could also reverse the thought procedure and construct a complete body of all statements which can be made in a chosen language. As in the application to genetics we are relying on the 'instructions in the words themselves;' that is, in a tendency of words to order themselves. Quastler (1964) pointed out that this is exactly the object of a project once underway in the Grand Academy of Lagado."

What I was saying, in a sarcastic way, was that life cannot originate just from its building blocks and all the laws of physics and chemistry any more than all messages in a chosen language can originate from a knowledge of all its letters and rules. The clear tip-off was the reference to the Grand Academy of Lagado, which exists in Jonathan Swift's great novel of social commentary, *Gulliver's Travels*.

Although I assured Dr. Thaxton in a letter to him dated 6/16/1983 that "Biological specificity is analogous to 'meaning' in ordinary language," this was an incomplete observation because he was a novice to the subject. I sent Dr. Thaxton all my relevant papers published through that time. If he read them, he would have read that an amino acid sequence must fold into a three-dimensional shape before it gains specificity, or biological function. In contrast, "ordinary language" remains a sequence and does not have to fold into a three-dimensional shape to have meaning. Because proteins have biological function only when the amino acids are in the right sequence AND folded up into a three-dimensional shape with a metal ion pocket, the specificity of proteins is not completely analogous to meaning in language because meaning in language is programmed only by the sequence of letters.

Page 15 of FTE's brief also cites Antony Flew as a "world famous atheist-turned-theist [who] was referring to a 1985 symposium in Dallas when he stated, 'I think the argument to intelligent design is enormously stronger than it was when I first met it.'"

I presented a paper at the 1985 Dallas symposium entitled, "Have my computations reduced life to a better reckoning?," a title that is a literary allusion to the poetry of Omar Khayyam. In this paper I present the evidence against the chance and self-organization scenarios for the origin of life and conclude that it is the business of science to clear away scenarios that are founded only on faith.

In a letter to Dr. Thaxton dated 13 March 1985, I wrote, “With regard to Creationism, I have no trouble with the conclusions in your book [The Mystery of Life's Origin, which is primarily about why the chance and self-organization theories of the origin of life are not valid]. They are well reasoned and they are supported by the scientific evidence. I was once working with an archeologist at a local pioneer site. He picked up, what looked to me like a nondescript rock, and showed that it was broken mortar used by the Indians to grind corn or acorns. The evidence indicated that it was created by an intelligent being, for a purpose and was not the result of chance or natural causes. I believe the materialist position will be more and more difficult to maintain.”

Whenever I refer to materialism, I am referring to the dialectical materialism of Marxism-Stalinism. Whatever I may have believed then, I quickly came to reject Creationism and I certainly reject Intelligent Design. Religion and faith have no business in the public schools, especially in science classes. So it seems that I am a counterpoint to Antony Flew. However, it would be inaccurate to say that I arrived at this point of view by becoming an atheist. Theism and atheism both are irrelevant to science because they address problems of faith and belief. I concur with Socrates that science should limit itself to “counting, measuring and weighing.”

Socrates gave the best explanation of what the methods and purposes of science should be:

Socrates: Every sort of confusion like these is to be found in our minds; and it is this weakness in our nature that is exploited, with a quite magical effect, by many tricks of illusion, like scene-painting and conjuring.

Glaucon: True.

Socrates: But satisfactory means have been found for dispelling these illusions by measuring, counting and weighing. We are no longer at the mercy of apparent differences of size and quantity and weight; the faculty which has done the counting, measuring or weighing takes control instead. And this can only be the work of the calculating or reasoning element in the soul.”

The Republic, Book X, Plato (428-348 B.C.), translated by Francis M. Cornford, Oxford University Press.

**Point Two: Information theory is not concerned with “patterns of intelligence”**

The statement on page 15 of FTE's brief that, “This suggested how to quantify the patterns characteristic of intelligence with a vastly greater precision and level of confidence than before,” is wrong for the following reasons:

1. Information theory measures information completely without regard to meaning when it is applied to language and completely without regard to specificity when it is applied to proteins.
2. Only the measurement of information in the genome and the transcription of information from DNA to RNA to protein are mathematically identical to the measurement of information and the transcription of written language.
3. In information theory, measurement and transcription have nothing to do with meaning or “patterns of intelligence.”

