

# CHROMOSOME COMPARISONS PP SCRIPT

## 1. Title: **CHROMOSOME COMPARISONS**

### SYNOPSIS

This short PowerPoint show can be used to introduce any of the chromosome comparison lessons featured on the ENSI website. It could also be used to provide a quick exposure to the striking similarities between hominoid chromosomes, and to show the congruence of the pattern of primate evolution revealed in other lessons on the site, e.g. **Molecular Sequences and Primate Evolution** (where students compare details of beta hemoglobin in several different species). This congruence is critical for students to fully understand the power of science.

## 2. Evolution **ENSI** Lesson on **Human Evolution- Hominoid Chromosomes**

Diagrams (based on photographs) of the banded late-prophase chromosomes of **hominoids** (humans, chimpanzees, gorillas and orangutans), compared side-by-side, reveal striking similarities, even many identical chromosomes and segments.

## 3. Comparing bullet marks:

“Numerous studies show that **CHROMOSOME SIMILARITY** is a good measure of **GENETIC RELATEDNESS**.

The probability that two different chromosomes would independently have identical banding patterns by chance is essentially zero.”

“Detailed studies provide clear evidence that any **IDENTICAL CHROMOSOMES** in two different species **INDICATES COMMON ANCESTRY** just as surely as identical scratch patterns on two bullets indicate that both came from the same gun.” (Wallace, 1966).

“Space” to have “Part 1, Bullet B” move over next to #3, showing close match there.

## 4. Closeup of chromosomes 1-6

## 5. Moving in on chromosome #5 for all 4 species

6. Focus on the human and chimp chromosome #5. Note that most of the upper and lower portions are identical, while the centromeres (constrictions) and adjacent portions do not align. “**Space**” once more, and that centromere region of the chimp chromosome slowly rotates 180° (inverts), showing that both chromosomes now appear completely identical.

“Space” to show “Inversion” (animated)

“Space” to show “Meiosis – Tetrads – Crossing Over”, and photo of typical tetrad configurations of chromosomes during meiosis, when matching (homologous) chromosomes pair off during first division, and when crossing over and inversions occur.

“Space” for diagram showing how one strand (pink) can twist into knot to match its looped homolog, which breaks and reattaches in an inverted position (a process often observed).

“Space” to see results in diagram of chromosome with its pericentric inversion.

## 7. Primate Cladogram Based on Chromosome changes

NOTE where fissions, fusions and inversions occurred as these hominoids arose  
“Space” to show chromosomes #1-6 again.

NOTE how the human chromosome #2 matches two ape chromosomes that have been oriented end-to-end. Detailed analysis of their DNA has shown that the human chromosome #2 resulted from a fusion of the shorter segments of the two shorter chromosomes, in the hominid line sometime after the chimps/gorilla clade branched off.

8. See Lesson on this: “The Chromosome Connection”, access via ENSI lesson:  
Comparison of Hominoid Chromosomes”,