
Reconstructing the first plant and animal colonizers within North America's ice-free corridor using ancient environmental DNA

Mikkel Winther Pedersen^{*†}, Anthony Ruter , Charles Schweger , Harvey Friebe , Richard Staff , Kristian Kjeldsen , Marie Zepeda Mendoza , Alwynne Beaudoin , Cynthia Zutter , Nicolaj Larsen , Ben Potter , Rasmus Nielsen , Rebecca Rainville , Ludovic Orlando^{2,3}, David Meltzer , Kurt Kjær , and Eske Willerslev⁴

¹Department of Zoology [Cambridge] – University of Cambridge, Downing Street, Cambridge CB2 3EJ, United Kingdom, Royaume-Uni

²Centre for GeoGenetics (CGG) – Natural History Museum of Denmark, Øster Voldgade 5-7, 1350K Copenhagen, Denmark, Danemark

³Anthropologie moléculaire et imagerie de synthèse (AMIS) – Université Paul Sabatier (UPS) - Toulouse III, CNRS : FRE2960 – Adresse 37 allées Jules Guesde 31400 Toulouse, France

⁴University of Copenhagen – Danemark

Résumé

During the Last Glacial Maximum, continental ice sheets isolated Beringia (northeast Siberia and northwest North America) from unglaciated North America. By around 15 to 14 thousand calibrated radiocarbon years before present (cal. kyr bp), glacial retreat opened up an approximately 1,500-km long corridor between the ice sheets. However, it remained unclear when plants and animals colonized this corridor and when it became biologically viable for human migration. We used a combination of radiocarbon dates, pollen, macro fossils and shotgun sequencing of ancient environmental DNA from lake sediment cores to reconstruct the timing and succession of plants and animals within the interior of the corridor. We found evidence of steppe vegetation, bison and mammoth by approximately 12.6 cal. kyr bp, followed by open forest, with evidence of moose and elk at about 11.5 cal. kyr bp, and boreal forest approximately 10 cal. kyr bp. Our findings reveal that the first humans in America, whether Clovis or earlier groups in unglaciated North America prior to 12.6 cal. kyr bp, are unlikely to have been able to travel this route into America. However, later groups may have used this north-south passageway.

Mots-Clés: ancient DNA, human migration, environmental reconstruction

*Intervenant

†Auteur correspondant: mp849@cam.ac.uk