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Review: John Smith and Eors Szathmary, *The Origins of Life: From the Birth of Life to the Origins of Language*, Oxford University Press, Oxford, UK, 1999 (2000 edn.)

Pages: 180

Refreshingly Blunt Biased Biology

From the preface, the authors are clear in their aim, to explain all life in Darwinian terms. As such, it is a mixture of anti-design polemic and biology. They are crystal clear: "all biochemists and molecular biologists today are 'mechanical materialists'," on p. 11. At the same time, they acknowledge evolutionary transitions require vast changes in information which they can't account for.

Unlike some embarrassed modern evolutionists, the authors do not shy away from including abiogenesis as part of their evolutionary belief system.

There are a wealth of candid statements on evolution's weaknesses, e.g:

-"It is not in principle possible to tell the difference between a living organism and a product of intelligent design simply by looking at the object itself ...it can only be by knowing its history." (pp. 5-6)

-"Unfortunately, we do not own the 'Book of Phylogeny' but must infer it by fallible methods." (p. 77)

From chapter seven ("Origin of Sex") and onwards, the story-telling intensifies: diploidy (it helps with double-strand DNA repair); gene imprinting (so organism can't revert back to parthenogenesis); Cambrian Explosion (no attempt is made to explain this), likewise for DNA methylation (epigenetics); and language is a complete mystery.

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I) Life and Information (pp. 1-13)

Darwin's (tautological) idea was individuals best able to survive and reproduce will transmit their genes and so "survive".

The raw material of evolution is stated as new, random heritable genetic variants.

While multiplication, variation, and heredity are necessary for evolution, they aren't sufficient as environment and physical laws must also be considered.

"It is not in principle possible to tell the difference between a living organism and a product of intelligent design simply by looking at the object itself ...it can only be by knowing its history." (pp. 5-6)

In 1861, Russian chemist Alexander Butlerov described an autocatalytic formose reaction in which formaldehyde and sugars formed additional sugar molecules at an increasing rate.

Despite mentioning genetic coding of base pairs to control amino acid sequences, the authors intimate the laws of chemistry determine protein folding and function. (p. 10)

Code translation requires translating machinery (a vicious circular problem). The first replicating molecules could not have specified anything and so had to wait for this translating machinery (!). (p. 11)

"All biochemists and molecular biologists today are 'mechanical materialists'". (p. 11)

In *The Principle of Life* (1970), Hungarian Tibor Ganti said a 'chemoton' was the basic design for a minimum chemical system having all life's characteristics: an autocatalytic chemical cycle and an informational molecule. Life has both 'absolute' and 'potential' abilities.

II) <u>The Major Transitions</u> (p. 14-29)

G. J. Chaitin proposed complexity could be measured by the length of the shortest list of instructions that will generate a given structure.

The authors false subscribe to the Junk DNA myth: “much of the DNA of any higher organism does not contribute useful information.” (p. 15)

The major transitions:

1. Replicating molecules: for evolution to progress, different kinds of replicators had to co-operate, and be enclosed within some kind of membrane.

2. Independent replicants – chromosomes: simple organisms are believed to have only had all their genes on only one chromosome to *avoid* gene competition (yet competition is meant to be evolution’s driving force!).

3. RNA as both gene and enzyme (“RNA World hypothesis”): transition to a “DNA World” required “evolution of the genetic code”.

4. Bacterial prokaryotes - cells with nuclei and organelles (eukaryotes): prokaryotes lack a nucleus and have one simple circular chromosome and include bacteria and cyanobacteria (blue-green algae). Eukaryotes have a nucleus containing rod-shaped chromosomes and other “organelles” such as mitochondria. They include all cellular organisms, single and multiple, from *Amoeba* to *Chlamydomonas*.

Multicellular organisms are claimed to have evolved separately *three* times.

The key idea here is *symbiosis*, hat different prokaryotes merged somehow.

5. Asexual clones: the “puzzling” fusion of two sex cells (gametes) from two different individuals to reproduce.

6. Single-celled organisms - animals, plants, fungi: although different cells like muscle, nerve and epithelial contain the same information, they are different shapes and sizes. How did they all become so different?

7. Solitary individuals - colonies with non-reproductive cases (ants, bees, termites): colonies likened to a “super-multicellular organism”.

8. Primates – humans:

(Table 2.2, p. 17)

The "levels of selection" problem is concerned with where the selection happens: genes; chromosomes; cells; organisms; sexual populations; societies.

DNA is claimed to have arisen from RNA because it is more efficient to split out the protein coding function (which is a *post hoc* just-so story).

Most higher plants are hermaphrodites. Offspring receives a copy of each chromosome from each parent, yet the mitochondria is only from the ovule parent.

