

# Origins Insights

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CREATION SCIENCE FELLOWSHIP



May 2003

## The Origin of Eukaryotic Cells

### Part 2

by Bob Harsh

Last month we asked the questions: Where did life come from? Where did the first living cells come from? Where did the first eukaryotic cells come from? What in the world are eukaryotic cells and why are they important? In the last issue I claimed that the easy answer to all of these questions is, God created all of these at the beginning intact and perfectly functional. The hard answers are proclaimed by “Evolutionary Naturalism”.

The following two quotes are worth repeating. How life started by natural means is extremely difficult. Biologist, Charles Thaxton wrote, “However life began on earth, the usually conceived notion that **life** emerged **from an oceanic soup of organic chemicals** is a most **implausible hypothesis**. We may therefore with fairness call this scenario “the **myth of the prebiotic soup**.” [Thaxton.C. 1984. *The Mystery of Life's Origin: Reassessing Current Theories*,” Philosophical Library, New York].

Nobel laureate and discoverer of the structure of DNA Francis Crick wrote,

“An honest man armed with all the knowledge available to us now, could only state that in some sense, the origin of life appears at the moment to be almost a miracle, so many are the conditions which would have had to have been satisfied to get it going.” [Francis Crick.1981. *Life Itself*]

## Summer Break

This promises to be a very busy summer for many of us at CSF. The International Conference On Creationism will take place in early August. If you have been procrastinating and now have decided you would like to help with our hosting of the ICC please contact Reid Moon our ICC Coordinator as soon as possible. If you would like to attend this world-class conference please register soon. You can even register on line at our web site.

**We will not be holding our monthly CSF meetings during June – August and this will be the last Origins Insights until September**

Bob Harsh is planning to return to Russia again in July. Creation Evangelism will be his general theme. Please remember Bob in your prayers as he prepares his lessons and presents them in Russia. Bob is still in need of financial support for his mission. If you would like to make a contribution toward Bob's Creationism mission to Russia you can make your check out to “Zelienople Church of Christ” Russian mission and send it to Bob Harsh, 439 Little Creek Road, Harmony, PA 16037.

Two types of living cells exist; prokaryotes and eukaryotes. The major difference is that prokaryotes do not contain any of the internal organelles composed of phospholipid membranes. These internal membranes form organelles such as, the nuclear membrane, golgi apparatus, chloroplasts and mitochondria. Prokaryotes do not have any of those organelles and are considered by most people as “simple life”. The inference is; the simpler prokaryotes evolved into the more complex eukaryotes. But where did the complex organelles like mitochondria and chloroplasts come from?

The system of living organisms depends on two basic series of chemical reactions; photosynthesis and respiration. Chloroplasts do photosynthesis while mitochondria do respiration. So the origins of mitochondria and chloroplasts are important to biologists.

The “Endosymbiotic Theory” for the origin of eukaryotic cells was developed in 1967 by Lynn Margulis from Boston University. The endosymbiosis theory postulates that:

- 1 **The mitochondria of eukaryotes evolved from aerobic bacteria living within their host cell.**
- 2 **The chloroplasts of eukaryotes evolved from endosymbiotic cyanobacteria (autotrophic prokaryotes).**
- 3 **Eukaryotic cilia and flagella may have arisen from endosymbiotic spirochetes. The basal bodies from which eukaryotic cilia and flagella develop would have been able to create the mitotic spindle and thus made mitosis possible.**

What kind of evidence is **proposed** to support the hypothesis that mitochondria and chloroplasts arose from bacteria?

