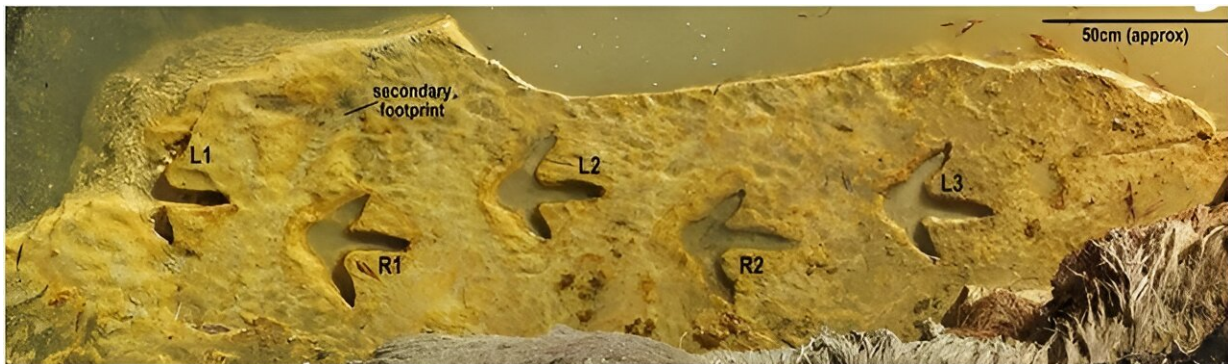


Feathery moa's fossilized footprints, ancient age revealed

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Orthographic image of the moa trackway found in the Kyeburn River immediately prior to extraction. Credit: *Journal of the Royal Society of New Zealand* (2023). DOI: 10.1080/03036758.2023.2264789

Cosmogenic nuclide dating, a method commonly used in dating coastal areas and alluvial riverbeds for landscape reconstruction, is also useful for calculating the age of trace fossils, such as a footprint, where no remains of the animal are preserved.

ANSTO scientist, Dr. Klaus Wilcken of the Center for Accelerator Science, used this method to determine the ages of layered sand and gravel samples in which seven footprints of the flightless bird, the moa, were found on the South Island in New Zealand in 2019.

In [research](#) published Nov. 14 in the *Journal of the Royal Society of New Zealand*, researchers from the Tūhura Otago Museum, University of Otago, Victoria University of Wellington and Aukaha reported a minimum burial age of 3.5 million years.

"We calculated that age with a range of +1.62/-1.18 million years, suggesting the Late Pliocene period and, potentially extending to the Early Pleistocene," said Dr. Wilcken. "This method involves measuring the isotopes, ^{26}Al and ^{10}Be produced by [cosmic radiation](#) interacting with rocks near the surface."

"It is certainly one of the more unusual rock samples we have dated," he added.

"The ANSTO contribution was significant. Without it, we would not have been able to put the footprints into evolutionary context. With it, we were able to identify these footprints as being from the Emeidae family and most likely the Pachyornis genera (similar to that of the heavy-footed moa as well as the other faint footprint that was made in the clay layers above the track from a Dinornithidae family and most likely the Dinornis genera.

"By 3.6 million years ago a least one species of moa had reached a gigantic size similar to the South Island Giant moa," said lead author Kane Fleury, Curator, Tūhura Otago Museum.

Sand and gravel were collected by the New Zealand research team from a 30-meter-high cliff, with two samples from different depths and one from downstream.

The samples were processed in a laboratory at the Center for Accelerator Science to extract the beryllium and aluminum isotopes.

To find the burial age, a model was developed, considering factors like burial depth and time. The model was tested against measured concentrations of the ^{26}Al and ^{10}Be isotopes on the Sirius accelerator.

This is the first known instance of moa footprints found in Te Waipounamu/South Island and represents the second earliest fossil record of moa.

More information: Kane Fleury et al, The moa footprints from the Pliocene—early Pleistocene of Kyeburn, Otago, New Zealand, *Journal of the Royal Society of New Zealand* (2023). [DOI: 10.1080/03036758.2023.2264789](https://doi.org/10.1080/03036758.2023.2264789)

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