Sarcoptic mange in Swedish wildlife

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Summary: Mange caused by Sarcoptes scabiei var. vulpes appeared among red foxes (Vulpes vulpes) in Scandinavia (south-west Finland) for the first time in this century in 1967. The disease was most probably introduced by foxes crossing the Gulf of Finland from Estonia. The mange epizootic spread northwards through Finland and reached Sweden in late 1975, when mangy foxes appeared in the northern part of the country. In 1984, mange was observed in most parts of Sweden. The disease was observed to spread rapidly in boreal areas, whereas it spread more slowly in agricultural areas. Mortality due to mange was very high. The duration of the disease before death due to emaciation has been shown experimentally to be over 90 days.

An outbreak of fox mange among Arctic foxes (Alopex lagopus) occurred in 1986. The local population of Arctic foxes was caught and successfully treated. The following year, treated foxes were caught again and no signs of disease were found. Sporadic cases of fox mange have also been diagnosed in lynx (Lynx lynx), pine marten (Martes martes) and domestic dogs. Single cases have been observed in other species: wolf (Canis lupus), mountain hare (Lepus timidus), domestic cat and horse. No cases of sarcoptic mange have been recorded in the badger (Meles meles). At present, although fox mange occurs as an epizootic in local populations, the number of foxes has increased again in many parts of Sweden.


INTRODUCTION

Sarcoptic mange (caused by Sarcoptes scabiei) is reported in several wild species (20, 21). Usually, the disease is reported as having little effect on wild animal populations (11) although other reports indicate that mange could be devastating for wildlife (13).

Prior to 1967, there had been no reports during the twentieth century of mange in Scandinavian wildlife.

In 1957, red foxes (Vulpes vulpes) with mange were found in south-western Finland (6). It was presumed that the disease had spread with foxes migrating over the ice from Estonia. The disease spread northwards through Finland, and by 1972, fifty-three cases of mange in red foxes and three cases in the raccoon dog (Nyctereutes procyonoides) had been diagnosed (K. Henriksson, personal communication).

The first case of mange in red foxes in Sweden was observed in 1972 (4). No further cases were observed until three-and-a-half years later, when several cases were
observed at different localities approximately 400 km north of the first site (3). At approximately the same time, the first mangy fox was observed in Norway (7).

**DISEASE SPREAD**

The cases observed in red foxes in Sweden in 1975-1976 occurred in the counties of Västerbotten and Jämtland at 64°N. Mange quite soon became the most common disease of foxes in Sweden (15). Prior to 1972, less than twenty foxes were examined annually at the National Veterinary Institute (NVI). After mange was introduced, the number increased to over 100 foxes per year. Up to 45% of these were foxes with mange, while most of the remaining animals had other skin diseases.

Mange spread throughout Sweden according to two patterns related to fox population dynamics (10). The infested area expanded in three pulses, each associated with “peaks” in the vole cycles. Within boreal areas, where foxes are frequently dispersed during peaks in the vole cycles, the spread was more rapid than in more southerly, agricultural areas where fox populations are more stable and dispersal of foxes is less frequent.

Another observation was that mange did not spread along a “front” (12) (Fig. 1). Instead, scattered local populations were infested, with a period of up to four years elapsing before disease spread into the gaps between infested areas (8).

![Fig. 1](image-url)  
*The expanding range of mange infestation in Sweden between 1975-1976 and 1983-1984 (12)*
EFFECT ON FOX POPULATIONS

The mange epizootic caused high mortality in most local populations of red foxes. In some counties, up to 50% of foxes shot were found to be infested with mange (8). In some areas, the annual bag was reduced to 10% of the level prior to the mange epizootic, according to local hunters.

The effects of the mange epizootic on red fox populations in relation to factors such as density, diet, ovulation, litter size, whelping frequency and the proportion of subadults have been studied by Lindström (8, 9). This author found that both ovulation rates and the proportion of subadults in the population in winter increased in areas affected by mange. Other variables were correlated with vole density but not with the reduction of the population caused by mange.

CLINICAL AND PATHOLOGICAL FINDINGS

All degrees of severity of mange were observed in infested foxes. In early and mild cases, skin lesions were found only on the hind parts of the body. In severe cases the whole body was affected, with more or less alopecia (Fig. 2).

Histological changes were characterised by hyper-, para- and acanthosis, with several mites in the epidermis. Purulent and/or mycotic dermatitis were observed in several cases but no pathological changes were found in the subcutaneous tissues.

FIG. 2
Emaciated red fox (Vulpes vulpes) infested with Sarcoptes scabiei var. vulpes
Following experimental infestations, foxes lived up to 94 days before dying from emaciation (16).

Between 1969 and 1981, the NVI received 1,835 red fox carcasses, of which 584 (32%) were infested with *Sarcoptes* (15). Approximately 20% of the foxes received were found dead and the rest were shot. The percentages of male and female mangy foxes were 62% and 38%, respectively. Age was estimated by measuring wearing of the teeth, which seems to be a more reliable method in red foxes than counts of cementum annuli (unpublished findings). Of mangy foxes, 47% were young animals (up to two years of age), 46% were three to four years old and 7% were over five years. There was an observable difference in nutritional state between shot foxes and those found dead. Seventy-one percent of the foxes found dead with mange were emaciated, 22% were in poor condition and 7% in normal condition. Among shot foxes with mange, 11% were emaciated, 38% in poor condition and 51% in normal condition (15).

