Breakthrough DNA study could slow big cat extinction

April 11 2014

Under threat: lions, Panthera leo, in Madikwe Game Reserve, South Africa. Credit: Lucy Brooks.

New research comparing genes from living lions with ancient lion remains could help scientists boost dwindling populations.

A team of scientists has for the first time compared the genetic signatures from living and extinct lions to identify five distinct geographical groups within the lion species.

Their findings were reported in the *BMC Evolutionary Biology* journal last week.

Lion groups

The research team, led by the University of Durham and including Museum zoologists Prof Ian Barnes and Richard Sabin, has identified the five groups of lions as North African/Asian, West African, Central African, South African and East-South African.

Current conservation policies recognise only two distinct geographical groups.

Unique characteristics

The genetic information contained in lion DNA identifies the unique characteristics of each population, which, according to Mr Sabin, is vital in understanding how to protect lions from the increasing threat of extinction, using conservation programmes and repopulation both in the wild and in zoos.

'We need to understand how individual groups develop and adapt to their local environment,' Sabin said. 'You can't just repopulate an area with lions from anywhere, because they could be entirely unsuitable.'

Only one lion species (Panthera leo) exists today, with isolated populations living across Africa and in India. About 124,000 years ago during the Late Pleistocene, lions were one of the most successful land mammals on the planet, with many subgroups of Panthera leo existing across a huge geographical range from southern Africa to Eurasia and Central America.

Modern hunting and habitat destruction has left lions in India, and western and Central Africa critically endangered. In the past twenty years around 30 per cent of the total lion population in Africa has been lost.

The results of this study will help scientists understand the potential loss of genetic diversity that could arise from poor conservation or mismanagement of the remaining lion populations.

African ancestors

The genetic data analysed by the team suggests that modern lions originated in Africa in the Late Pleistocene and that climate changes in Africa may have isolated lion populations, leading to the five unique geographical groups.

Humid periods in Africa led to the growth of tropical rainforest and savannah environments, creating barriers for lion groups that are not well adapted to living in such habitats. These environments then retreated during dry periods, allowing lions to leave sub-Saharan Africa around 21,000 years ago and populate north Africa and Asia.

Royal lions

This is the first time scientists have analysed a large collection of ancient DNA alongside DNA from modern lions. Some of the ancient DNA was collected from remains held at the Museum, including the jaw bones of the now extinct Barbary lion, emphasising the importance of museum collections.

'Collections like ours represent archives of genetic diversity from parts of the world that may now be politically inaccessible and closed to study,

or from organisms that are now extinct,' Sabin said.

The Barbary lion remains held at the Museum were found by workmen excavating at the Tower of London in 1937. The animals were part of the exotic Royal Menagerie kept at the Tower during the fourteenth and fifteenth centuries.

Buried treasure

Sabin also said that there could be more remains lurking beneath the Tower of London. 'There is likely to be a continuous record of almost 900 years of history in that moat. And there could be some really exotic animals buried there.'

Provided by Natural History Museum