

Genetic legacy of last glaciation influences reindeer's seasonal migrations

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Wild caribou in the Rocky Mountains of Canada. Credit: Mark Bradley, Parks Canada (CC-BY 4.0, creativecommons.org/licenses/by/4.0/)

Caribou (known as reindeer in Europe) make one of the longest seasonal migrations of land animals, but an individual's propensity to migrate

depends on its genetic ancestry, Maria Cavedon at the University of Calgary in Canada and colleagues report in a study publishing February 10th in the open-access journal *PLOS Genetics*.

The researchers used GPS tracking and DNA sequencing to investigate the [genetic factors](#) influencing migratory behavior in 139 female reindeer (*Rangifer tarandus*) living in tundra or woodland habitats across western North America. They identified over 50 [genetic mutations](#) associated with migratory behavior, of which 27 were located in genes involved in brain activity, fat and energy metabolism, body development, or hormone production. The sequences clustered into northerly and southerly subpopulations, descended from ancestral caribou that were trapped either side of the Rocky Mountains during the last glaciation. Despite generations of hybridization since the glaciation ended around 11,000 years ago, the researchers found that caribou with a greater proportion of genes from northern ancestry were more likely to migrate longer distances. Migratory individuals travelled nearly 250 kilometers on average, ten times further than sedentary reindeer. These results indicate an evolutionary legacy from the last glaciation, when northerly caribou populations had to migrate to survive in harsh tundra environments, while southerly populations living in forests were more sedentary.

The study is the first to investigate the genes influencing migration in an endangered terrestrial mammal. Seasonal migrations allow animals to track moving resources or avoid harsh conditions, but they also make them particularly vulnerable to [habitat fragmentation](#). Ancestral genes for migration could be lost forever if the descendants of northern lineages are driven extinct, but conserving key habitats in their seasonal migration routes could help to preserve the genes underpinning the world's longest terrestrial migration, the authors say.

"Wide-ranging animals, including [migratory species](#), are significantly

threatened by the effects of habitat fragmentation and habitat loss," Cavedon adds. "We examined migratory behavior of GPS-collared endangered caribou in western North America and carried out genomic scans for the same individuals. We detected genes associated with migratory behavior, and we determined that propensity to migrate depended upon the evolutionary history of caribou. If, as we report, [migratory behavior](#) is influenced by genes, caribou could be further impacted by the loss of the migratory trait in some isolated populations already at low numbers."

More information: Cavedon M, vonHoldt B, Hebblewhite M, Hegel T, Heppenheimer E, Hervieux D, et al. (2022) Genomic legacy of migration in endangered caribou. *PLoS Genet* 18(2): e1009974. doi.org/10.1371/journal.pgen.1009974

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