given species of *Sarcocystis* have a characteristic morphology (size, shape, surface structure), which distinguishes them from the sarcocysts of other *Sarcocystis* species occurring in the same species of intermediate host. *Sarcocystis* species have generally been considered to have a rather strict intermediate host specificity. The definitive host becomes infected with sarcosporidia through ingestion of musculature containing sarcocysts.

Prior to the investigation reported in the present thesis, reindeer was considered to be the intermediate host of only one species of *Sarcocystis*, i.e. *S. grueneri*, which had been incompletely described and whose definitive host was unknown. The thesis consists of 14 separate papers published in 4 different journals, and an Introduction and a General Discussion. The investigations reported in the different papers included: (1) an examination of sarcocysts in histological sections; (2) a light microscopic examination of the morphology of numerous live sarcocysts isolated from the musculature of reindeer (under a dissection microscope); (3) a transmission electron microscopic examination of the different types (species) of sarcocysts identified by ligth microscopy; (4) a scanning electron microscopic examination of the surface structure of isolated sarcosysts of the different species occurring in reindeer; (5) transmission experiments, in which infected musculature or isolated sarcocysts of certain species were fed to prospective definitive hosts (silver and blue foxes, dogs, raccoon dogs, cats).

The investigations showed that domestic reindeer in northern Norway may harbour 6 morphologically distinct types of sarcocyst, and thus may act as intermediate host for 6 species of *Sarcocystis*. Wild reindeer in southern Norway were found to act as intermediate host for 4 of these species. The morphology of the sarcocysts of each of the 6 species, as revealed by light microscopy and transmission and scanning electron microscopy, was described in detail, which should allow the different species to be unequivocally identified by other investigators later. The old species name *S. gruneri* was assigned to one of the newly differentiated species, having cysts only in cardiac muscle, whereas the 5 other species, with cysts confined to the skeletal musculature, each was given a new species name (*S. hardangeri, S. rangi, S. rangiferi, S. tarandi, S. tarandivulpes*). The sarcocysts of *S. rangiferi* and *S. hardangeri* were macroscopic in size, whereas the cysts of the other species in general were difficult to detect with the unaided eye. The sarcocysts of some of the species were morphologically similar to sarcocysts of presumably other *Sarcocystis* species described from other species of intermediate host, mainly from other cervids. These findings might suggest that some of the *Sarcocystis* species described from reindeer are not strictly specific to this host, but may infect related species of hosts.

The transmission experiments showed that foxes (*Vulpes vulpes* and *Alopex lagopus*) were suitable definitive hosts for the species *S. grueneri, S. tarandivulpes* and *S. rangi*. It is highly probable that other canines also act as definitive hosts for these 3 species. One experiment showed that raccoon dogs (*Nyctereutes procyonoides*) acted as definitive host for *S. grueneri* and for at least one other species. Dogs were also found to serve as definitive hosts for *Sarcocystis* spp. of reindeer, but it could not be conclusively determined which species (presumably *S. grueneri* and *S. tarandivulpes*), developed in this host as musculature containing cyst of more than one species was used to infect the experimental dogs.

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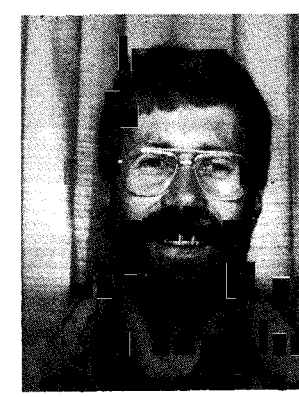
Arne Skorping forsvarte avhandlingen «The population dynamics of *Elaphostrongylus rangiferi* in the intermediate host - an experimental study» («Populasjons-dynamikk hos *Elaphostrongylus rangiferi* i mellomverten - en eksperimentell undersøkelse») for den filosofiske doktorgrad (Dr. philos) ved Universitetet i Tromsø 12. september 1986. Arne Skorping er født i 1948 i Bergen, og tok sin utdannelse dels ved Universitetet i Bergen og dels ved Universitetet i Oslo. Han har siden 1981 vært ansatt som amanuensis ved Universitetet i Tromsø.

Arne Skorping successfully defended the thesis «The population dynamics of *Elaphostrongylus rangiferi* in the intermediate host - an experimental study» for the Dr. philos degree at the University of Tromsø, Norway, September 12 1986. Arne Skorping was born in 1948 in Bergen, and was educated at the Universities of Bergen and Oslo. He has since 1981 been employed as a lecturer at the University of Tromsø.



