Disclosure

of things evolutionists don't want you to know

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Complexity Revisited

Ten years ago we pondered the complexity of life.
It is time to revisit the topic again.

Some creationists argue that life is too complex to have happened by chance. It is a reasonable argument—but it is subjective on two levels. First, how do you measure and assign a numerical value to the complexity of living things? Second, if you can assign an objective numerical value to complexity, what is the threshold value that corresponds to "too complex?"

Interdisciplinary Approach

The "interdisciplinary approach" was the hot new idea at the end of the 20th century (even though it dates back to the ancient Greeks). The idea is that you build a team of people from different academic backgrounds. The TV show, Scorpion, is a good example because the team consists of members from diverse disciplines, including a psychologist, mathematician, and mechanical engineer. People from different backgrounds bring different skills to the task of problem solving.

A team of biologists studying the problem of biological complexity could benefit from members with different backgrounds. In particular, someone with a computer science background could be very helpful.

In the 1970's, software engineers (that is, computer programmers) were forced to address the complexity issue. The more complex a computer program is, the more errors it is likely to contain, and the harder (and more costly) it will be to find and fix those errors. Software developers recognized that they desperately needed a way to measure complexity and relate complexity to cost. In 1976, Thomas McCabe invented a tool to measure software complexity that became the industry standard. [1] I worked in a group that used this tool to measure the cyclomatic complexity of every software module, and, if the complexity exceeded 20, it had to be rewritten to simplify it. Otherwise, the software module would not be approved.

Biologist Robert M. Hazen may not have the same appreciation for complexity that software engineers do. He gave a lecture titled, Emergence, in which he claimed that simple systems just become more complex and more capable naturally. We addressed his lecture in 2006. [2] We hope you will go back and read that essay. In it, we happened to mention the McCabe cyclomatic complexity criterion. We were shocked, humbled, and honored to receive an email from Thomas McCabe himself in which he said he had similar thoughts. We published part of his email in the August, 2006, newsletter. [3] His email contained a preliminary draft of a paper he was writing on the subject.

His email began,

> This letter has some thoughts that follow from your article "Emergent Complexity" dated March 06. I agree with and enjoyed your application of the McCabe complexity to emergent intelligence and in fact I have several observations about emergent intelligence in software systems. I'll relay my thoughts on macro emergent intelligence later but I have some thoughts about applying complexity at the micro biological level --- where life begins.

It ended with the words,

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[1] https://en.wikipedia.org/wiki/McCabe_complexity
[2] *Disclosure*, March 2006, "Emerging Complexity", http://scienceagainstevolution.info/v10i6f.htm
[3] *Disclosure*, August 2006, "Measuring Complexity", http://scienceagainstevolution.info/v10i11e.htm

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   There's much more here, perhaps this
'teaser' will get a healthy discussion going.
My fortuitous breakthrough was to see the
mathematics at work with our computer
algorithms --- maybe the same mathematics is
at work with our biological algorithms.
   The second complexity analysis is to work
directly with the DNA double helix and treat
it as a mathematical structure. More on this
later.
   Best Regards,
   Thomas McCabe
   Copyright C --- Thomas J McCabe, June 2006
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We didn't publish the paper in his email because it was preliminary, incomplete, very technical, and copyrighted.

Ten years have gone by, and we haven't heard from him since. In recent years we have tried to contact him on several occasions, but we could not find him on social media, and he is no longer associated with the company he founded. Presumably he retired, and he might possibly be dead by now (as so many of my professional associates are).

We hope that he is still pursuing the topic, and that he is still reading our newsletter, and will respond. If any of you readers know how to contact him, we would greatly appreciate it if you could send us his contact information. Unfortunately, we have to proceed on the assumption that Tom has no more to say on the subject, and we have to proceed without him.

Let the Discussion Begin

If we ignore the spiritual and cognitive aspects of life, we can consider life to be nothing more than a metabolic process.

