

New study suggests polar bears evolved earlier than previously thought

April 20 2012, by Lin Edwards



(Phys.org) -- A new genetic analysis carried out by an international team of scientists has revealed that polar bears and brown bears may have diverged around 600,000 years ago, which is much earlier than the previous estimate of 150,000 years ago.

The researchers were led by Frank Hailer of the Biodiversity and Climate Research Centre in Frankfurt, Germany (a joint venture between Senckenberg Nature Research Society and Goethe University). The team analyzed the nuclear DNA of 45 bears, including polar bears (*Ursus maritimus*) [brown bears](#) (*Ursus arctos*) and [black bears](#) (*Ursus americanus*).

[Nuclear DNA](#) is passed down through both parents. Previous estimates of the emergence of polar bears as a discrete species were mostly based on the analysis of the smaller [mitochondrial DNA](#), which is inherited only through maternal blood lines.

The researchers compared 9,000 base pair sequences from the DNA of the 45 bears, and were able to use the data to construct a family tree, with the bears having greatest genetic difference being furthest apart on the tree. This allowed the scientists to estimate when the polar and brown bears diverged into separate species.

The results suggested that polar bears emerged around 600,000 years ago, which would mean the species has already survived several [glacial periods](#) and inter-glacial warm periods. Hailer said this also makes sense because during that period the [Arctic region](#) was much larger than at present, and so a greater area of suitable habitat was available for polar bears.

A lack of [genetic variation](#) in the polar bear population also suggested that many polar bears died during the interglacial warm periods, creating a “genetic bottleneck,” and reducing genetic diversity.

Dating the emergence of polar bears as a separate species at 600,000 years ago rather than 150,000 years ago solves the problem of the appearance in polar bears of a number of specialized features, which would require a particularly rapid evolution if the shorter period was correct.

Hailer said he had long been puzzled by the idea that polar bears were such a rapidly evolving species and had wondered if it was true. He said the earlier studies using the mitochondrial genome and suggesting a divergence 150,000 years ago might have reflected a “hybridization event” during the last inter-glacial warm period, when polar and brown

bears came into contact and bred during a period of melting sea ice.

This period would have introduced mitochondrial DNA from brown bears, and this could have given the hybrids a survival benefit. The population of [polar bears](#) at the time was small, and it is possible that in all the survivors the brown bear mitochondrial DNA had replaced the original polar bear mitochondrial genome.

The paper is published in the April 20th edition of *Science*.

More information: Nuclear Genomic Sequences Reveal that Polar Bears Are an Old and Distinct Bear Lineage, *Science* 20 April 2012: Vol. 336 no. 6079 pp. 344-347. DOI: 10.1126/science.1216424 .
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