

Journal Publications

Musiani, M., J.A. Leonard, H.D. Cluff, C.C. Gates, S. Mariani, P.C. Paquet, C. Vila, and R.K. Wayne. 2007. **Differentiation of tundra/taiga and boreal coniferous forest wolves: genetics, coat colour and association with migratory caribou.** *Molecular Ecology* 16:4149-4170.

Abstract

The grey wolf has one of the largest historic distributions of any terrestrial mammal and can disperse over great distances across imposing topographic barriers. As a result, geographical distance and physical obstacles to dispersal may not be consequential factors in the evolutionary divergence of wolf populations. However, recent studies suggest ecological features can constrain gene flow. We tested whether wolf–prey associations in uninterrupted tundra and forested regions of Canada explained differences in migratory behaviour, genetics, and coat colour of wolves. Satellite-telemetry data demonstrated that tundra wolves ($n = 19$) migrate annually with caribou ($n = 19$) from denning areas in the tundra to wintering areas south of the treeline. In contrast, nearby boreal coniferous forest wolves are territorial and associated year round with resident prey. Spatially explicit analysis of 14 autosomal microsatellite loci ($n = 404$ individuals) found two genetic clusters corresponding to tundra vs. boreal coniferous forest wolves. A sex bias in gene flow was inferred based on higher levels of mtDNA divergence ($F_{ST} = 0.282, 0.028$ and 0.033 ; $P < 0.0001$ for mitochondrial, nuclear autosomal and Y-chromosome markers, respectively). Phenotypic differentiation was substantial as 93% of wolves from tundra populations exhibited light colouration whereas only 38% of boreal coniferous forest wolves did ($\chi^2 = 64.52, P < 0.0001$). The sharp boundary representing this discontinuity was the southern limit of the caribou migration. These findings show that substantial genetic and phenotypic differentiation in highly mobile mammals can be caused by prey–habitat specialization rather than distance or topographic barriers. The presence of a distinct wolf ecotype in the tundra of North America highlights the need to preserve migratory populations