> **Metabolism** (from Greek: μεταβολή *metabolē*, "change") is the set of life-sustaining chemical transformations within the cells of living organisms. The three main purposes of metabolism are the conversion of food/fuel to energy to run cellular processes, the conversion of food/fuel to building blocks for proteins, lipids, nucleic acids, and some carbohydrates, and the elimination of nitrogenous wastes. These enzyme-catalyzed reactions allow organisms to grow and reproduce, maintain their structures, and respond to their environments. The word metabolism can also refer to the sum of all chemical reactions that occur in living organisms, including digestion and the transport of substances into and between different cells, in which case the set of reactions within the cells is called **intermediary metabolism** or **intermediate metabolism**. [4]

Subjectively, these processes appear to be very complex. In our first essay ten years ago, [5] we tried to show you the huge (3724 square inch) two-part chart of Metabolic Pathways published by Roche Applied Science. The photo of the whole chart reduced all the pathways so much that they could not be read. The enlarged photo of a small portion of the chart was readable, but lost the enormity of the chart. That two-part chart is now available on-line in an interactive form. [6] We encourage you to check it out that way.

Many, Many Paths

The McCabe measurement of software complexity depends upon measuring the number of paths from the input to the output. The more paths, and the more decisions about which path the process should take, the more complex the computer program is.

The Roche chart depicting all the metabolic pathways in living cells contains many more process paths than any computer program I ever wrote. So, just on the basis of the number of processes, and the many interconnections between them, the entire metabolic system is obviously very complex. But exactly how complex is it? What is the best way to count paths and connections?

Hardware and Software

A functioning computer consists of many hardware components (such as a Central Processing Unit, some memory, input and output devices, a power supply and wires to connect them all together). But the hardware won't do anything without software (a computer program) to tell it what to do.

In the same way, an automobile consists of hardware components (engine, transmission, wheels, *etc.*). But the car won't do anything without a driver telling the hardware what to do. Even the experimental "self-driving" cars need some sort of controller that simulates a human driver.

The point is that living things are like computers and automobiles in that they all consist of tangible material and an intangible process that controls the material. Both are necessary. The material can't do anything without a controlling process, and a process can't do anything without material to carry out the process' intention. Any biological complexity measurement has to take

[4] https://en.wikipedia.org/wiki/Metabolism

[5] *Disclosure*, March 2006, "Emerging Complexity", http://scienceagainstevolution.info/v10i6f.htm

[6] Part 1: Metabolic Pathways http://biochemical-pathways.com/#/map/1
Part 2: Cellular and Molecular Processes http://biochemical-pathways.com/#/map/2

into account the complexity of the processing as well as the complexity of the physical mechanism needed to perform the process.

The Accidental Cell

When evolutionists speculate about how the first living cell formed, they always focus on the hardware and ignore the software. That is, they try to imagine simple, natural ways in which amino acids, proteins and enzymes could form accidentally. Then they speculate about how a membrane could have formed around the necessary organic molecules.

But even given all the proper organic molecules in a suitable membrane (that is, the hardware necessary for life) where does the software come from?

The fictional Doctor Frankenstein created a monster by sewing together a bunch of body parts. (An engineer would have simply started with the body of someone who had died in his sleep. All the necessary body parts and fluids are already there. No assembly required. ☺) Assembling the hardware was the easy part. The hard part is bringing the body to life. That is, the hard part is loading the software and booting the system. It takes more than a lightening bolt to do that.

Simple Metabolism

That brings us back to metabolism. Metabolism is the set of processes that the cellular hardware has to perform. Generally speaking, those processes are very complex. This month's *Evolution in the News* column examines just one of those processes, so we don't want (or need) to go into detail here. All we want to say at this point is that one must evaluate the complexity of the metabolic process as well as the complexity of the physical structure needed to execute that process.

Some Starting Points

The purpose of this essay is to stimulate a discussion of complexity with the goal of finding an objective method of measuring biological complexity. The premise is that a lot of this work has already been done by computer scientists and software developers. So, let's start there.

