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Abstract: The cheetah narrowly escaped extinction at the end of the latest ice age, according to genetic analysis. At this time, between 10 000 and 12 000 years ago, about 75 per cent of all large mammals, including mammoths, cave bears and sable tigers, died out.

Cheetahs teetered on brink in the ice age

CHEETAHS, the fastest animals on Earth, narrowly escaped extinction at the end of the latest ice age, according to American researchers who have carried out a genetic analysis. At this time, between 10 000 and 12 000 years ago, about 75 per cent of all large mammals, including mammoths, cave bears and sable tigers, died out.

G. Langsbury/Bruce Coleman

The cheetah suffered near extinction at the end of the latest ice age

Today there are fewer than 20 000 cheetahs living in southern and eastern Africa. Difficulties in breeding the animals prompted a detailed study, which revealed that there is very little genetic variation between individual cheetahs. This can lead to abnormalities in sperm, decreased fecundity, high cub mortality and sensitivity to disease.

Genetic differences in animals occur when DNA mutates randomly. The almost complete absence of genetic variation in cheetahs suggested that in the past almost all cheetahs perished, reducing the variation of genes in the few surviving animals. Since this "genetic bottleneck", there has been insufficient time for random mutations to produce much new genetic variation. But when this "near-extinction" happened was not known. Some people thought it occurred a few hundred years ago, due to hunting, whereas others believed it was millions of years ago.

Now Marilyn Menotti-Raymond and Stephen O'Brien from the National Cancer Institute in Frederick, Maryland, have analysed the DNA from 74 cheetahs and pinned down the genetic bottleneck (*Proceedings of the National Academy of Sciences*, vol 90, p 3172). They assumed that at one time only one litter of cheetahs survived a near-extinction, so there would have been hardly any genetic variation. By counting the number of mutations that have occurred since then in a specific part of the DNA, they could estimate when this near-extinction happened.

The researchers first added restriction enzymes to the DNA. These cleave DNA when they recognise a specific sequence of 6 nucleotides. Next, they determined the length of the fragments that contained the mitochondrial DNA and "minisatellite" DNA, which accumulates mutations 5 to 10, and 100 to 1000, times faster than most other DNA. When an individual does not produce a fragment of the expected size, it means that a mutation had changed the sequence recognised by the restriction enzyme.

The mitochondrial DNA suggested that the hypothetical ancestral litter lived less than 36 000 years ago. The data from the mini-satellite DNA yielded a time of 3000 to 13 000 years ago. "We are not quite sure when it exactly happened, because of this range, but it wasn't 200 or 300 years ago," says O'Brien. "We're comfortable that the cheetah almost became extinct around the same time all those other large animals did."

The assumption that only one litter survived may be an oversimplification, but it could be that the progeny of half a dozen or so animals in one small area survived. **Koen De Smet**