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“Anyone who observes the chimpanzee, the gorilla, or the orang, would not find it difficult to believe that they have some common ancestry with the human race”

D. E. Robinson 1931
Ellen White's secretary

Comparing the Human and Chimpanzee Genomes: More Different than Expected

Timothy G. Standish



GEOSCIENCE
RESEARCH INSTITUTE

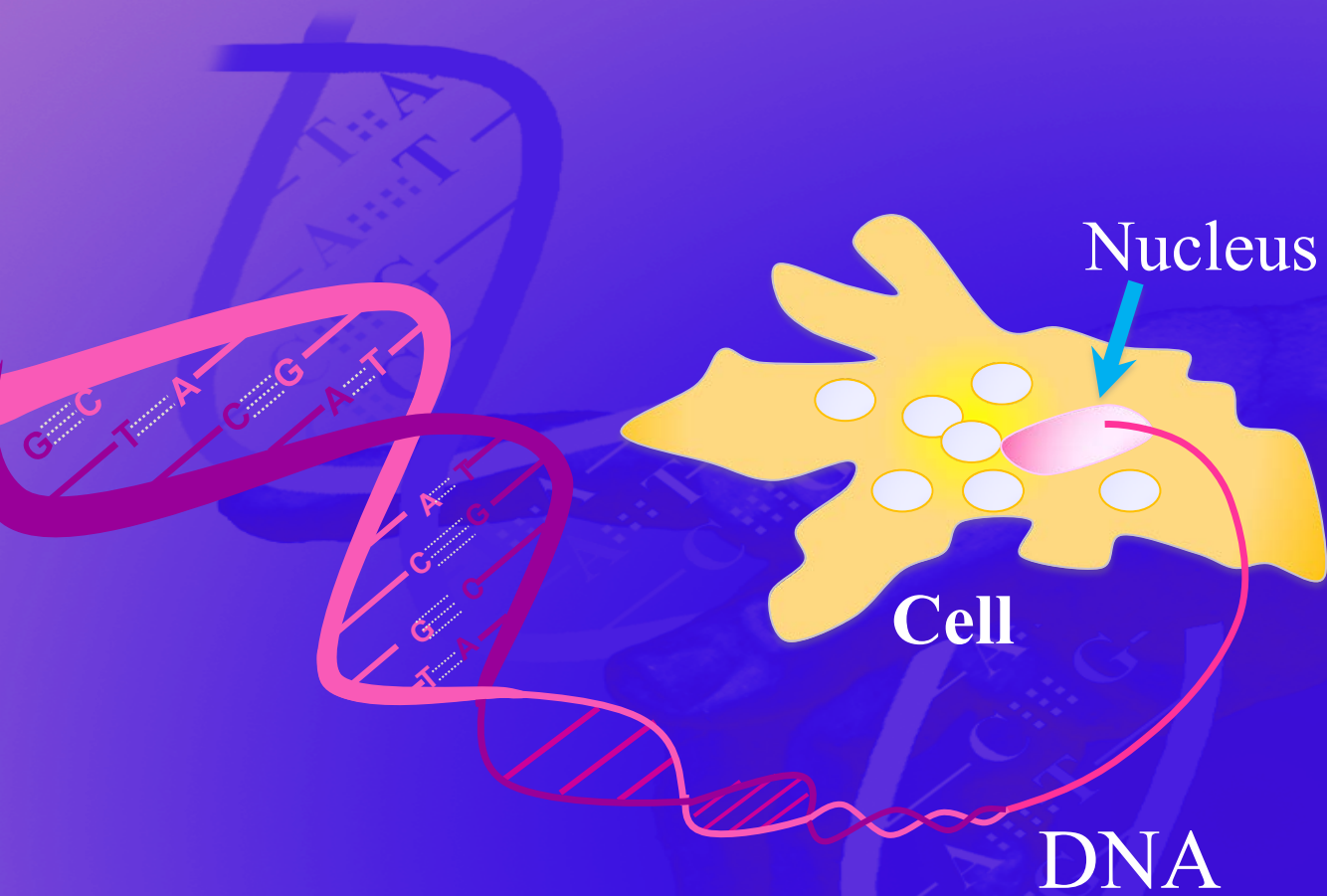
And the Lord God formed יָצַר man
of the dust of the ground אֲדָמָה ,
and breathed into his nostrils the
breath נְשָׁמָה of life חַי; and man
became a living being.

