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10 March 2010

Eggshell of extinct giant bird unlocks key to ancient DNA

Ancient DNA from the fossil eggshell remains of the extinct elephant bird, has been successfully extracted thanks to help from a University of Sheffield expert - marking a world-first for archaeology and genetics.

Professor Mike Parker Pearson, from the University's Department of Archaeology, discovered the eggshells whilst researching in Madagascar. An international team of researchers has now discovered that ancient DNA is well-preserved in the eggshells of the now extinct elephant bird (*Aepyornis*) of Madagascar, which – at half a ton – is the heaviest bird to have ever existed.

Their findings, published this week (Wednesday 10 March 2010) in the leading scientific journal *Proceedings of the Royal Society B*, describe how an eggshell up to 19,000 years old is an excellent source of ancient DNA, especially in warmer climates such as Madagascar and Australia.

The eggshell samples were collected by Professor Parker Pearson's research team who have been investigating the extinction of this giant bird. Scouring the coastal dunes of southern Madagascar, they found many of the bird's nesting sites and some of the human settlements where the giant eggs were re-used as containers for liquids. They have radiocarbon dated the fossil eggshells whose chemical composition can also be used to shed light on past environments. This new study will enable a DNA profile to be produced for this creature, formerly the world's largest bird.

Like an outsized ostrich, *Aepyornis* stood nearly 3m high and its eggs are the largest bird eggs ever known, with a capacity of 11 litres - equivalent to 180-240 chicken eggs or seven ostrich eggs. Most of the birds appear to have died out before AD 1000, when a lost civilization emerged in the south of Madagascar, with long-distance trade contacts to Africa's Swahili coast, the Persian Gulf and China. By the time that this civilization flourished, in the 11th-13th centuries, the elephant bird's numbers were in decline, most likely linked with human population growth.

The last of these remarkable birds became extinct around 1650 when a French colonist described them as living in the most remote places and too difficult to catch.



Size of the elephant bird



Professor Mike Parker Pearson in southern Madagascar finding a settlement site with eggshell and tortoise midden

The DNA breakthrough was achieved by researchers from the University of Sheffield, the University of Oxford, Murdoch University in Australia and the University of Western Australia, Canterbury University and Otago University, both in New Zealand, Colorado University in America, and Copenhagen University in Denmark.

The ancient DNA research team now plan to study eggshells from a number of archaeological sites in New Zealand to investigate how humans interacted with another giant bird, the moa, which became extinct 600 years ago due to hunting pressures.

Professor Mike Parker Pearson, from the Department of Archaeology at the University of Sheffield, said: "This mysterious bird was probably the inspiration behind stories in the Thousand and One Nights and as told by Marco Polo. It's amazing that we now know so much about its genetic make-up, its diet and its habits. Sadly, it seems to have been yet another casualty of human population growth."

Doctoral student Charlotte Oskam from the School of Biological Sciences and Biotechnology at Murdoch University in Western Australia, said: "Researchers have tried unsuccessfully to isolate DNA from fossil eggshell for years – it just turned out that they were using a method designed for bone that was not suitable for fossil eggshell."

Notes for Editors: To read the paper in full, visit the link below.

Professor Mike Parker Pearson's fieldwork in Madagascar was funded by National Geographic. To find out more about National Geographic, visit the link below.

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- [Proceedings of the Royal Society B - full paper](#)
- [National Geographic](#)

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