



The Adams Event: Pleistocene Life, Death and (nearly) Everything

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The widespread disappearance of megafauna towards the end of the Pleistocene remains one of the great evolutionary whodunnits. While the entire Pleistocene (2.6 Ma -11.7 ka) was characterised by extreme and abrupt climate changes, the extinctions of megafauna (>40kg adult bodymass) appear concentrated in the last 50,000 years (50 ka), coinciding with the period after modern humans moved out from Africa. However, recent dating results in Madagascar, Australia, and Europe have emphasised the very extended periods between initial human arrival and eventual megafaunal extinction, even on islands. New genetic studies have further revealed the temporal fragility of both megafaunal and human populations in response to climate change around the world. Indeed, a global perspective suggests climate change had a far more pronounced impact than has been previously recognised, potentially due to the limitations of earlier dating methodologies.

Intriguingly, new dating records reveal that major environmental shifts and biological turnover occurred almost contemporaneously in the northern and southern hemispheres, within dating error, at 42.7 ± 0.9 ka. Critically, in several cases these changes are clearly unrelated to human activity. The parallel nature of these events in both hemispheres appears to have not been previously recognised due to the proximity to the traditional limit of radiocarbon dating. While the exact mechanisms remain obscure, we term this the 'Adams Event' (after Douglas Adams) due both to the timing and association with extinctions.

The increasing evidence for the association of major environmental changes such as the Adams Event with rapid localised extinctions of both megafaunal and human populations, plus the repeated pattern of extended periods of megafaunal-human overlap, suggest that humans may not have been the primary driver of the extinctions. However the concentration of events after their global dispersal indicates they were very likely involved. The implication of this model is that where humans were responsible for the megafaunal extinctions it was by securing key resources during periods of pronounced environmental stress. This is a deeply concerning observation given projected climate extremes and variability for the 21st Century, and the potential loss of vital ecosystem functions through future megafaunal extinctions. These recent studies highlight the urgent need for interdisciplinary studies to better understand extinction processes during periods of abrupt and extreme climate change.