Genesis 2:7 NKJV

Out of the ground **אֲדָמָה** the
Lord God **יָצַר** every beast
of the field and every bird of the
air, and brought *them* to Adam ...
Genesis 2:19 NKJV

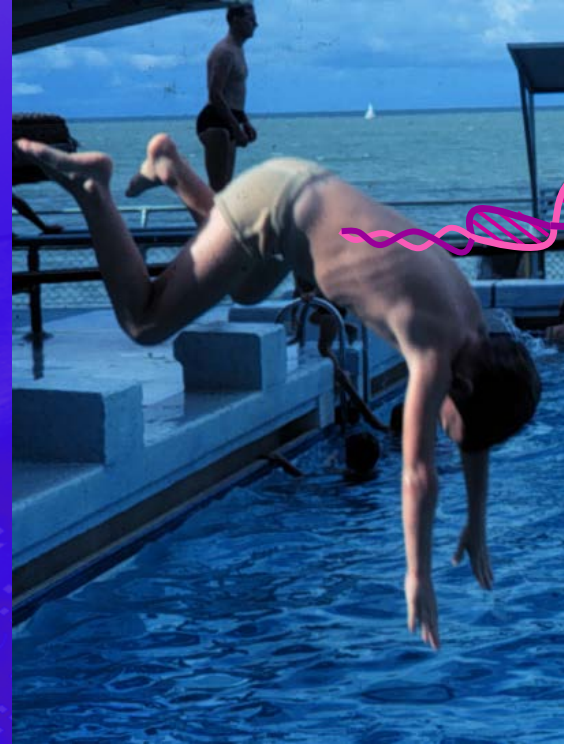
And they went into the ark to
Noah, two by two, of all flesh
in which is the breath **רוח** of
life **חַי**.

Genesis 7:15 NKJV





A chimpanzee



A human

The Argument

- Darwinists have claimed that the human and chimp DNA sequences are almost identical, only 1 % difference separates them
- Therefore, chimpanzees and humans share a common ancestor from which we inherited our slightly different genomes
- They claim we diverged 6 million years ago
- I will argue that differences between the human and chimpanzee genomes are profound and explaining data within the paradigm of common ancestry is problematic; design by a single Creator better explains both similarities and differences between these genomes

Some Quick Vocabulary

- The word **genome** simply means the genetic material, DNA, of an organism
- DNA carries information about how, where and when to make proteins
- DNA is made out of chemical “letters” called **nucleotides**
- There are only 4 different nucleotide “letters” (A, T, G and C) used in DNA
- The sequence of nucleotide “letters” encodes the information, just as the sequence of letters in this sequence encodes information

A humbling truth emerged: our DNA blueprints are nearly 99 percent identical to theirs [chimpanzees]. That is, of the three billion letters that make up the human genome, only 15 million of them—less than 1 percent—have changed in the six million years or so since the human and chimp lineages diverged.

Evolutionary theory holds that the vast majority of these changes had little or no effect on our biology. But somewhere among those roughly 15 million bases lay the differences that made us human...

Katherine S. Pollard, 2009, *Scientific American*

“For many, many years, the 1% difference served us well because it was underappreciated how similar we were [to chimpanzees],” says Pascal Gagneux, a zoologist at UC San Diego. “Now it’s totally clear that it’s more a hindrance for understanding than a help.”

