



## Summary

We have all heard it said that man and chimpanzee are 98% identical.<sup>1,2</sup> Biology textbooks, newspapers, and TV programs have been proclaiming this 'fact' for decades. But is it true? Fatally flawed, older research methods led to these false conclusions. New studies now show very large genetic differences. Amazingly, one recent study showed that the human and chimp Y-chromosomes are as different as would be expected between man and chickens.<sup>3</sup>

## Human and Chimp DNA – Far From 98% Genetically Identical!

It is now clear that the idea of 98% identity arose from older studies which were seriously flawed. Those researchers consistently focused their research on those parts of the chimp and human genomes which were most similar.<sup>4,5</sup> Regions most dissimilar were excluded from all analyses. Virtually every previous study which reported very high levels of similarity involved this type of selective use of data.<sup>5</sup> Certainly, man and chimp have similar body plans, but the newest studies now show that on the genetic level the differences are profound. This is most clearly seen in a recent scientific paper in the prestigious *Nature*.<sup>3</sup>

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## LETTERS

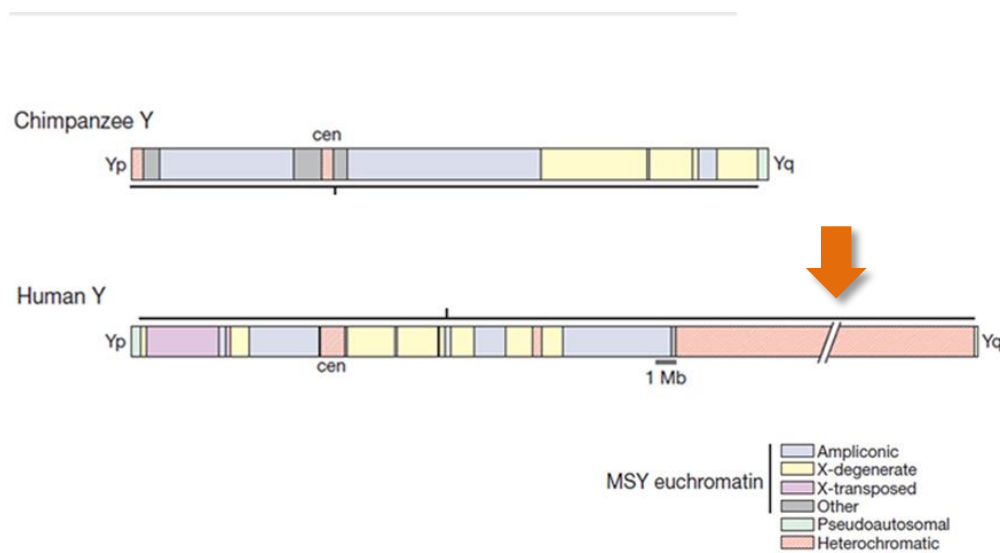
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## Chimpanzee and human Y chromosomes are remarkably divergent in structure and gene content

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The human Y chromosome began to evolve from an autosome hundreds of millions of years ago, acquiring a sex-determining (Supplementary Fig. 1 and Supplementary Table 1). To avoid polymorphic differences between chimpanzee Y chromosomes that might

The article in *Nature* shows that the human and chimp Y chromosomes are enormously different. The two chromosomes have radically different architecture (see image from paper for comparison), such that they cannot even be visually aligned. They show that the human chromosome is twice as big (note the arrow showing where the human Y chromosome should be elongated), and has twice as many genes (Figure 1). That paper reports that the degree of similarity seen is comparable to that between a chicken and a human. They report only 70% human/chimp homology for this specific chromosome. However, it appears this paper again only analyzed those regions similar enough to allow side-by-side alignment, and excluded non-alignable (very different) regions. If this is the case then the percent identity is still much lower than what was reported.



**Figure 1:** A diagram retrieved from the 2010 *Nature* article that visually compares the vast structural differences between the human and chimpanzee Y chromosomes. The arrow points to a break in the human Y chromosome; it should really be twice as large as the chimpanzee Y chromosome. Such divergent gene structure and content is in direct conflict evolutionary predictions.

Might the other chromosomes be much more similar? They may be slightly more similar, but we will not know until the chimp genome is re-sequenced. There are very good reasons to believe that the chimp genome is not assembled correctly and has been highly humanized due to human genetic contamination, as well as mis-assembly caused by evolutionary assumptions. It was only because researchers realized this that the Y chromosome was re-sequenced. Only then could the large genetic difference be seen. Until the same is done with the rest of the chimp genome, we cannot accurately measure the genetic differences among those other chromosomes.

One researcher recently analyzed the entire human and chimp chromosomes, using a sampling method that avoided bias toward the most similar sequences.<sup>4</sup> He showed that the human/chimp identity was consistently in the range of 70%, with Y chromosome being just 40% (Figure 2). This level of difference would mean that there are nearly a billion letter's difference between the human and chimp genomes. The exact degree of similarity is hard to measure, but it is now very clear that humans and chimps are

not even close to genetically identical. We are profoundly different. There is no credible evolutionary scenario that could convert the chimp genome into the human genome.

**Table 1.** Individual chromosome similarities for chimpanzee compared to human using optimized sequence slices and the BLASTN algorithm.

Chromosomes compared	Optimized slice size producing top similarity (number bases)	Percent chimp sequence aligned to human
1	350	70.9
2A, 2B vs 2 (human)	300	69.0
3	300	68.9
4	300	66.1
5	300	68.2
6	300	69.2
7	350	67.3
8	300	68.4
9	350	70.1
10	300	71.0
11	300	70.8
12	300	70.1
13	300	70.8
14	300	71.6
15	350	72.0
16	450	73.3
17	500	76.1
18	250	72.5
19	500	72.0
20	400	75.2
21	500	76.2
22	450	77.9
X	300	69.4
Y	400	43.2

**Figure 2:** Genetic research has shown that the Y chromosome is not the only major difference between human and chimp DNA. A recent reevaluation of the similarities between the all other chromosomes reveals an average identity of 70%. This became especially evident when the previously omitted data (the non-alignable regions) were rightfully included in the analysis.

The realization that man is vastly different from chimps aligns perfectly with the truth found in God’s Word, the Bible. The creation account in Genesis, as well as the rest of Scripture, affirms that God created man separately from animals, after God’s own image. “So God created mankind in his own image, in the image of God he created them; male and female he created them.” (Genesis 1:26)

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## **FURTHER READING**

[Greater Than 98% Chimp/Human DNA Similarity? Not Anymore](#)

[Chromosome Comparison Shows More Chimp-Human Differences](#)

[Genomic monkey business—estimates of nearly identical human–chimp DNA similarity re-evaluated using omitted data](#)

## **REFERENCES**

1. King, M. et al. 1975. Evolution at two levels in humans and chimpanzees. *Science* 188:107-116.
2. Britten, R. 2002. Divergence between samples of chimpanzee and human DNA is 5%, counting indels. *PNAS* 21:13633-13635.
3. Hughes, J. et al. 2010. Chimpanzee and human Y chromosomes are remarkably divergent in structure and gene content. *Nature* 463:536-539.
4. Tomkins, J. 2013. Comprehensive Analysis of Chimpanzee and Human Chromosomes Reveals Average DNA Similarity of 70%. *Answers Research Journal* 6:63-69.
5. Tomkins, J. 2011. How Genomes are Sequenced and Why it Matters: Implications of Studies in Comparative Genomics in Humans and Chimpanzees. *Answers Research Journal* 4:81-88.