Going ape over segmental duplication

Bursts of duplication may be the difference between great apes

Kate McDonald (Australian Life Scientist) 12/02/2009 17:39:00

A burst of activity in genomic duplication may have been the spark that separated the great apes into different species, new research shows.

In a study published in today's special Darwin 200 issue of Nature, researchers from the University of Washington in the US took a whole-genome shotgun sequence detection approach to the genomes of four primates: macaque monkeys, orang-tans, chimpanzees and humans.

They also compared data from other close relatives, the gorilla and the bonobo, and looked for areas of shared and lineage-specific segmental duplication.

What they found was an unusually high rate of acceleration of duplication in the ancestral branch leading to humans and the great apes, after we split from the macaques. They found another burst after we split from orang-utans, but the most significant burst of activity occurred just before the speciation of the gorilla, chimp and humans.

A great deal of restructuring in the individual genomes also occurred after the duplication activity, they found. For example, they identified a region on chromosome 10 that had expanded in the chimp but remained a single copy in humans and orangs, which split much earlier.

Interestingly, they found that the lineage-specific duplications occurred in regions of the genome close to ancestral duplications, suggesting not only a great deal of genomic instability, but that duplications are not random.

Duplications may also provide a further reason as to why primates, particularly chimps and humans, are so different in phenotype despite sharing much the same genetic make-up. The chimp-human burst took place at a time when other forms of mutation were slowing down, they said.

As to why these duplications took place, they are unsure. What they are sure of is that it is significant in hominid evolution. Now the task is to identify the genes in these duplicated segments and find out what they do, study leader Evan Eichler said in a statement.

"There is the possibility that these genes might be important for language or for aspects of cognition, though much more work has to be done before we'll be able to say that for sure," he said.