

Interactions between Arctic and Red Foxes in Scandinavia — Predation and Aggression

KARL FRAFJORD,¹ DENNIS BECKER² and ANDERS ANGERBJÖRN²

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ABSTRACT. Arctic fox (*Alopex lagopus*) populations in Scandinavia are small and restricted to alpine regions, while red foxes (*Vulpes vulpes*) are common throughout both Norway and Sweden. The two species are similar in behaviour and diet, and thus competition between them is likely. This study provides seven observations of aggressive interactions between the two species. One adult arctic fox and one cub were killed by red foxes, one male arctic fox was chased away from his den, one female arctic fox and a cub fled into the den as a red fox approached, four cubs fled into the den as a red fox walked upon it and once a red fox walked upon the arctic fox den when no arctic foxes could be seen. Only on one occasion did an arctic fox succeed in chasing away a red fox. Red fox predation may prove to be limiting to the small arctic fox population in Scandinavia, and arctic foxes can be displaced from good dens and the most productive regions.

Key words: arctic fox (*Alopex lagopus*), red fox (*Vulpes vulpes*), interactions, predation, aggression, field observations, Scandinavia

RÉSUMÉ. En Scandinavie, la population des renards polaires (*Alopex lagopus*) est petite et se limite aux zones alpines, alors que le renard roux (*Vulpes vulpes*) est commun dans toute la Norvège et la Suède. Les deux espèces, qui ont un comportement et une alimentation semblables sont probablement en compétition. Cette étude fournit sept observations d'interactions agressives entre les deux espèces: un renard polaire adulte et un renardeau tués par des renards roux, un renard polaire mâle chassé de son terrier, un renard polaire femelle et un renardeau s'enfuyant dans le terrier à l'approche d'un renard roux, quatre renardeaux s'enfuyant dans leur terrier alors qu'un renard roux se tenait au-dessus, et un renard roux se tenant sur le terrier d'un renard polaire alors qu'aucun renard polaire n'était en vue. Une seule fois, un renard polaire a réussi à chasser un renard roux. La prédation par le renard roux pourrait bien limiter la petite population de renards polaires en Scandinavie, et les renards polaires peuvent être chassés des bons terriers et des régions les plus productives.

Mots clés: renard polaire (*Alopex lagopus*), renard roux (*Vulpes vulpes*), interactions, prédation, agression, observations sur le terrain, Scandinavie

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INTRODUCTION

Arctic and red foxes (*Alopex lagopus* and *Vulpes vulpes*) are closely related in morphology, behaviour and diet (Clutton-Brock *et al.*, 1976; Hersteinsson and Macdonald, 1982), although the red fox is about 25% larger in head-body length (Hersteinsson, 1984). The two species may compete for food and dens in areas where they coexist (Chirkova, 1968; Kaikusalo, 1974; Haglund and Nilsson, 1977; Østbye *et al.*, 1978; Pedersen, 1985). In several cases red foxes have occupied dens previously inhabited by arctic foxes and some studies suggest that red foxes may prey upon arctic foxes (Chirkova, 1968; Chesemore, 1975; Kaikusalo, 1982; Frafjord, 1986). Hersteinsson (1984) suggests that the northern limits of the red fox distribution are determined by productivity of the habitat, while the southern limits of the arctic fox are determined by competition with red foxes. Red foxes are abundant all over Scandinavia, while arctic foxes only breed in small numbers above the tree line. The arctic fox is protected by law both in Norway and Sweden. As part of other studies seven observations of interactions between these species were made and are reported here.

MATERIAL AND METHODS

The behaviour of arctic foxes has previously been studied by Frafjord (1984, 1986) in Sylane and by Angerbjörn (1987) in Vindelreservatet. Sylane is situated in the county of Sør-Trøndelag, Norway, while Vindelreservatet is situated in the county of Västerbotten, Sweden. Total observation time at the two den sites where interactions between arctic and red foxes were observed was 953 hours, of which 502 hours were at the den in Sylane and 451 hours at the Vindelreservatet den.

RESULTS

1) *Arctic fox male chasing red fox female:* An adult arctic fox male was on his way to the den followed by one cub (Table 1). The dog-fox suddenly stopped and moved his head up and down, raising his tail to a horizontal position. He then walked forward with tail a little lower, ran a few metres, then stopped and lowered his body somewhat, tail held low and head and neck horizontal. This running forward a few metres and stopping was repeated six times before he started to pick up speed, ears pricked forward and tail low, the cub rapidly lagging behind. In front of him a red fox could now be seen fleeing. The arctic fox male was an unusually large arctic fox (Frafjord, 1985), larger than the red fox, which was believed to be a female.

