Moa or less: Extinct 'robust' birds of New Zealand might not have been so robust after all

December 18 2013

Giant Haast's eagle attacking New Zealand moa. Artwork: John Megahan. Copyright: PLoS Biology. Via Wikipedia.

Giant moa bird (*Dinornis robustus*, literally meaning 'robust strange bird') may not have actually had robust bones, according to new research conducted by The University of Manchester. The leg bones of one of the tallest birds that ever existed were actually rather like those of its modern (but distant) relatives, such as ostrich, emu and rhea, the studypublished in *PLOS One* today (18 December) shows.

The study, led by biomechanics researcher Charlotte Brassey, in collaboration with palaeobiologist Professor Richard Holdaway at the University of Canterbury in New Zealand, has found that the largest of

the moa species had leg bones similar to those of modern flightless birds that can run fast, whereas a much smaller species of moa – from a different family - had an extremely robust skeleton.

Ms Brassey said:"Our research suggests that this group of birds came up with several different solutions to deal with the problem of supporting the large body necessary to process a diet of coarse vegetation.

"We know that these species of moa were living together in the same locations, at the same time. So we don't think the differences we're seeing in leg robustness are adaptations to a particular habitat type.

"Instead it seems they were perhaps engaging in different behaviours, although both could deal with extremely rough terrain."

The project was funded by the Natural Environment Research Council. It involved academics from the School of Earth Atmospheric and Environmental Sciences and Faculty Life Sciences at Manchester, together with Biological Sciences at Canterbury.

To find out whether the leg bones were overly thick and strong, the researchers first had to work out how heavy the birds were in life. Scientists have done this in the past by working from how thick or round the leg bones themselves are, then scaling up according to the size of bones of living birds The problem comes when the leg bones have unusual proportions.

Ms Brassey, from the Computational and Evolutionary Biology Research Group, Faculty of Life Sciences, said: "If we'd wanted to estimate the weight of a saber-toothed cat, no-one would have suggested measuring canine tooth length and then scaling up the tooth size of your standard tabby.

"That's because we know that the saber-toothed cat had unusually oversized canines compared to house cats. It wouldn't be a fair comparison, and you'd end up with a ludicrously high estimate of the body weight of the saber-toothed cat.

"The same was true for moa. We already knew that moa had disproportionately wide leg bones, yet previous estimates of their body mass had been based on those same bones which probably resulted in overestimates."

To get around this, the authors scanned whole skeletons, and, as predicted, the new estimates were considerably lower. Nonetheless, the largest moa still weighed in at a hefty 200kg, or 30 family-sized Christmas turkeys: if you wanted roast moa on Christmas day, you would have to start cooking on December 23.

Dr William Sellers, co-author on the study, said:: "If you don't get the body mass right, the rest of your analysis will just spit out the wrong numbers. By using the whole skeleton rather than just a single bone we get much better mass estimates, and we can even calculate how good this estimate actually is."

The researchersthen applied an engineering technique know as Finite Element Analysis (FEA) to estimate how robust the moa really were. FEA is a way of 'virtually crash-testing' an object using computer simulations, and is commonly used in civil engineering to estimate the strength of bridges, or model the behaviour of Formula One cars. The FEA technique and new estimates for body mass revealed that different groups of moa had solved the engineering problems of supporting their huge bodies in different ways. Such fundamental differences in structure suggest that the nine species of moa had long histories of independent evolution.

More information: The paper "More than one way of being a moa: Differences in Leg Bone Robustness Map Divergent Evolutionary Trajectories in Dinornithidae and Emeidae (Dinornithiformes)" will be published online by the journal *PLOS ONE* after the embargo time of 5pm EST on December 18th 2013: dx.plos.org/10.1371/journal.pone.0082668

Provided by University of Manchester

Citation: Moa or less: Extinct 'robust' birds of New Zealand might not have been so robust after all (2013, December 18) retrieved 19 June 2024 from https://phys.org/news/2013-12-moa-extinct-robust-birds-zealand.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.