Cohen - 2007. *Science* 316:1836

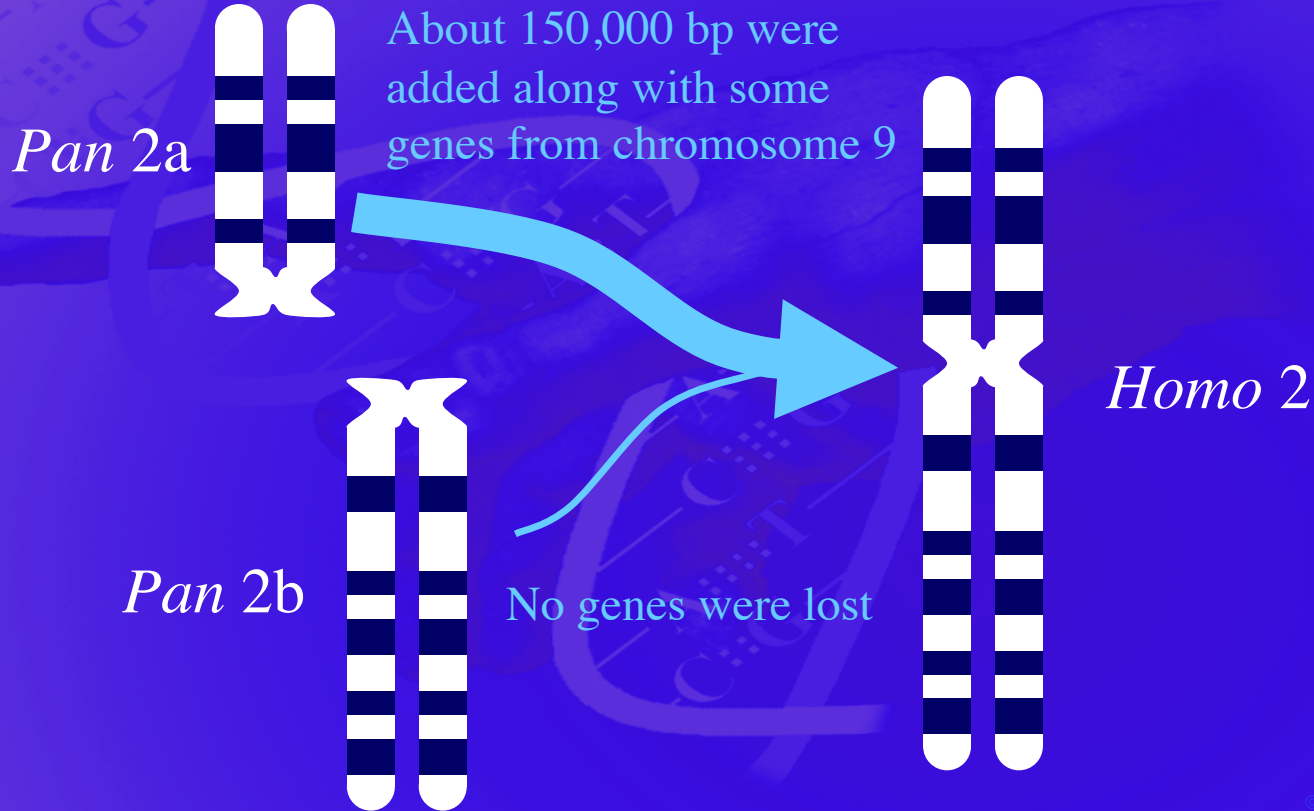
Lots of Numbers

- Humans and Chimpanzees are:
 - 99.4 % identical – Wildman et al. 2003
 - 98.77 % identical – Fujiyama et al. 2000
 - 98 % identical – Marks 2002
 - 96 % identical - Chimpanzee Sequencing and Analysis Consortium 2005
 - 95 % identical - Britten 2002

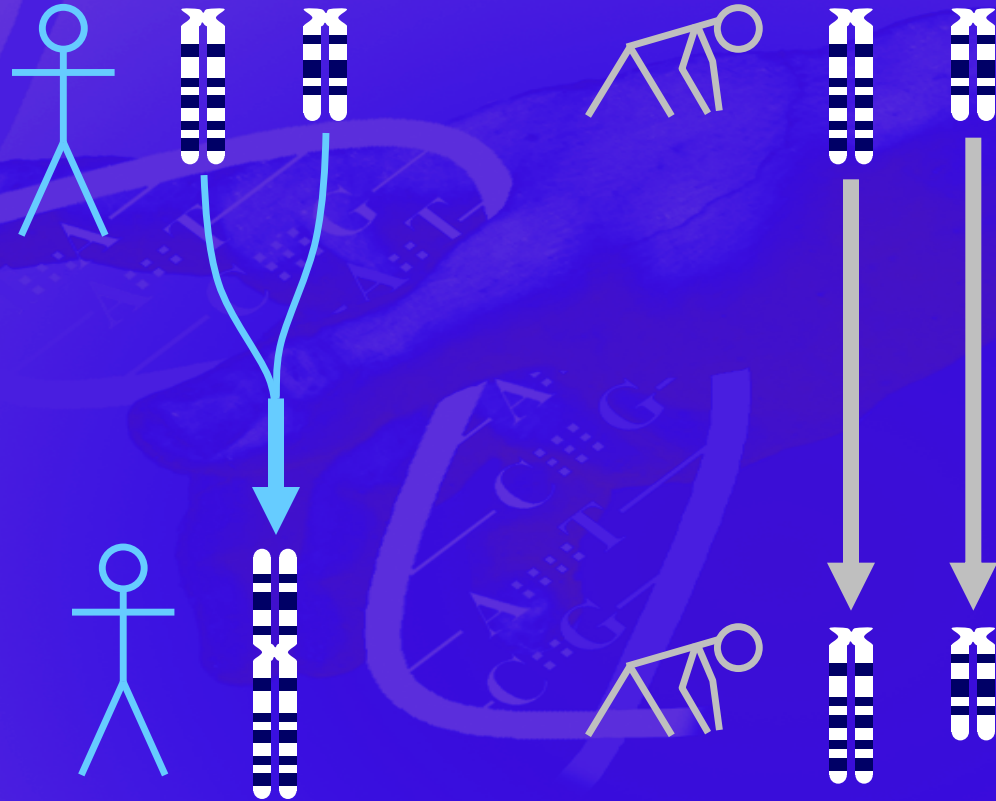
A Few Facts

- The human genome is $\approx 2,900,000,000$ bases long
- The chimpanzee genome is $\approx 3,100,000,000$ bases long
- Size estimates vary a little from source to source, but the chimpanzee genome is consistently estimated to be about 6 – 7 % larger than the human genome
- The human genome is divided into 23 chromosomes (two sets in most cells making 46/cell)
- The chimpanzee genome is 24 chromosomes (two sets in most cells, making 48/cell)

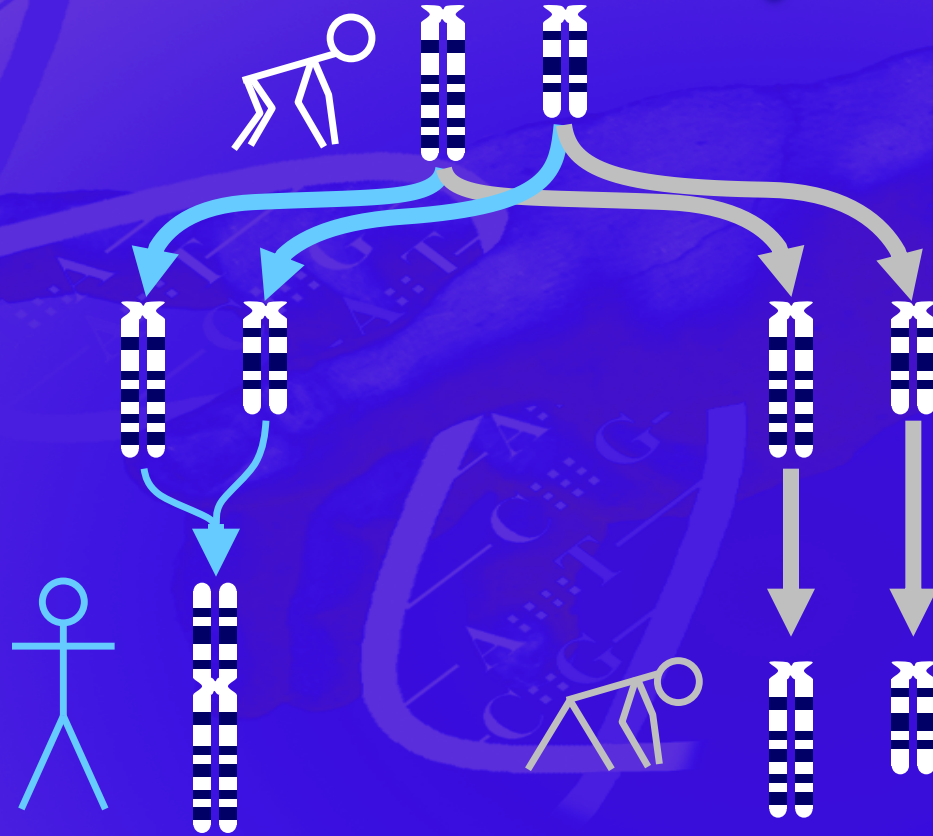
Is Human Chromosome 2 a Fusion of 2 Ancestral Chromosomes?



Does evidence of chromosome fusion prove common ancestry?



Does evidence of chromosome fusion prove common ancestry?