**OTHER SPECIES INFESTED WITH MANGE**

The only domestic animals in which sarcoptic mange has been found in Sweden in recent decades are swine (5). Even if the same degree of control was not practised prior to 1972, mange probably did not exist in wildlife in Sweden before that date, with the exception of one red fox from southern Sweden examined at the NVI in 1955 (unpublished findings). It can therefore be assumed that mange diagnosed in species other than the red fox is *S. scabiei* var. *vulpes*.

Although there are reports indicating that, in general, fox mange is not easily transmitted to other species (18), the epizootic outbreaks in Scandinavia indicate that transmission can occur under some conditions and that the present *S. scabiei* is not specific to foxes.

In 1980, the first case of mange in a lynx (*Lynx lynx*) was observed (13). Since 1980, over twenty lynx with mange have been diagnosed at the NVI. Clinical findings in lynx are similar to those for red fox, and most lynx were in very poor condition or emaciated. The Swedish lynx population in 1980 was estimated to be 600 animals (1). This population decreased over the last decade (2) and mange has probably been an important factor in this process.

Shortly after the outbreak of mange in Swedish red foxes, the disease appeared in fur farms (12) affecting both red foxes and blue (Arctic) foxes (*Alopex lagopus*). In the wild, mange was not observed in Arctic foxes before 1986 when it was diagnosed in Arctic foxes in the area of Stekenjokk (17). Transmission between red and Arctic foxes seems to have occurred at a slaughtering facility for reindeer (*Rangifer tarandus*). In 1987, several Arctic foxes in this area were observed with mange. Twenty-one Arctic foxes were caught alive, four of which were found to be infested with *S. scabiei*. Infested foxes were successfully treated and all foxes were released into the wild. In 1988, eleven foxes were recaptured, seven of which had been caught the year before. All caught animals were free of mange and the disease has not been observed in the Arctic fox in Sweden since 1986.

Sarcoptic mange has also been found in approximately ten martens (*Martes martes*) with pathological findings similar to those in foxes and lynx.
A single case of sarcoptic mange has been observed in a mountain hare (*Lepus timidus*), with lesions similar to those found in other wild animals.

Over 200 badgers (*Meles meles*) have been examined at the NVI since 1975, but mange has not been found in this species. These animals were submitted for examination with suspected skin changes which, in the majority of cases, were shown to be old infected wounds mainly caused by fighting.

Since 1975, sarcoptic mange has been found frequently in domestic dogs (19) and on a single occasion in the domestic cat (D. Christensson, personal communication). The disease has also been observed in one horse (5).

Humans handling infected carcasses have occasionally been bitten by sarcoptic mites, causing "pseudo-scabies", but this seems to be uncommon.

**CONCLUSIONS**

Sarcoptic mange is currently present throughout Sweden, except for the islands of Gotland and Öland in the Baltic Sea.

Mange is still the most common disease found in red foxes, and the clinical course and appearance seem to be similar to that which has been described in previous years in Sweden.

Reports by local hunters still indicate that mange, when present in restricted localities, seems to reduce the fox population heavily. However, in some areas, especially in the north, fox populations have increased in recent years. In these areas, hunters report short-term fluctuations with high numbers of foxes in some years followed by a decline in the population. Mange seems to be present in some of these areas. Although these fluctuations are mainly the result of normal regulating factors, the influence of mange outbreaks and fluctuations in vole (*Microtus* spp., *Clethrionomys* spp.) populations is not known. The future situation in Sweden will probably follow this pattern of short-term fluctuations if no measures are taken to control the disease.

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**LA GALE SARCOPTIQUE DES ANIMAUX SAUVAGES EN SUÈDE.** – T. Mörner.

Résumé : La gale provoquée par Sarcoptes scabiei var. vulpes est survenue en Scandinavie (sud-ouest de la Finlande), pour la première fois depuis le début du siècle, chez le renard roux (*Vulpes vulpes*) en 1967. La maladie a très probablement été introduite par des renards qui avaient franchi le Golfe de Finlande en provenance d’Estonie. L’épizootie de gale s’est étendue vers le nord, traversant la Finlande et atteignant la Suède vers la fin de 1975, où des renards atteints ont été observés dans le nord du pays. En 1984, la gale était présente dans la plupart des régions suédoises. La maladie s’est propagée rapidement dans les zones boréales et plus lentement sur les terres agricoles, avec une mortalité très élevée. Il a été montré expérimentalement que les animaux atteints meurent de cachexie après un délai de plus de 90 jours.
Un foyer de gale est apparu chez des renards polaires (Alopex lagopus) en 1986. Les populations locales ont pu être capturées et traitées avec succès. L’année suivante, les renards traités, à nouveau capturés, ne présentaient aucun signe de la maladie. Des cas sporadiques ont aussi été diagnostiqués chez des lynx (Lynx lynx), des martres (Martes martes) et des chiens domestiques. Des cas uniques ont été observés chez d’autres espèces : loup (Canis lupus), lièvre variable (Lepus timidus), chat domestique et équidé. Aucun cas de gale sarcoptique n’a jamais été enregistré chez le blaireau (Meles meles). Bien que la gale du renard soit encore épizootique dans certaines populations locales, le nombre de renards s’est à nouveau accru dans de nombreuses régions de Suède.


References