2) *Arctic fox male being chased by red fox male:* A red fox male was observed on top of the arctic fox den, digging into it (Table 1). The arctic fox male appeared from one of the entrances, attacking the hind leg of the red fox. The red fox responded by chasing the arctic fox from the den. After a

TABLE 1. Summary of interactions between arctic (AF) and red (RF) foxes in Scandinavia

No.	Date	Location	Length (min)	Type of interaction
1	26 June 1982	Sylane	3	RF♀ chased by AF♂
2	31 July 1985	Vindelr.	3	AF♂ chased by RF♂
3	11 July 1982	Sylane	2	RF♀ killed AF cub
4	18 July 1982	Sylane	5	AF♀ fled from RF♂
5	7 July 1982	Sylane	9	AF cubs fled from RF♂
6	12 July 1982	Sylane	5	RF♀ on AF den, cubs inside
7	—	Vindelr.	—	AF killed by 2 RF
8	11 July 1982	Sylane	—	Additional observations

¹Norwegian Polar Research Institute, P.O.B. 158, N-1330 Oslo Lufthavn, Norway

²Department of Zoology, University of Stockholm, S-10691 Stockholm, Sweden

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few seconds he returned and started to dig again. Once more the arctic fox male attacked the hind leg of the red fox. This time the red fox chased the arctic fox up a hillside, and both went out of sight. During the chase the red fox was never more than two metres behind the arctic fox, following his every twist and turn. All the time the female arctic fox was sitting silently 100 metres away from the den. When the arctic fox male returned after about two minutes, he was very upset and barked and screamed.

3) *Red fox female killing arctic fox cub*: A red fox female walked around upon the den, then stopped and looked around (Table 1). No adult or juvenile arctic fox was to be seen. The red fox then made a jump and seized an arctic fox cub in her mouth. The cub was shaken violently and hung passive as the red fox carried it away from the den. After 6 min the female arctic fox could be seen in the area where the red fox disappeared. She was moving around, running most of the time and looking around. For the next 30 min she was alternately sitting, standing and running, barking or screaming all the time in the same direction. The cub was estimated to be 46 days old.

4) *Arctic fox female evading red fox male*: A large red fox male stood close to the arctic fox den looking at the arctic fox female. One cub that was out immediately fled into the den as the female arctic fox gave a warning scream. The adult female fled into the den as the red fox approached her and remained inside as the red fox sniffed around on the den. As the red fox left the den, the arctic fox female reappeared from the den and ran a short distance before disappearing into the den again.

5) *Arctic fox cubs fled from red fox female*: Three arctic fox cubs fled into their den as the red fox female walked upon it sniffing (Table 1). One cub sat on the outside, looking and barking at the red fox, but fled inside as the red fox came closer (about 5 m). Cubs barked from inside as the red fox calmly walked away.

6) *Red fox on arctic fox den, cubs inside*: One arctic fox cub went inside the den just before a red fox entered it. However, it is not known whether the cub was scared off by the red fox (Table 1). The red fox (probably the same female as previously) walked around on the den, sniffing, before leaving it.

7) *Red foxes killing arctic fox in winter*: Two red foxes were observed at some carcasses during winter at the same time as an arctic fox (Table 1; more detailed information is lacking). Several squabbles were seen and during one fight the arctic fox was killed and torn into pieces by the red foxes (L. Strömberg, pers. comm. 1986).

8) *Additional observations*: During 17 hours on 11-12 July several conflicts were noticed among the arctic foxes at the den in Sylane (Table 2), in addition to the two previously described. These additional observations were incomplete due to bad weather, and it could not be firmly established that red foxes were involved. This seems, however, very likely when considering that one arctic fox was killed this day.

DISCUSSION

At the start of this century there was a great reduction in the arctic fox population in Scandinavia, and the population has not recovered since (Hersteinsson *et al.*, 1989). Compe-

TABLE 2. Additional observations on 11-12 July 1982, Sylane (AF=arctic fox, RF=red fox)

Time	Length (min)	Comments on observation
07.08	1	Screaming, one fox chasing another away at some distance from the arctic fox den
09.37	3	RF killed AF cub (obs. no. 3)
22.14	10	Screaming, barking and noises indicating one fox chasing another away from the den, closely passing the obs. tent
00.14	2	Screaming
00.31	10	RF on AF den (obs. no. 6), screaming and barking

dition with and predation from red foxes may be one reason for the non-recovery of the arctic fox, although verification has been lacking (Hersteinsson *et al.*, 1989). As shown in this study, arctic foxes may be killed or chased by red foxes, even though not all interactions observed were clearly aggressive. In a study of penned red and arctic foxes, Rudzinski *et al.* (1982) found no evidence of red foxes killing arctic foxes, although their observations indicated that limited food supplies and dens could be dominated by red foxes. The outcome of a contest may depend on the size and sex of the individuals involved. As observed in Sylane, a large male arctic fox may be able to chase off a red fox. Our observations did not indicate that the arctic foxes were killed for food, and the two red foxes visiting the arctic fox den in Sylane did not eat any food remains on the den. As indicated by Rudzinski *et al.* (1982), arctic foxes will mostly avoid direct confrontation with red foxes, and the chance of observing these short encounters is low. Red fox predation could be significant to the small arctic fox population in Scandinavia, reducing it in periods of limited food supplies, so that fewer arctic foxes are available to breed when times are more favourable.

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