Paper presented at The First Arctic Ungulate Conference,
Nuuk, Greenland, 3-8 September, 1991.

Expanded abstract

Genetic differentiation and evolution of reindeer and caribou

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Rangifer, 12 (3): 175-176

A comparison of electrophoretically-detected genetic variation in different subspecies of reindeer and caribou, *Rangifer tarandus* L., is summarized and discussed in relation to origin and evolution of the different subspecies. The material analysed includes the following subspecies: Eurasian tundra reindeer, *R.t. tarandus* (Røed 1985a), Alaska caribou, *R.t. granti* (Røed and Whitten 1986), Canadian barren-ground caribou, *R.t. groenlandicus* (Røed and Thomas 1990), Peary caribou, *R.T. pearyi* (Røed *et al.* 1986), Svalbard reindeer, *R.t. platyrhynchus* (Røed 1985b), and American woodland caribou, *R.t. caribou* (Røed *et al.* 1991).

A total of thirty different alleles are present at the locus coding for transferrin, considerable genetic heterogeneity being present among the subspecies. The caribou in North America have several more alleles segregating at this locus than do reindeer from Eurasia. As many as 17 alleles present in North American caribou are absent in mainland Eurasia, while only one allele present in mainland Eurasia is absent in North America. Such a pattern is consistent with the idea that present Eurasian reindeer originated from within older, more diverse, caribou lineages in North America.

A comparison of the allele frequency distribution in the six different subspecies revealed that the Eurasian tundra reindeer from Norway and the Alaska caribou are genetically the most similar subspecies, and that both Svalbard reindeer and the American woodland caribou are very different from the others. The genetic similarity between the Alaska caribou and the Eurasian reindeer would seem to reflect a common ancestry of these subspecies in the Beringia refuge during the late Wisconsin period. The large genetic distance between *R.t. caribou* and other subspecies may reflect an origin of present *R.t. caribou* from ancestral populations which survived the Wisconsin glaciation in refugia south of the continental ice sheet. Thus, as the ice-barriers retreated during late Wisconsin period and early Holocene epoch, the caribou from Beringia which colonized the Eurasian tundra region became the present Eurasian reindeer, *R.t. tarandus,* those which colonized the Canadian mainland became the present Canadian barren-ground caribou, *R.t. groenlandicus,* and those which remained in Beringia became the present Alaska caribou, *R.t. granti.* The caribou surviving south of the ice-sheet probably colonized the Maritime Provinces and the Québec/Labrador Peninsula after the ice retreated. Some of these were adapted to the tundra such as the ancestors of present George River and Leaf River herds (*R.t. caribou),* while others were adap-

ted to the forests, such as the ancestors of the present woodland caribou in Ontario and Manitoba *(R.t. caribou).*

The transferrin variability revealed furthermore that the Svalbard reindeer is genetically more similar to North American subspecies than the Eurasian reindeer. This is illustrated by one particular transferrin allele which is the most common allele in both Svalbard reindeer and Peary caribou, and also relatively common in other subspecies in North America, and yet entirely absent in Eurasian reindeer. This, together with the findings that the average genetic distance between Svalbard reindeer and the continental Eurasian reindeer from Norway, calculated from 35 loci, is high (D=0.045), provides evidence that Svalbard reindeer have common ancestors with North American caribou rather than Eurasian reindeer. The genetic similarity between Svalbard reindeer and Peary caribou may indicate a common origin of these subspecies in a high Arctic refuge in Arctic Canada or in northern Greenland during the last glaciation. The genetic similarities between subspecies are, however, much greater when the continental tundra subspecies are compared with the Peary caribou, than when they are compared with *R.t. caribou,* which indicates that the Peary caribou has not been isolated from the continental tundra forms to the same degree as *R.t. caribou.* This could reflect a situation in which the ancestors of Svalbard reindeer and Peary caribou survived parts of the Wisconsin glaciation period in areas other than an isolated high Arctic refugium, perhaps in more marginal parts of the Beringia refugium, partly isolated from the ancestors of the continental tundra caribou.

Keywords: Breeding, genetic variability.

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Manuscript accepted 18 March, 1992