Chromosome Count

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Report

Halvorson Lecture

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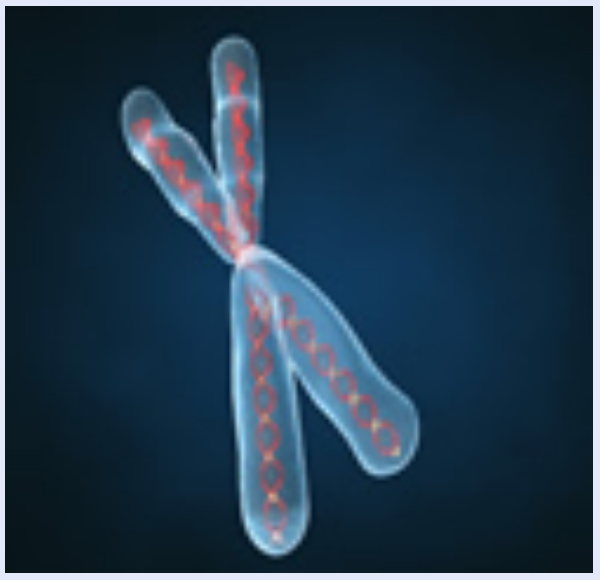

Chromosome Count Summary

[Updated 10/30/08]

The authors of *The Urantia Book* assert "there are forty-eight units of pattern control—trait determiners—in the sex cells of human reproduction." In 1955, when the book was first published, the general scientific community believed that human beings have forty-eight chromosomes; in 1956 researchers determined that there are, in fact, forty-six chromosomes. The sex cells are distinct from other (somatic) cells. This distinction, taken in light of the reference to the total number of "units of pattern control," supports an interpretation of *The Urantia Book* that is consistent with the now universal acceptance of forty-six as the correct number of human chromosomes.

The Urantia Book not only avoided supporting science that was incorrect at the time of publication, but also provided specific information that turned out to be consistent with what was about to be discovered shortly after its publication.

Halvorson Lecture

Chromosome Count (19:29)

This recording addresses the section in *The Urantia Book* that is the basis for the Chromosome Count Report. It covers the issues related to interpretation of the text and how this applies to genetics and to our evolving appreciation for this field of science.

Chromosome Count Report

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[Updated 10/30/08]

The authors of *The Urantia Book* state "On Urantia there are forty-eight units of pattern control—trait determiners—in the sex cells of human reproduction." [1] When *The Urantia Book* was published in 1955, it was generally believed that human beings have forty-eight chromosomes in each body cell. With more advanced research techniques scientists determined in 1956 that human cells have 46 chromosomes. This in turn led some people to conclude that the authors of *The Urantia Book* had incorrectly aligned themselves with the erroneous beliefs held in 1955. However, a more careful analysis of this statement, and other statements in the book, reveals that the authors adeptly avoided supporting the incorrect belief about the number of chromosomes and provided

information that was consistent with what was soon to be determined as the correct number of chromosomes.

In the section of the book titled “The Limitations of Revelation” the authors state “We are not at liberty to anticipate the scientific discoveries of a thousand years.” [2] But then later in this same section they add:

> While statements with reference to cosmology are never inspired, such revelations are of immense value in that they at least transiently clarify knowledge by:
>
> 1. The reduction of confusion by the authoritative elimination of error.
>
> 2. The co-ordination of known or about-to-be-known facts and observations. [3]

The reference to cosmology—the study of the physical universe considered as a totality of phenomena in time and space—may at first seem a bit overencompassing in relation to the statement that there are “forty-eight units of pattern control—trait determiners—in the sex cells of human reproduction.” However, this information is provided in Paper 36: “The Life Carriers”—which concerns an order of beings who are responsible for designing and implanting evolutionary life on inhabitable worlds—and occurs in a paragraph noting that the “number twelve, with its subdivisions and multiples, runs throughout all basic life patterns.” [4]

Before getting into the substance of the statement regarding the “trait determiners,” it is noteworthy that the word “chromosomes” is not used in this context, but it is used elsewhere in the book. [5] While the underlying premise in the preparation of UBtheNEWS reports is that *The Urantia Book* is *not* entitled to “the benefit of the doubt,” in all fairness, nor should it be presumed that the authors meant other than what was stated. If the authors had wanted to refer to chromosomes, clearly they were sufficiently familiar with the term, for it was used in another context.

A review of the history of research regarding chromosomes and DNA is necessary in order to appreciate the statement in *The Urantia Book* about trait determiners. From Wikipedia:

> Painter in 1922 was not certain whether the diploid number of man was 46 or 48, at first favoring 46. He revised his opinion later from 46 to 48, and he correctly insisted on man having an XX/XY system. Considering their techniques, these results were quite remarkable. [6]

The issue was not settled until 1956.