A Few Facts

- Three human and chimpanzee chromosomes – 4, 9, and 12 – appear to have been “remodeled”
- The Y (male) chromosomes of both species differ in size and sequence
- The ends, telomeres, of human chromosomes are shorter, (10 kb) than other apes (23 kb)
- Subtelomeric sequences are different
- Recombination hotspots are different

Some More Numbers

- The genes in the human genome are:
 - About 88% the same as rats
 - About 60% the same as chickens
 - About 80% in the same class as sea-squirt's
- Human proteins are:
 - Only 29 % identical (quite possibly less) to chimpanzee proteins

Differences

- What matters when it comes to differences in DNA sequences is the same thing that matters with any other sequence encoding information...
- ... how different the information is, not how different the sequence is

Small or big difference?

I love my ants. I love my aunts.



Researchers are finding that on top of the 1% distinction, chunks of missing DNA, extra genes, altered connections in gene networks, and the very structure of chromosomes confound any quantification of “humanness” versus “chimpness.” “There isn’t one single way to express the genetic distance between two complicated living organisms,” Gagneux adds.

Cohen - 2007. *Science* 316:1836

A conceptual image featuring a human hand holding a glowing DNA double helix. The DNA is depicted with a blue and white color scheme, showing the characteristic twisted ladder structure. The background is a solid blue color. The title 'Profound differences' is centered over the image in a white serif font.

Profound differences

Percent and Absolute Numbers

- Small percentage differences represent very large numerical differences
- If the human and chimp genomes are approximately 99 % identical, which they are not, that means they are 1 % different
- These genomes are about 3 billion nucleotides long
- 1 % of 3 billion is 30 million

Percent and Absolute Numbers

- If half the genome differences arose in human ancestors and half in chimpanzee ancestors, for each 1 % difference, 15 million differences must have developed in each lineage after they split from their common ancestor
- NOTE THAT THINGS ARE A LITTLE MORE SUBTLE THAN THIS, BUT IT ACCURATELY ILLUSTRATES THE PROBLEM
- These differences must have arisen, from a Darwinist perspective, over about 6 million years

Orphan Genes

- Some changes in genomes may be relatively easy
- For example, changing “I ate a dog” to “A dog I ate” requires one change and maintains the same information
- This is equivalent to the relatively easy DNA change from AGG to AGA, in which both code for the same amino acid, arginine

Orphan Genes

- Other changes appear to be much more difficult
- For example, going from “ ” to “Call to Me, and I will answer you, and show you great and mighty things, which you do not know” is a big and difficult change

Orphan Genes

- Orphan genes are genes that are unique to specific organisms, thus not inherited from ancestors shared with other organisms
- The human genome appears to have a significant number of orphan genes, probably hundreds

A Human Orphan Gene: **CTA-373H7.7**

Conclusions

- That human and chimp genomes are similar to each other than to other organisms is unsurprising
- Similarities between human and chimp genomes can be expressed in many different ways, but expressing the meaning of the similarities and differences is a more challenging task
- Small percentage differences add up to large numbers of individual differences
- Common ancestry, common design and common constraints all explain similarities
- Differences are not well explained by common ancestry

For by Him all things were created that are in heaven and that are on earth, visible and invisible, whether thrones or dominions or principalities or powers. All things were created through Him and for Him.

Colossians 1:16 NKJV

The background of the slide is a solid blue color. Overlaid on this background is a faint, large, stylized graphic. It features a large, light blue letter 'T' in the upper left and a large, light blue letter 'G' in the lower right. In the center, where the 'T' and 'G' overlap, is a smaller, light blue letter 'A'. The letters are semi-transparent, allowing the blue background to show through. The text 'The END' is centered over this graphic. 'The' is in a smaller, white, serif font, and 'END' is in a much larger, white, serif font. Both letters have a thin blue outline.