**Point Three: When Dr. Thaxton consulted me while writing *The Mystery of Life's Origin*, he ignored or dismissed every point I made that disproved his pre-conceived conclusions**

I cannot support the claim in the amicus brief that Dr. Thaxton is a brilliant or cautious scholar. Although I read the ninth chapter of his book, *The Mystery of Life's Origin*, in manuscript, as my attached letters show, he ignored every point I made and paper I cited to him that showed him where he was wrong in his assertions and conclusions.

Although I later complimented him on the book when it was published, that is simply because I regard science to be a sort of football game where opposing points of view play to win but do not show poor sportsmanship by insulting one another in the process. When Dr. Thaxton asked for me to supply him with a blurb for the book's cover, I gave him one that was limited to the point on which we agree: chance and self-organization theories of the origin of life are not scientifically valid.

The whole purpose of science is to consider contending theories and discard the ones that are inadequate or invalid. I believed, and believe, Dr. Thaxton's theories of creationism, now called intelligent design, must be entirely discarded. Science has no need for an Intelligent Designer any more than the planets and stars needed angels to move them around after Newton discovered the law of gravity and the three laws of motion.

I did not foresee that Dr. Thaxton and his fellow travelers would resort to techniques of propaganda when their theories failed in the scientific arena because that is not how scientists function.

**Point Four: about the incorrect *Panda* quotes**

This material will follow on Thursday, 11/17.

**Point Five: Modern science shows that the genome is the answer to all objections based on gaps in morphology or the fossil record at any level of life—past, present and yet-to-evolve. Therefore there is no need for a theory of “Intelligent Design” to explain any gaps.**

As I show in my book, *Information Theory, Evolution and the Origin of Life* (Cambridge University Press, 2005), Darwin's theory of evolution is one of the most well-established theories in science. There is no need of an “Intelligent Designer” in evolution for the following reasons:

1. The genome is the engine of evolution. The genome evolves through a random walk and therefore has no need of an Intelligent Designer.
2. There are no gaps in the genome from the origin of life to the present and for all life yet-to-evolve. Therefore there is no need for an ad hoc Intelligent Designer to explain gaps in the fossil record or morphology.
3. Dr. Yockey defines the distinction between living and non-living matter as follows: “There is nothing in the physico-chemical world [apart from life] that remotely resembles reactions being determined by a sequence [the genome] and codes between sequences [the genetic code]. The existence of a genome and the genetic code divides living organisms from non-living matter.” (Computers and Chemistry, 24 (2000) 105-123).
4. All the Intelligent Design scenarios comparing living matter to machines are specious because they posit that machines exist, function and evolve due to the agency of an unspecified “Intelligent Designer” and claim that since living matter exists, functions and evolves this also must be due to an “Intelligent Designer.” The fatal flaw in this assertion is that life is not comparable to machines because machines have no genome. The place that they assert that “Intelligent Design” holds in machines is held in living matter by the genome. Since living matter DOES have a genome programming its existence, functioning and evolution—from the origin of life to the present and for all life yet-to-evolve—it does not need an Intelligent Designer.
5. In addition, life is not “irreducibly complex” because the term was coined and defined by Alan Turing as a calculation that continues indefinitely. Michael Behe cannot hijack it and steal its identity. The genome, which is the non-material information programmed into DNA, has definite starting and stopping points the information transcribed from it. For example, the genome for making a mouse does not run forever—it stops when it has made a mouse.

The five points above are what should be taught in schools when objections to evolution based on gaps are raised. The next point is what should be taught in schools about the origin of life.

**Point Six: Evolution and the origin of life are two separate problems. Darwin's theory of evolution is among the most well-established in science. However, information theory shows that the origin of life is unknowable by scientific methods and must be accepted as an axiom of biology.**

As I showed in my book, *Information Theory, Evolution and the Origin of Life* (Cambridge University Press, 2005), there is no need for an ad hoc "Intelligent Designer" in the origin of life because the origin of life is unknowable through scientific methods and must therefore be accepted as an axiom of biology. (An axiom is an elementary fact that cannot be proved or derived from any other facts and therefore must be taken as a starting point.)

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