Lichens are a symbiotic union of a fungus and an alga.

The authors often invoke direction, e.g., "from a gene's eye view, what would you want to do? What the gene would be selected to do". On the other hand, they explicitly state natural selection lacks foresight!

Gymnosperms (coniferous trees) in which photosynthetic chloroplasts are only transmitted in pollen.

Duplication is claimed to increase genetic information, but only after the duplicated material has been "programmed by selection" (!). New information requires that messages are altered step-by-step (there goes Goldschmidt's hopeful monster!).

While symbiosis has the sum total of information from each individual, it gains no new information in the act of combination.

III) <u>From Chemistry to Heredity</u> (pp. 30-36)

The last sentence of Darwin's Origin was: "There is a grandeur in this view of life … being originally breathed by the Creator into a few forms or into one." "By the Creator" only entered in the second edition.

Abiogenesis research began with A. I. Oparin in 1924 and J. B.S. Haldane in 1929. Absence of O_2 was important to stop organic compounds oxidising to CO_2 and H_2O.

Stanley Miller performed his experiment in 1953.

Even if nucleotides could be synthesised, it was unclear how they could be linked up to form oligonucleotides.

Gunter Wachtershauser suggested reactions may have taken place on positively-charged iron pyrites (fool's gold).

K. von Kiedrowski created the first DNA replicator in 1986 of six base pairs.

"We cannot advise creationists to put their faith in the belief that only God could create a molecule with unlimited heredity". (p. 34) The blindness of this statement is extraordinary, for it shows the author agrees that he knows life requires an intelligent designer; in this case an experimenter.

Viable replication must result in at least one perfect copy out of *n* products, i.e., an error probability of less than *1/n*.

Leslie Orgel's C-G pairing error rate was 5% without enzymes, meaning only a 20-base pair string was. This is far too short to code for an enzyme, therefore, OOL researchers have suggested ribozymes as a solution.

DNA repair has two mechanisms which reduce the error rate to 10^{-9}!

IV) <u>From the RNA World to the Modern World</u> (pp. 37-46)

Initial RNA strings had no proof reading in replication, so there was no way for the molecule to determine of the paired nucleotides were in the correct order.

They image RNA bending back in a hairpin fashion in a closed loop. In this way they can have a diversity of three-dimensional structures.

The first ribozymes were discovered in 1989.

Protein synthesis is the rate-limiting step in the growth of living organisms.

tRNA molecules are like motor cars with symbols on the bonnet which must take turns to drive into a parking lot.

The tRNA code of 64 triplet codons is **chemically arbitrary**. (p. 41)

The idea is feathers evolved as modified, frilly scales (!).

The amino acid triplet code is universal, except for a few cases like AAA (lysine in the universal code, but asparagine in flatworm and echinoderm mitochondria).

The genetic code is strong evidence all like on earth had a single origin (!). (p. 45)

Leucine is the commonest AA.

V) <u>From Heredity to Simple Cells</u> (pp. 47-57)

In a hypercycle, each unit in the circle is itself a replicator, e.g. *Daphnia* (waterflea), *Chlamydomonas* (single-celled green algae), and the stickleback fish.

There is a stochastic corrector model having two different-speed replicators within cells. When some critical cell-number is reached, it will divide.

Where do long-chain fatty acids come from? They are not from Miller-type primitive-soup experiments. Our hope is that their formation on charged surfaces – in a primitive pizza rather than a primitive soup – will prove more feasible. (p. 53)

In the absence of transporter and pump proteins, any nascent cell wall would have been unable to traffic essential molecules like phosphate ions.

Cells get energy from: photosynthesis; heterotrophy (eating plants and animals); autotrophy.

The first cells must have been autotrophic since sugars were not able to pass through a lipid bilayer without protein pumps.

Pier Luigi Luisi combined a replicating template with a membrane subsystem.

VI) The Origin of Eukaryotic Cells (pp. 58-78)

Empire is the highest taxonomic category.

Eukaryotic cells are 10,000X larger on average than prokaryotic.

Lyn Margulis revived the idea of symbiotic origin of plastids and mitochondria in the 1970s.

Many eukaryotic cells have no walls.

Archaezoa have a nucleus and rod-shaped chromosomes but are never multicellular, lacking mitochondria and plastids. This was said to occur from a loss of rigid outer shell walls, and it then had to invent microtubules to compensate (!) and mitosis of its chromosomes.

Without cell walls, the first eukaryotes could swallow other bacterial organisms, which would become 'organelles'.

Cell wall loss would be catastrophic, making bacteria extremely fragile. One of these bacteria (re?)developed a cell wall to become archaeobacteria, another type an internal molecular skeleton (a cytoskeleton). (p. 63)

The whole chromosome is a one replication unit, a replicon.