The
END

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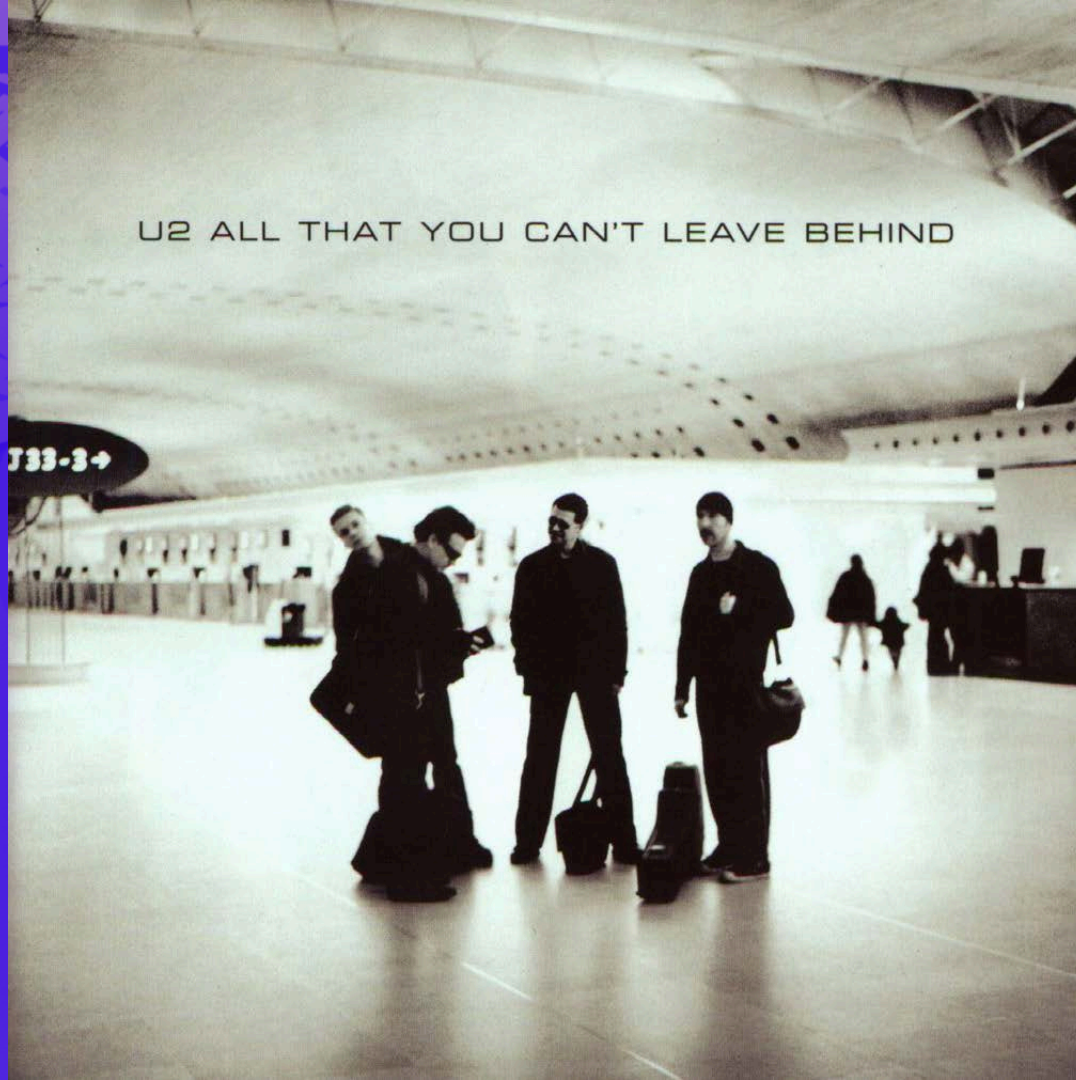
Outline:

- Sequences can be compared in different ways giving different outcomes
- Not all differences are created equal
- Percentage is a misleading metric
- Small differences on a percentage basis make for huge numerical differences
- It turns out some of the differences are profound

But Jesus answered him,
saying, “It is written,
‘Man shall not live by
bread alone, but by every
word of God.’”

Luke 4:4 NKJV

U2 ALL THAT YOU CAN'T LEAVE BEHIND





Sequence Comparison Exercise

Measuring Similarity and Difference

Would you be free from your burden of sin?
There's power in the blood, power in the blood;
Would you o'er evil a victory win?
There's wonderful power in the blood.

(44 identical words/ 62 words) = 71 % identical

Would you be free from your passion and
pride?
There's power in the blood, power in the blood;
Come for a cleansing to Calvary's tide

Measuring Similarity and Difference

Would ~~you~~ be free from ~~your~~ burden of sin?

~~There's power in the blood, power in the blood;~~

Would you o'er evil a victory win?

~~There's wonderful power in the blood.~~

(12 identical words/ 30 words) = 40 % identical

Would ~~you~~ be free from ~~your~~ passion and

~~pride?~~

There's power in the blood, power in the blood;

~~Come for a cleansing to Calvary's tide~~

Small or big difference?

I love my ants.



I love my aunts.

The wives of
my parent's
brothers are
very precious to
me.