- 1 **Both mitochondria and chloroplasts can arise only from preexisting mitochondria and chloroplasts. The rest of the story is; they cannot be formed in a cell that lacks them because nuclear genes encode only some of the proteins of which they are made.**
- 2 **Both mitochondria and chloroplasts have their own genomes and they resemble that of prokaryotes not that of the nuclear genome. Both genomes consist of circular molecules of DNA. There are no histones associated with the DNA.**
- 3 **Both mitochondria and chloroplasts have their own protein-synthesizing machinery, and it resembles that of prokaryotes not that found in the cytoplasm of eukaryotes.**
- 4 **Mitochondria and bacteria are similar in size.**

## What is known about the Mitochondrial Genome?

The genome of human mitochondria contains 16,569 base pairs of DNA organized in a closed circle and encode 37 genes:

- 2 ribosomal RNA (rRNA) molecules
- 22 transfer RNA (tRNA) molecules (shown in the figure as yellow bars; two of them labeled)
- 13 polypeptides that are vital to the production of ATP by the mitochondria.

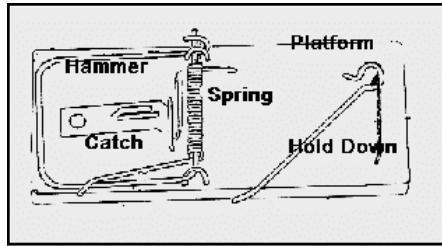
It has been said that there is “simple” life and “complex” life and “simple life” evolved into “complex life”.

## How simple is the simplest life today ?

We are now going to learn about “one” part of these “simple” organisms. We are also going to introduce powerful evidence against evolution.

Irreducible Complexity is a concept about the origin of living things that causes huge problems for evolution. **If a structure is so complex that all of its parts must initially be present in a suitably functioning manner, it is said to be irreducibly complex.** A simple mousetrap is irreducibly complex. **Nothing can be missing** and it could **not** have arisen **one piece at a time.**

# How many parts does a simple mousetrap have?



**Six components:**  
the platform,  
the spring,  
the hammer,  
the catch,  
the holdback bar,  
and staples.

There is no evidence that random mutations and natural selection can produce any irreducibly complex biochemical systems. We are going to take a close look at the flagellum of bacteria. It is an organ that is irreducibly complex and therefore proclaims:

## Designed by a Designer!!!!

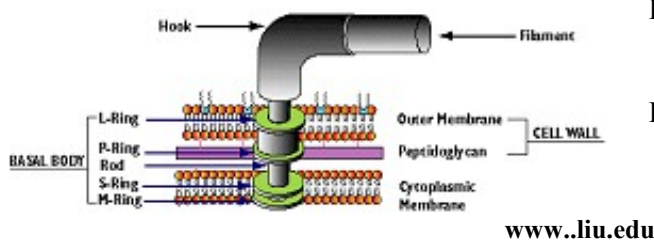
Some bacteria move by means of flagella that resemble tiny electric motors. They rotate at a rate of 1000 times per second!

### **E. coli:**

- is about 1/1000th of a mm in size
- can swim 35 times its diameter per second
- can taste its environment
- can decide whether it wants to move in a way that increases its chances of getting something it needs or moving away from something harmful
- is equipped with rotary motors that are about 45nm in diameter
- has 4,288 genes encoded in 4,639,221 base pairs
- can reproduce every 20 minutes

All structural components of the bacteria, including its flagellum, are constructed by using the information contained in the genetic code of the chromosome.

### FLAGELLA STRUCTURE IN GRAM NEGATIVE ORGANISM



The structural complexity and finely tuned coordination of the bacterial flagellum is evidence it was designed on purpose.

## Parts of Bacterial Flagellum

- Filament - Helical 20nm x 10,000nm
  - Made of 20,000 monomer units of the protein - flagellin
  - Rotates at base
- Hook - Bent, attaches filament to base
  - May help change direction
- Base - Attachment of flagellum to cell wall
  - L-ring in lipopolysaccharide
  - P-ring in peptidoglycan
  - Attached to plasma membrane
  - S-ring and M-ring

**To function completely, the flagellum requires over 40 different proteins.** The electrical power for driving the motor is supplied by the voltage difference developed across the cell membrane.