This work dates back to the 1970's. That's when computers started to be embedded in smart appliances. For the first time people were programming computers to do something other than keeping track of the company payroll or solving equations. Frankly, we didn't know what we were doing, and we were making it up as we went along. We were making a lot of expensive mistakes. I became moderately famous by learning from those mistakes and presenting solutions in the professional literature and speaking at conferences. So let's go back to the beginning of software complexity measurements and start there to develop some biological complexity measurements.

Size

The first thing we did was to count lines of code. It stands to reason that if it takes 100 pages to print a computer program, that computer program might be twice as complex as a program that can be printed on 50 pages. Oh, if it were only that simple! There's more to it than just program size—but size does matter. Generally speaking, the longer a program is, the more complex it is.

The simplest (and admittedly crudest) measurement is simply to count the number of biological molecules in a cell. Count the number of different molecules in brain cells, bone cells, muscle cells, and skin cells. The cell with the most different kinds of molecules is most complex. The number of molecules is an objective measurement that can be compared easily.

Function Points

The number of different functions something can perform might be a better measure of complexity than size is. In 1979, Allan Albrecht came up with the idea of measuring "function points" common to all software processes. Perhaps there are corresponding biological function points that could be measured.

Subunits

This month's *Evolution in the News* column mentions the number of subunits in the NADH:ubiquinone oxidoreductase enzyme. Counting subunits might be a valid complexity measurement. (Unpronounceablity might be an equally good measurement of complexity! ☺)

No Answers

We admit we don't have the answers to the questions, "How complex are living things?" and "What is too complex to have happened by chance?" But at least we are asking the question and thinking about possible answers. We hope to encourage you to do the same thing. Even if we can't put a numerical value on the complexity of a living cell, at least we can get some subjective appreciation for how complex life is.

Hardly Breathing

Respiration isn't as easy as it seems.

This month's feature article addresses the complexity of living things. Living things are characterized as having metabolism. We touched on the complexity of metabolism in general in that essay. A recent news article about an enzyme called Mammalian Respiratory Complex I [Roman numeral 1] [7] provides us with a specific, current example.

Controlled Burn

Outside the body, when oxygen combines with carbon and/or hydrogen it releases energy in the form of heat and light. This release of energy is called, "fire." Inside the body, oxygen combines with carbon and/or hydrogen to release energy, but people don't burst into flames. That's because the reaction is carefully controlled so as to release just the right amount of energy. It is very much like a nuclear power plant where control rods allow the nuclear reaction to proceed fast enough to produce enough energy to produce the necessary power, but not so fast as to produce too much power and destroy the power plant (as happened at Chernobyl).

Let's ignore all the simple, trivial details (☺) about how oxygen gets through the lungs, into the blood stream, and pumped (along with fats and sugars from the digestive system) through the body to the cells where the release of energy actually takes place. Let's just focus on the process that takes place in the cells and see how complex that metabolic process is.

The abstract of the aforementioned article on mammalian respiration is the "simple" description of what they did. Here it is. (Don't worry, we will translate portions of it into plain English.)

> Complex I (NADH:ubiquinone oxidoreductase), one of the largest membrane-bound enzymes in the cell, powers ATP synthesis in mammalian mitochondria by using the reducing potential of NADH to drive protons across the inner mitochondrial membrane. Mammalian complex I (ref. 1) contains 45 subunits, comprising 14 core subunits that house the catalytic machinery (and are conserved from bacteria to humans) and a mammalian-specific cohort of 31 supernumerary subunits. Knowledge of the structures and functions of the supernumerary subunits is fragmentary. Here we describe a 4.2-Å resolution single-particle electron cryomicroscopy structure of complex I from *Bos taurus*. We have located and modelled all 45 subunits, including the 31 supernumerary subunits, to provide the entire structure of the mammalian complex. Computational sorting of the particles identified different structural classes, related by subtle domain movements, which reveal conformationally dynamic regions and match biochemical descriptions of the 'active-to-de-active' enzyme transition that occurs during hypoxia. Our structures therefore provide a foundation for understanding complex I assembly and the effects of mutations that cause clinically relevant complex I dysfunctions, give insights into the structural and functional roles of the supernumerary subunits and reveal new information on the mechanism and regulation of catalysis. [8]

You may wonder, "Are they such bad writers that they can't express themselves clearly, or are they just trying to impress everyone by making it seem too complicated to understand?" No, they aren't bad writers, nor are they trying to make it more complicated than it seems. It really is that complicated.

