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Toxoplasma gondii in the Subarctic and Arctic

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Summary

The coccidian protozoan *Toxoplasma gondii* has a world-wide distribution. It causes toxoplasmosis, a potentially very serious disease to humans and other warm-blooded animals. Infection has in many studies been shown to be rather common in the Nordic countries also, where its prevalence both in domestic animals and wildlife can be explained by contacts with cats and their faeces, cats and wild felids being the only definitive hosts of the parasite known.

Before the discovery of the complete life cycle of the parasite, other infection routes to animals were studied e.g. in Russia, where lateral transmission of infection in a reindeer herd was reported. The vehicle of infection was apparently body fluids, such as e.g. saliva and lacrimal fluid containing parasite tachyzoites, which might invade another reindeer via mucosal membranes. According to the finding, toxoplasmosis might be apprehended to be also a sexually transmitted disease. Following the discovery of the pivotal role of the cat in the epidemiology of *T. gondii*, possible alternative pathways of infection have generally been ignored. In Fennoscandian semi-domesticated reindeer, a clear association of the seroprevalence of antibodies to *T. gondii* was seen with the degree of domestication, and, thus, with cat contacts [1].

In the high Arctic of Svalbard, there is a considerably high seroprevalence of infection both in polar bears and Arctic foxes [2-4]. The source of infection is unlikely to be found in the seals constituting the major part of the polar bear's diet, as in one study, antibodies were not found in North Atlantic marine mammals. However, in other, less arctic and remote, cetacean and pinniped populations studied, *T. gondii* infection has been found.

Because Svalbard reindeer and sibling voles studied have been free from *T. gondii* infection, it can be assumed that sexual stages of infection (in definitive hosts) leading to oocyst production is not a major part of the Svalbard *T. gondii* life cycle [2]. Then, carnivores probably get the infection with food, anyhow. Cannibalism is considered common in polar bears and Arctic foxes, and probably can explain a lot. One parasite isolate from an Arctic fox proved to belong to the Type II strain, the predominant *T. gondii* lineage in the world [3]. This somewhat objects to the suggested idea of a specific Arctic life cycle of the parasite, but incorporates the Arctic to the global *T. gondii* infection network. Further support to the hypothesis is gained from the finding that Svalbard barnacle geese (*Branta leucopsis*) are rather commonly infected. They may get the infection when wintering in Scotland. So, perhaps migratory birds are important in *T. gondii* globalisation.

Cats are crucial to *T. gondii* epidemiology. However, the Arctic example proves that the successful parasite can thrive even in the absence of cats.

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