

Mystery of the Matching Marks, and...

The Test: SEARCH FOR THE TELL-TALE TELOMERES

NOW IT'S YOUR TURN: Form teams of 3-4. Your team representative should get worksheets for each person, and a Team Folder for the team. Remove the 4 pages of DNA copied from the predicted region in our #2 chromosome where fusion should have happened.

Be sure that each person in your team has one of the 4 pages of DNA on which to search for the telomeres. When you find the telomeres, ask your team-mates to look at them. If you all agree that you've found the "Tell-Tale Telomeres," all of you raise your hands for your teacher to check you.

WHAT TO LOOK FOR: **PLEASE, DO NOT MARK ON THE PAGES OF DNA**

On your page of DNA, search for an area that looks like the following (ignore the numbers):

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301 tgcattgcag ggtgaggggtg agggttaggg tttggggttg gtttgggggtt ggggttgggg
361 taggggtggg gttgggggtt ggggttgggg taggggtagg ggtaggggta ggggtagggt
421 cagggtcagg gtcagggtta gggttttagg gttaggattt tagggtagg gtaagggtta
481 agggttgggg ttgggggttag ggtaggggt tagggttggg gttgggggtt gggttgggggt
541 tgggggttggg gttagggtta gctaaacct accctaacc ctaaccctaa ccccaacccc
601 aaccctacc ctaccctac ccctaacc ctaaccctaa ctaaccctaa ccccaacccc
661 ctaaccctaa cccaaaccct aaccctacc taaccctaac ccaaccctaa ccctaaccct

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Notice that the lower rows (with lots of multiple c's) are easier to find, so look for those first. Then, when you find them, look a few rows above them for the rows of mostly multiple g's.

NEXT STEP:

1. Can you find exactly **where** the multiple g's end and the multiple c's begin? When you do, show your partners, and write the number for the line where you found it. Be prepared to show your teacher where the change takes place. That's the **Point of Fusion**, on line #_____
2. There are several lines **above** that point with mostly multiple g's. This is the DNA that is normally found at the tip ends of chromosomes. What is that chromosome tip called?
3. There are several lines **below** that Point of Fusion with mostly multiple c's. Where would that sequence of DNA normally be found?

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MOLECULAR FOSSILS: You have just found the **Two Tell-Tale Telomeres** from the two short ancestral chromosomes that had to fuse there to make your long #2 chromosome! You are looking at “**molecular fossils**,” the remains of the **fusion event** that happened in our ancient past. Every one of you, in every #2 chromosome in your body, has these “molecular fossils,” these ancient telomeres in the middle of your #2 chromosomes, right where we predicted they would be if fusion had occurred.

4. Chimps still have those two short ancient chromosomes, which would have been found in the species that evolved into both humans and chimps. What would we call that animal?
A) monkey; B) ape; C) common ancestor; D) all of these; E) none of these. _____
5. **RESULTS:** We found the remains of the two telomeres, as predicted. How does this affect our hypothesis? A) disproves it; B) weakens it; C) proves it; D) supports it. _____
6. **CONCLUSIONS:** What happened in our recent ancestry that did NOT happen in the chimps' recent ancestry?
7. How does this conclusion affect our earlier conclusion about human-chimp ancestry (based on the identical banding patterns in human and chimp chromosomes)?
A) strengthens it; B) weakens it; C) proves it; D) disproves it; E) has no effect. _____
8. What does all of this (chromosome banding patterns, and “fossil” telomeres in the middle of our #2 chromosome) say about the relationship between humans and chimpanzees?
9. **NEW PREDICTION:** What could we expect to find in the chromosomes of the common ancestor to humans and chimps? A) a long one like our #2; B) two short ones like the 2a and 2b that we find in chimps today; C) impossible to tell. _____ Why?

Return the 4 DNA sheets to your team folder, and take out the **Hominid Chromosomes** sheet.

HOMINID CHROMOSOMES: Study this sheet, where human chromosomes are compared with the chromosomes of chimpanzees (2nd), gorillas (3rd) and orangutans (4th) chromosome in each set. Notice the striking similarities, even examples of identical chromosomes.

10. After studying and comparing their chromosomes, how closely would you say that gorillas and orangutans are related to humans? A) very closely; B) distantly related; C) not related at all. _____
11. Which one of the great apes (chimpanzees, gorillas, or orangutans) seems to be the most closely related to humans (based on their chromosomes) (look for the one with the fewest differences)?: