

Fossilised Moa bones help scientists unravel the mystery of DNA decay

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Dr. Mike Bunce with a moa bone.

(Phys.org)—A new study is finally laying to rest the debate over whether DNA from the age of the dinosaurs could survive to the present day.

Scientists at Murdoch University led a study which shows the rate of DNA degradation and calculates that all bonds in a [DNA strand](#) preserved at the ideal temperature of minus five degrees centigrade would be completely destroyed in bone after approximately 6.8 million years.

This figure is incompatible with the idea of finding intact DNA in an 80 million year old dinosaur remnant, as was famously alluded to in the [Steven Spielberg](#) film Jurassic Park, but is much older than the currently

accepted record of 450,000 to 800,000-year-old DNA from Greenlandic [ice cores](#).

Dr Mike Bunce and Dr Morten Allentoft from Murdoch University's [Ancient DNA](#) lab came to their conclusions after studying 158 fossilised [leg bones](#) belonging to three species of the [moa](#), an [extinct group](#) of birds that once roamed New Zealand.

"It has been agonisingly difficult to estimate the rate of DNA decay before now because finding a large set of DNA-containing fossils with which to make meaningful comparisons are exceedingly rare," said Dr Bunce.

"Environmental conditions like temperature, degree of microbial 'attack' and oxygenation, can affect the DNA decay process and make it hard to detect a basic rate of degradation.

"The moa bones however have allowed us to study the comparative DNA degradation because they come from different ages from a region where they have all experienced the same environmental conditions."

The fossil bone specimens were carbon dated as being between 600 and 8000 years old and looking at the varying degrees of DNA degradation in each specimen, the team were able to calculate a DNA half-life of 521 years. The half-life is the amount of time taken for an amount of DNA to reach 50 per cent of the starting amount.

The scientists found that the estimated decay rate in the specimens was almost 400 times slower than predicted from simulation experiments carried out in the lab.

Based on these calculations and other investigations, the team were able to make their predictions of DNA survival deeper into time.

"If the [decay rate](#) is accurate then we predict that DNA fragments of sufficient length will preserve in frozen [fossil bone](#) of around one million years in age," added Dr Bunce.

The research team say that much more research into DNA degradation was required because their findings showed that the age of the fossils can account for only 38.6% of the variation in DNA preservation.

"Other factors that impact on DNA preservation include storage time following excavation, soil chemistry and even the time of year when the animal died," explained Dr Bunce.

"We hope to refine predictions of DNA survival by more accurately mapping how DNA fragments decay across the globe.

"Ultimately the models might enable better estimates of which fossils might work and prevent the destructive sampling of rare fossils which are thought unlikely to yield DNA."

The research is published in the latest issue of the *Proceedings of the Royal Society B* journal.

Provided by Murdoch University

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