We will do our best to explain this in plain English and take the risk that our critics may try to discredit us by nit-picking what admittedly may be an over-simplification of the process. Here goes:

There is a very complicated enzyme in living cells called Complex I which isn't very well understood. They used an electron microscope to examine a sample of the Complex I enzyme found in cows. They discovered that this one enzyme is made up of 45 parts. Fourteen of those parts are found in all living cells. The other 31 parts of the Complex I enzyme in cows are found generally in other mammals. They were particularly interested in what happens to the enzyme during hypoxia (that is, when it suffers from lack of oxygen).

As we said, the abstract was the simple part. Most of the article contains paragraphs like the one below. All you need to really understand is the last sentence and a half, and count the number of NDUFs (and other words you don't understand).

[7] Jiapeng Zhu, *et al.*, *Nature*, 18 August 2016, "Structure of mammalian respiratory complex I", pp. 354–358, http://www.nature.com/nature/journal/v536/n7616/full/nature19095.html

[8] *ibid.*

The 18 supernumerary transmembrane helices (TMHs) (Fig. 1b) establish a cage around the core membrane domain. Three TMH-containing subunits, B9 (NDUFA3 in the nomenclature for human complex I), B16.6 (NDUFA13) and MWFE (NDUFA1), interact extensively with PGIV (NDUFA8) on the intermembrane-space (IMS) face, enclosing core subunit ND1. Subunit B14.5b (NDUFC2), bound to ND2, contains two different-length TMHs and attaches KFYI (NDUFC1) to the complex. Three TMHs that interact with ND4 are assigned to MNLL (NDUFB1), ESSS (NDUFB11) and SGDH (NDUFB8). Four TMHs, assigned to B17 (NDUFB6), AGGG (NDUFB2), B12 (NDUFB3) and ASHI (NDUFB8), are bound to ND5. The TMHs of ASHI and B15 (NDUFB4, on the side of ND4) cross the ND5 transverse helix, and the four TMHs of B14.7 (NDUFA11) appear to support ND5-TMH16 in anchoring it against ND2. Four subunits confined to the IMS (PGIV, the 15□kDa subunit (NDUFS5), PDSW (NDUFB10) and B18 (NDUFB7)) form a helix latticework (together with SGDH and B16.6) on the IMS face (Fig. 2a). PGIV, the 15 kDa subunit and B18 contain CHCH domains (pairs of helices linked by two disulfide bonds) and are canonical substrates for the Mia40 oxidative-folding pathway; PDSW probably contains two further disulfide bonds. These disulfide bonds form during complex I biogenesis and are probably important for enzyme stability. Thus, the supernumerary cage has evolved to become integral to the structure and stability of the membrane domain.

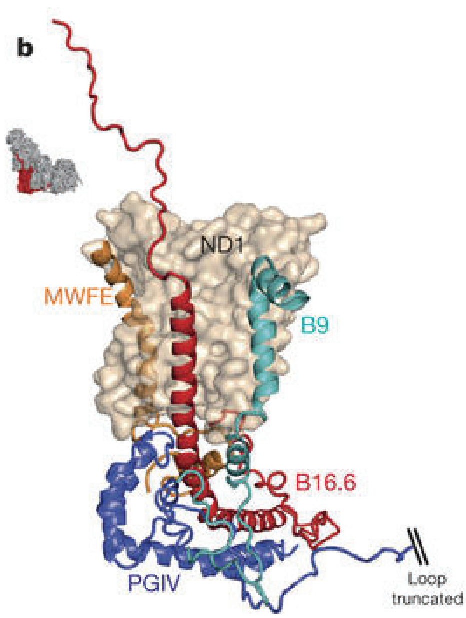

Figure 1b.