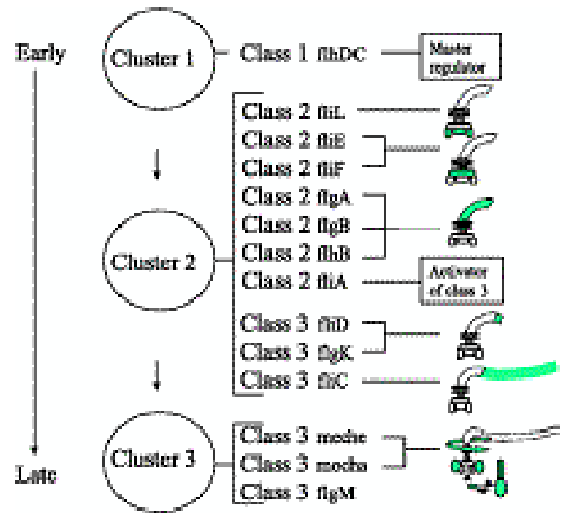
Fifty genes are needed for a properly functioning bacterial flagellum.

There is even a sequence for the order in which the genes are turned on. The Class I *fliDC* gene is the master regulator gene that turns on the Cluster 2 sequence of genes. The Class 2 *fliA* serves as the activator of the Cluster 3 genes.

So, even genes that regulate the expression of other genes had to evolve if evolution is true.

Some of you have experienced putting rear brakes on a car and the sequence of putting the parts together is essential. The same is true for constructing a bacterial flagellum.

**A bacterial flagellum must have had all the parts from the start in order to function at all.**



Kalir et al. 2001 Ordering Genes in a Flagella Pathway by Analysis of Expression Kinetics from Living Bacteria Science 292 (5524): 2080

Bacteria can enable them to obtain speeds as high as 0.00017 kilometers per hour. That doesn't sound very fast, does it? They are traveling at about 50-60 body lengths per second. This would be the equivalent of a six foot tall man running at 100 meters per second, 9 times faster than the world record! Cheetahs, are the fastest animals on land but even they only move at about 25 body lengths per second.

These bacteria can move forward and reverse. If they have a single flagellum at one end they reverses their direction if they reverse rotation. If they have a single flagellum at each end then one end propels one direction and the other end propels other direction. If they have a group of flagella that surround the cell, they wrap around each other and rotate in unison, they move one way. To move in the other direction they unwrap, move to other end, wrap around each other, and rotate in unison. In other bacteria with multiple flagella that surround the cell, they wrap around each other and rotate counter-clockwise in unison they swim in one direction. If they have clockwise rotation the flagella fly apart and bacteria tumble chaotically.

What must they be able to do if they can respond to their environment? These bacteria can sense their environment. An increase in attractant or decrease in repellent results in more time in counter-clockwise rotation. This causes swimming in one direction and increases chances of going towards favorable conditions or away from unfavorable conditions.

Decrease in attractant or increase in repellent will cause the bacteria to more time in clockwise rotation. The result is tumbling which causes change in direction which increases the chance of escaping unfavorable conditions.

Without any one of a number of parts, the flagellum does not merely work less efficiently; it does not work at all. Like a mousetrap it is irreducibly complex and therefore cannot have arisen gradually. [Lucy Shapiro, "The Bacterial Flagellum: From Genetic Network to Complex Architecture," Cell 80 (1995): 525-27].

The only rational explanation of the origin of bacterial flagella is that they came about complete in the first bacteria that could move on its own.

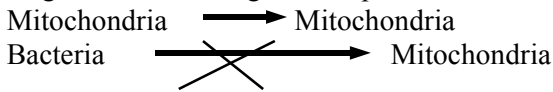
Bacterial flagella are sufficiently complex as to require "intelligent design" rather than chance events.

If Darwinian evolution is the source of bacterial design, the genetic information had to be added; not just changed!