Hjernemarken (*Elaphostrongylus rangiferi*) er en rundmark som forekommer i sentralnervesystem og muskulatur hos rein. Ved høye infeksjoner fremkaller marken tydelige symptomer på sykdom, først og fremst lammelser i bakkroppen. Et stort antall av denne parasitten kan føre til at reinen dør. Hos reinkalver har denne marken enkelte år ført til særlig høy dødelighet.

Hjernemarken produserer store mengder larver som kommer ut på beitet via reinens avføring. Som mange andre parasitter må disse larvene først gjennomgå en utvikling i snegl før de kan infisere rein. Rein blir smittet ved at den får i seg snegl med hjernemark-larver på beite.

I første del av doktoravhandlingen er det kartlagt hvilke sneglearter som kan være smittefarlige for rein, og hvordan infeksjon og utvikling av marken er påvirket av miljøforhold. Det er påvist at både infeksjon og utvikling av marken er sterkt temperatur-avhengig, og dette er sannsynligvis den viktigste forklaringen på at forekomsten av hjernemark i rein ser ut til å øke etter spesielt varme somre. Både land-levende og vann-levende snegl kan fungere som mellomverter, og det ble funnet at hjernemark-larvene kan infisere snegl i flere måneder etter de er kommet ut med reinfeces.

Kandidaten har også undersøkt om det finnes mekanismer som kan motvirke at parasitt-mengden svinger passivt med endringer i miljøfaktorer. Slike mekanismer vil virke stabiliserende på en infeksjon, og er av stor interesse for å få en generell forståelse av epidemier. Hos hjernemark viser det seg at høye infeksjoner virker som en bremse på produksjonen av infektive hjernemark-larver i snegl - dels ved at utviklingen går seinere, og dels ved at flere infiserte snegl dør før reinen blir smittet. I siste del av avhandlingen er også sneglens immunreaksjoner mot hjernemark studert. Disse undersøkelsene tyder på at sneglen har et lite effektivt immun-system, og at parasitten er i stand til å bryte ned sneglens immun-celler (fagocytter).

Elaphostrongylus rangiferi is a nematode infecting the CNS and musculature of reindeer. This worm can cause serious disease, and the main symptom is posterior paralysis. A high number of this parasite can cause the death of reindeer. In some years this worm has lead to high mortality, especially amongst reindeer calves. *E. rangiferi* must, like many other parasites, go through a development within a gastropod before it can infect reindeer. Reindeer become infected by ingesting snails with the food on pasture.

In the first part of the thesis the susceptibility of different gastropods to *E. rangiferi* has been studied. The worm could develop in both terrestrial and aquatic snails, and the freeliving larvae could infect snails for several months after being isolated from feces. One important ascpect of the thesis were how the infection and the development of the worm were affected by environmental conditions. It was found that both infection rate and developmental rate were strongly affected by temperature, and this may explain the increase of the prevalence of the worm after warm summers.

The candidate has also examined mechanisms that may prevent the number of parasites to fluctuate passively with the environmental conditions. Such mechanisms will act to stabilize an infection and are of general interest to understand epidemics. High infections of *E. rangiferi* appear to slow down the rate of production of infective larvae in gastropods. The death rate of infected snails is also positively related to the number of larvae present. In the last part of the thesis the cellular immune reactions of the gastropod host have been studied. These studies indicate that the immune-system of the gastropod is inefficient, and that the parasite is able to brake down the phagocytes of the snail host.

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Knut H. Røed forsvarte sin avhandling «Studies on the genetic structure of populations of reindeer and caribou (*Rangifer tarandus* L.)» for doktorgraden i landbruksvitenskap ved Norges Landbrukshøgskole den 9. oktober 1986.

Knut H. Røed successfully defended his thesis «Studies on the genetic structure of populations of reindeer and caribou (*Rangifer tarandus* L.)» for the Dr.agric degree at the Norwegian University of Agriculture on 9. October 1986.

Arbeidet er utført ved Zoologisk institutt, Norges Landbrukshøgskole. Som redskap for å studere genetiske strukturer hos rein, og å avdekke viktige faktorer som ligger til grunn for disse, ble det analysert variasjoner i gen-systemer som koder for forskjellige proteiner hos ulike bestander av rein og caribou i både Nord-Amerika og Nord-Europa. Betydelige genetiske forskjeller ble funnet, ikke bare mellom ulike