The first of the two reasons we quoted that paragraph is to convince you that the enzyme is complex. Did we succeed? If not, please go to the *Nature* website and read the rest of the article, which consists of 18 more paragraphs just like that one.

The second reason we quoted the paragraph was the last sentence and a half. They aren't sure why this structure evolved, but they are sure it happened by chance and natural selection. There's no justification for that belief.

Their primary interest is in what happens when the cell is deprived of oxygen (that is, during hypoxia). That's because when deprived of oxygen, a cell becomes "de-active," entering a "profound resting state" that could become so profound it never becomes active again. (In other words, it could die.)

> In the absence of substrates to sustain turnover (such as during hypoxia) it converts spontaneously to its 'de-active' state, a profound resting state that requires slow, reactivating turnovers to regain 'active' status.[9]

It doesn't take a PhD biologist to recognize that cells can spontaneously de-activate, and that when cells are dying it can be tough to get them to regain active status before they are irreversibly deactivated. Everybody knows that.

The important thing to recognize is that cells don't reactivate spontaneously or easily. That is, life doesn't just happen spontaneously. It requires some specific "reactivating turnovers." Where did these reactivating turnovers come from?

Measured Complexity

All living cells need an enzyme called Complex I to function. This enzyme is so complex that scientists still don't understand exactly how this one critical enzyme works. But scientists believe (strictly by faith, with no supporting evidence) that this complex enzyme happened by chance in the first living cell. Furthermore, it started out with 14 core pieces, and gradually, accidentally acquired 31 more parts by the time cows evolved.

The questions remain, "Specifically, how complex is a living cell?" and "How complex is too complex to have happened by chance?" We can't answer those questions yet; and neither can evolutionists. They just believe it all happened by chance filtered by natural selection. Trial and error, they believe, caused Complex I to arise naturally. That takes a lot of faith!

[9] *ibid.*

Web Site of the Month – October 2016

by Lothar Janetzko

Darwin Unhinged: The Bugs in Evolution

http://fredoneverything.org/darwin-unhinged-the-bugs-in-evolution/

Scurrilous Commentary by Fred Reed

This month's website review looks at a site recommended by a reader of our newsletter. In the words of the author of the site, "This is atrociously long, criminally even, by internet standards… few will read it, which is understandable." I hope this is not the case, however, since the article presents interesting insights into one person's understanding about the issues involved when talking and reading about evolution.

The article begins with the author relating his experiences from high school when he began to think about evolution. He points out that "The question of the origin of life interested me." He found the "evolutionary explanations that I encountered in textbooks of biology seemed weak." The various thoughts of how life came about started to bother him. He states that "Evolution began to look like a theory in search of a soup."

In the next section of the article with the title "**What Distinguishes Evolution from Other Sciences**" you gain insight into why the author started to question the theory of evolution. "Early on, I noticed three things about evolution that differentiated it from other sciences (or, I could almost say, from science). First, plausibility was accepted as being equivalent to evidence… second, evolution seemed more a metaphysics or ideology than a science… third, evolutionists are obsessed by Christianity and Creationism, with which they image themselves to be in mortal combat."

When addressing the animosity between evolution and Christianity and Creationism you learn that the website author is not a Creationist. He points out what many of us experience: Evolutionists' "constant classification of skeptics as enemies (a word they often use) of truth, of science, of Darwin, of progress…'Creationist' is to evolution what 'racists' is to politics: A way of preventing discussion of what you do not want to discuss. Evolution is the political correctness of science."

So far I have only discussed the beginning of the "atrociously long" article. Much more interesting reading follows. In fact, right now I have only described the section "**A Preamble**" of the article. Here you learn what the intent of the author's essay really is. "I write here for those who can look at the world with curiosity and calm, divining what can be divined and conceding what cannot, without regarding themselves as members of warring tribes."

What follows in the article is how the author views the many claims made by evolutionists and considers whether or not the claims really make sense.