Human and Chimp Evolution

Gorilla

Chimp

Human

----- ≈ 6 M years

Ancestors

Ancestors

HERVs

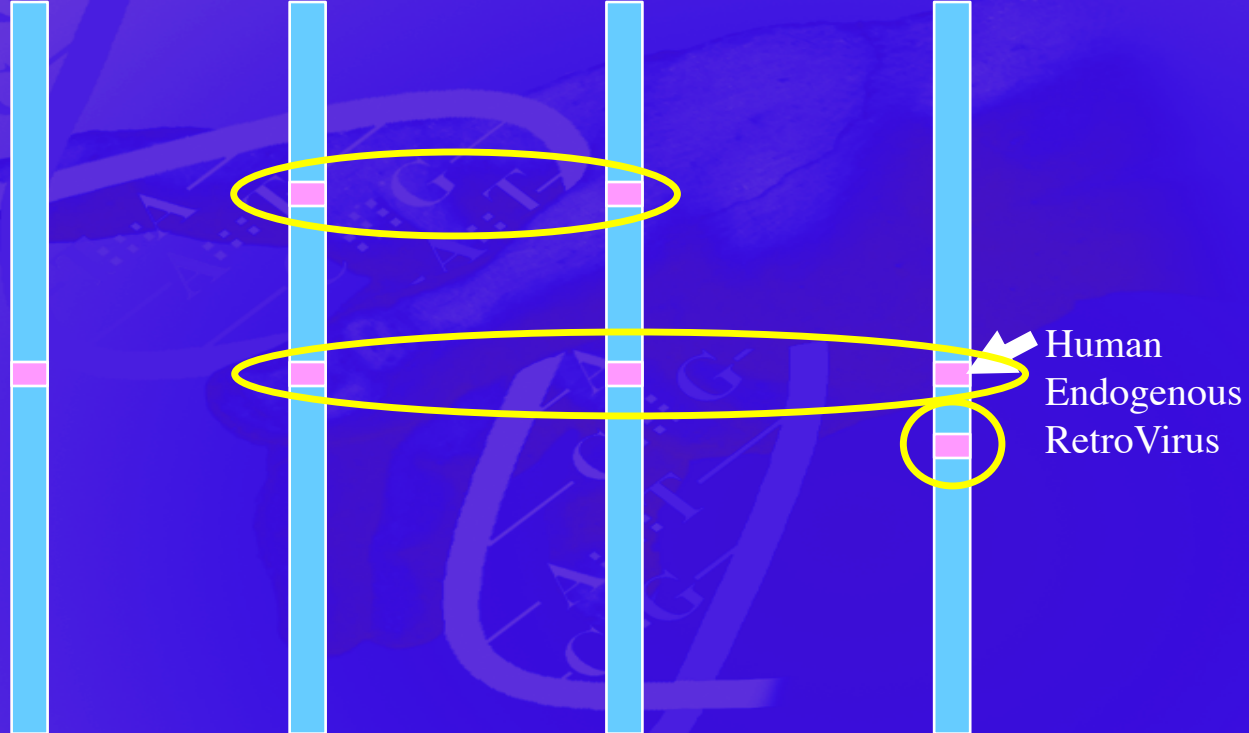
Human Endogenous RetroViruses

Ancestor

Human

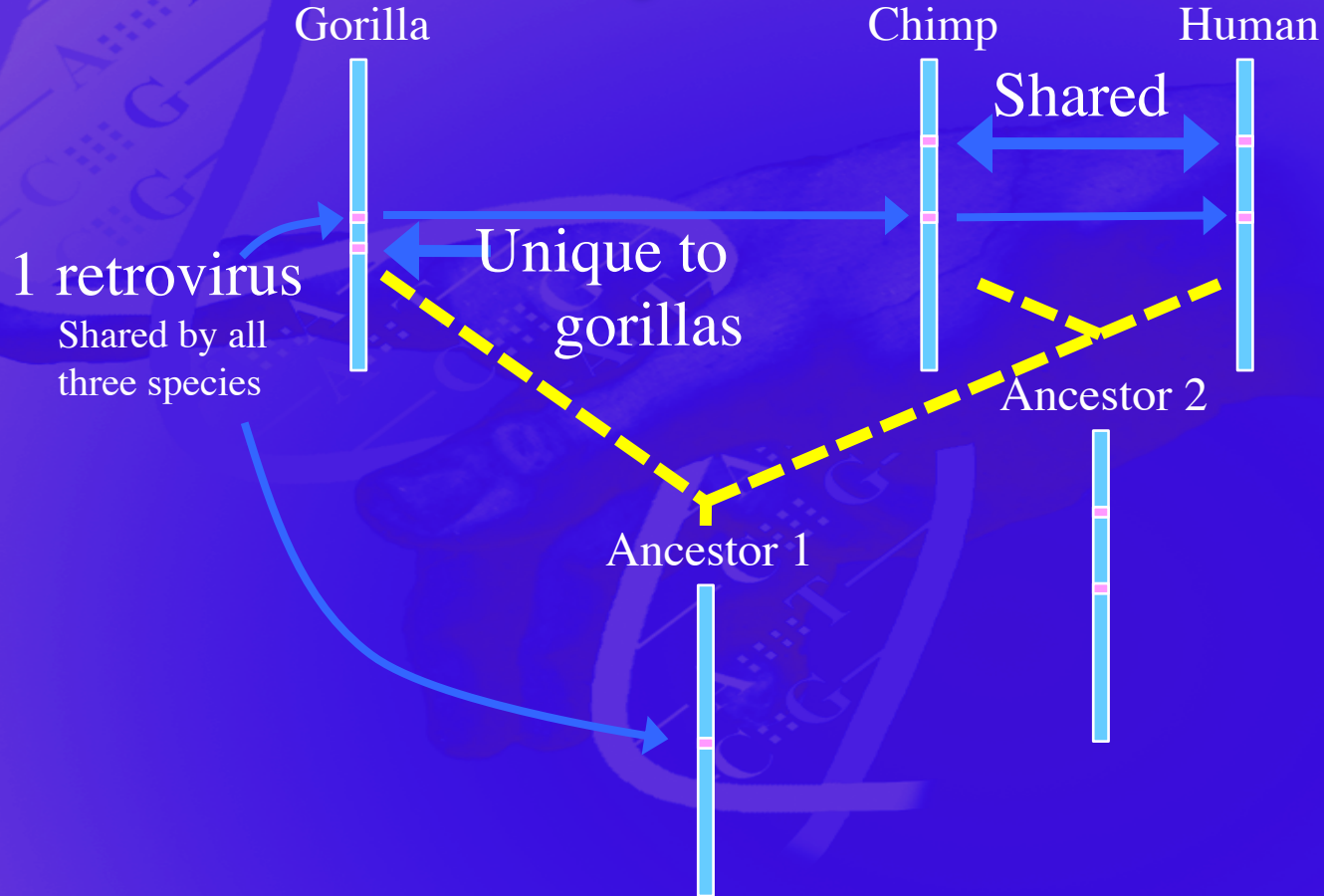
Chimp

Gorilla



HERVs

Human Endogenous RetroViruses



HERVs

Human Endogenous RetroViruses

Gorilla

Chimp

Human



Ancestor 1

Ancestor 2

Hypothetical

Producing and Fixing Differences

- To fix a genetic change in a species requires that:
 1. The mutation (difference) arise in the gametes of an individual
 2. All decedants of the species that do not carry the mutation are ultimately eliminated
- This requires that species have the reproductive capacity to survive losing huge numbers, either to selection or to population bottlenecks
- Humans and chimpanzees lack the reproductive capacity to have fixed 15 million changes in their genomes over 6 million years

And Jesus said to him,
“Assuredly, I say to you, today
you will be with Me in Paradise.”

Luke 23:43 NKJV

And Jesus said to him,
“Assuredly, I say to you today,
you will be with Me in Paradise.”

Luke 23:43 TGS

Genomes contain a large number of genes that do not have recognizable homologues in other species and that are likely to be involved in important species-specific adaptive processes. The origin of many such “orphan” genes remains unknown. Here we present the first systematic study of the characteristics and mechanisms of formation of primate-specific orphan genes.

Toll-Riera, 2009. *Molecular Biology & Evolution*

It is abundantly clear that the long list of attributes setting humans apart from their ape relatives did not arise overnight, nor were they driven by a single factor. Rather, these traits are the combinatorial outcome of over 6 million years of evolution, during which ancestral populations experienced successive and potentially conflicting selective pressures arising from climate, competition with other species, infections diseases, demographic collapse and recovery, founder effects (bottle necks), and niche construction, whereby our ancestors set in place ecological and social-cultural niches which in turn exerted strong selection on past populations.

Ajit Varki, 2017

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And the Lord God formed יִצָּר man
of the dust עֶפְרָ of the ground
אֲדָמָה, and breathed into his
nostrils the breath נְשֻׁמָּה of life חַי;
and man became a living being.

Genesis 2:7 NKJV