Pleuromitosis is a hypothetical cell division intermediate stage.

Mitotic recombination was probably an unselected byproduct of DNA repair!. (p. 70)

ATP was already present in the prokaryotic world, descended from purple non-sulphur bacteria.

Evolution from symbiont to organelle involved transfer of many genes to the cell nucleus.

Chromista algae are claimed to have evolved from four different ancestors.

Methanogens obtain energy from H_2 and CO_2, releasing CH_4. ($H_2 + CO_2 -->2CH_4 + O_2$).

"Unfortunately, we do not own the 'Book of Phylogeny' but must infer it by fallible methods." (p. 77)

VII) <u>The Origin of Sex</u> (pp. 79-93)

A *zygote* is formed by fusion of two *gamete* sex cells, which typically only have one chromosome set (i.e., they are *haploid*). Therefore, zygotes are *diploid*.

Sex is not necessary for reproduction, e.g, reptile parthenogenesis (American whiptail lizard *Cnemidophorus uniparens*).

Neither mammals nor birds are parthenogenetic.

Gametes come only in one size, they are "isogamous".

Gene imprinting is where genes 'remember' whether they were inherited from father or mother, something which makes reversion to parthenogenesis impossible.

If both DNA strands are damaged, repair is only possible by copying an undamaged DNA molecule containing that same message section. This is possible if cells contain two copies of each strand (diploidy; an amazing design mechanism!).

O_2 concentration *increases* DNA damage.

VIII) <u>Genetic Conflict</u> (pp. 94-99)

Humans have an *Alu* gene 282 bases long copied 300-500k times (~5% of the genome), which evolutionists claim does nothing ("Junk" DNA).

IX) <u>Living Together</u> (pp. 100-107)

Rhizobium bacteria can fix atmospheric N_2.

Plants fertilised the land during the Devonian.

X) <u>The Evolution of Many-Celled Organisms</u> (pp. 108-124)

At the beginning of the Cambrian, c540mya, animals rapidly evolved a range of different body plans!

Germ-line cells only retain a complete complement of genes; all genes pass to all cells, but different genes are active in different cells.

Francois Jacob and Jacques Monod discovered the gene regulation mechanism: 1) a regulatory gene R produces a regulatory protein, which binds to a specific promoter sequence at the start of the structural gene, and prevents it being transcribed; 2) an inducer binds to the regulatory protein, and alters its shape so it cannot bind, thus permitting transcription.

There is 'cell heredity' ("like begets like").

"All complex communication depends on arbitrary signals". (p. 113)

When DNA is replicated, methylation tags are also maintained via an enzyme which copies the old-strand tag onto the new one. However, when gametes are produced, the labelling pattern must be restored to the initial state, a "RESET" button pressed as it were.

Natural structures such as vortices are not influenced by any informational input.

A *morphogen* is a diffusible chemical substance.

Hox genes code for 60 AAs and are at the start of a "homeobox" domain. These are active in different regions of the embryo and act as a master switch. Examples include *Drosophila antennapedia* mutations which cause leg structures to appear on its head, and *tetraptera*, where halteres on the thorax are replaced by a second pair of wings.

"What is puzzling is the conservation of the signalling system". (p. 122)

Structural similarity is one of the decisive reasons for accepting evolution; all chordates pass through a "phylotypic stage".

The pharynx is claimed to be perforated by gill slits!

"Chordate phylotype echoes the life of our earliest ancestors" (Haeckel's Biogenetic Law myth).

Any genetic programme able to evolve new structures would require a way of programming tasks that change the coding to lead to improvement, i.e., *foresight*.

XI) Animal Societies (pp. 125-135)

Eusocial ("real sociality") requires: 1) reproductive labour division; 2) colony generation overlap; 3) co-operative care of the young.

Genetic mosaics are claimed to arise "by chance". (p. 126)

Haldane assumed there was an "altruistic" gene.

Nepotism depends on efficiency recognition of relatives and is high when:

1) Benefit to recipient is low.
2) High cost of failure from other discriminated relatives.
3) Recognition cost is high.

Inefficient recognition would do more harm than good.

Young honey bees work the nest while older ones forage.

Nanomia cara is the colonial medusa; a colony if highly differentiated individuals.

XII) From Animal Societies to Human Societies (pp. 136-148)

The author merely claims that *australopithecenes* were bipedal, and grammatical competence simply "evolved".

Immanuel Kant said it is easy to ensure co-operation amongst devils, provided they are intelligent.

XIII) <u>The Origin of Language</u> (pp. 149-170)

The nature of universal grammar is a mystery.