> In 1956, Joe-Hin Tijo and Albert Levan were working with human embryonic tissue when they discovered that there [were] 46 chromosomes, not 48, which scientists had believed to be the case for over 30 years. Previously, scientists were unable to distinguish the correct number of chromosomes because techniques for preparing microscope slides had not yet been perfected. However, Tijo and Levan's methods for separating chromosomes on microscope slides proved successful when they [were] able to count 46 chromosomes per cell during observations of 261 embryonic cells. [7]

Around this same time, a crucial piece of the puzzle concerning heredity was also being discovered. Chromosomes hold the genetic material, genes, that are responsible for trait determination. A gene is now known to be a delimited sequence of encoded information along a strand of a double-stranded DNA molecule. [8]

> The sentence “This structure has novel features which are of considerable biological interest” may be one of science’s most famous understatements. It appeared in April 1953 in the scientific paper where James Watson and Francis Crick presented the structure of the DNA-helix, the molecule that carries genetic information from one generation to the other.
>
> . . .
>
> “It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material,” wrote Watson and Crick in the scientific paper that was published in *Nature*, April 25, 1953.
>
> This was indeed a breakthrough in the study of how genetic material passes from

generation to generation. Once the model was established, its mere structure hinted that DNA was indeed the carrier of the genetic code and thus the key molecule of heredity, developmental biology and evolution.

The specific base pairing underlies the perfect copying of the molecule, which is essential for heredity. During cell division, the DNA molecule is able to "unzip" into two pieces. One new molecule is formed from each half-ladder, and due to the specific pairing this gives rise to two identical daughter copies from each parent molecule.[9]

"The specific base pairing" plays a similar role in the formation of RNA molecules from a DNA molecule. A single-stranded messenger RNA (mRNA) molecule is the pattern that is used in the process of protein synthesis, and proteins are the molecules that carry out the instructions that are encoded in the genes.[10] Each DNA strand is the template and control for the transcription of a mRNA copy of a segment of the other DNA strand. The integrity of the mRNA pattern is controlled through the complementary nature of the base pairs. Hence, each strand of a DNA molecule is a unit of pattern control for the unit of genes in the other strand. A DNA molecule is both two units of pattern control and two units of genes—trait determiners.

Now, back to chromosomes.

"There are 24 *distinct* human chromosomes: 22 autosomal chromosomes, plus the sex-determining X and Y chromosomes." [11] The authors of *The Urantia Book* specify "the sex cells of human reproduction," rather than somatic (nonsex) cells, in an apparent attempt to keep us from misinterpreting the statement. At the time of its publication, scientists mistakenly thought that there were forty-eight chromosomes in a somatic cell. By specifying "sex cells" the authors are actually steering the reader away from this mistake, and away from the confusion of the homologous pairs of autosomes in a somatic cell.

A germ (sex) cell has twenty-three chromosomes—the twenty-two autosomes plus an X or a Y chromosome. Collectively, "the sex cells" contain the two different implementation subsets of the full design set of twenty-four chromosomes. Each chromosome contains one double-stranded DNA molecule; thus, collectively, there are forty-eight *distinct* units of genes in the human sex cells. Of course, no single sex cell contains all forty-eight; but there are forty-eight units of trait determiners "in the sex cells of human reproduction."

Therefore, when it was published in 1955, the authors of *The Urantia Book* made a correct statement; while the beliefs of the scientific community on the subject were still erroneous. It is also noteworthy that there is substantial evidence indicating that the plates for printing *The Urantia Book* were completed in the late 1940's, before the discovery in the early 1950's that DNA was the key molecule governing heredity.[12]

Footnotes:

[1] UB 36:2.4 Citations to *The Urantia Book* are provided as Paper:Section.Paragraph . "Papers" can be thought of as "Chapters." "Urantia" is a coined word with the etymological meaning "(y)our place in the heavens."

[2] UB 101:4.2

[3] UB 101:4.5

[4] http://www.answers.com/topic/cosmology

[5] UB 77:2.5

[6] http://en.wikipedia.org/wiki/Cytogenetics

[7] http://www.bookrags.com/biography/joe-hin-tijo-wog/

[8] http://en.wikipedia.org/wiki/Gene

[9] http://nobelprize.org/educational_games/medicine/dna_double_helix/readmore.html

[10] http://en.wikipedia.org/wiki/Gene#Gene_expression

[11] http://en.wikipedia.org/wiki/Human_chromosomes

[12] http://urantiabook.org/archive/originals/uf_fund_raising_102550.pdf

Raw Data

http://papa.indstate.edu/amcbt/volume_22/v22-2p3-9.pdf extensive history about human chromosome research

http://www.ubfellowship.org/archive/science/kanders1.htm this is a 1988 article by Kermit Anderson on the subject

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