**Let us now evaluate the "Endosymbiotic Theory" for the origin of eukaryotic cells.**

**1- FACT:** Both mitochondria and chloroplasts can arise only from preexisting mitochondria and chloroplasts. They cannot be formed in a cell that lacks them because chromosomal genes encode only some of the proteins that are necessary for their structures and functions.

**Challenge:** To postulate that mitochondria arise from any source beyond where we “know” they come from is a violation of empirical science. Origins science is always “forensic science”. Where empirical evidence is available, it should be granted more weight than speculation.



**Reason** leads us to the conclusion that the **“original” eukaryotic cells contained mitochondria.**

**Necessary inference** for the origin of eukaryotic cells by naturalistic means requires us to **disregard empirical science** and **accept known violations** of how we know living things produce mitochondria and chloroplasts.

**2-Evidence:** Both mitochondria and chloroplasts have their own genomes and they resemble that of prokaryotes not that of the nuclear genome. Both genomes consist of circular molecules of DNA. There are no histones associated with the DNA.

This “evidence” is misleading because it is only partly true but mostly false.

### The Facts?

It is true that both mtDNA and bacterial DNA lack histones associated with the strand of DNA.

It is also true that bacterial DNA and mtDNA are circular, which is different from nuclear DNA, which is straight.

**Challenge:** Bacterial and mitochondrial DNA are extremely dissimilar.

What is the function of chromosomal DNA? Chromosomal DNA contains all of the information to produce a “whole” living organism. Mitochondrial DNA does not contain enough genetic information to even produce another mitochondrion.

### The Mitochondrial Genome

- The genome of human mitochondria contains **16,569 base pairs of DNA and contains 37 genes.**
- *Haemophilus influenzae*, considered “typical” among bacteria, has **1,830,137 base pairs** coding for an estimated **1,743 genes**. *E. coli*: has **4,288 genes** encoded in **4,639,221 base pairs**.

The Mitochondrial Genome vs. Small bacterial Genome  
16,569 base pairs vs. 1,830,137 base pairs  
37 genes vs. 1,743 genes

**3- Evidence:** Both mitochondria and chloroplasts have their own protein-synthesizing machinery that resembles that of prokaryotes.

**Challenge:** Let’s imagine-

Aerobic bacteria that were surviving successfully for a long time got eaten by healthy anaerobic bacteria. The aerobic bacteria, that produced certain proteins for it to survive, found it advantageous to give up those vital genes that coded for the required proteins.

Those vital genes joined the DNA of the host cell. The chromosomal DNA of the host cell transcribed m-RNA that had to travel to the ribosomes in the cytoplasm to be translated into the vital proteins. Those proteins had to be then transported to the aerobic cell and were required to cross the cell wall and plasma membrane.

And this is supposed to give a selective advantage to the “donor” aerobic cell?

**Give me a break!!!!!!**

4- **Fact** - Mitochondria and bacteria are similar in size and shape.

## So what?!!!!!!

Mitochondria are the shape and size that they are in order to function the way they do. If they were 10x larger they would not do what mitochondria do. A bulldozer would be useless to sweep up the dust on your kitchen floor and a broom and dustpan would be useless to remove boulders from a construction site!

It is my hope that you can understand:

- 1 The endosymbiotic hypothesis is baseless as an explanation of where eukaryotic cells came from.
- 2 Simple life is a myth.
- 3 Some microscopic structures are irreducibly complex and could not have come into existence, piecemeal one random part at a time by way of fortuitous mutations guided by natural selection.

### 2003 CSF Meeting Topics

Tuesday, May 20 "The Trinity as Seen in Creation", Bob Walsh

No Meetings for June / July/ August

**Aug 4-9, International Conference on Creationism. Held at Geneva College**

Tuesday, Sept. 16 "Highlights and An Overview of the 2003 ICC", Lionel Dahmer and Reid Moon

Tuesday, Oct. 21 "What is Relevance of the Biblical Creation Account to YOUR Christian Faith", Reid Moon

Nov 18 "Neo-Creationist Geology from 2003 ICC", Chuck Danley

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