



Serosurvey for *Trichinella* in polar bears (*Ursus maritimus*) from Svalbard and the Barents Sea

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ABSTRACT

Blood samples of live-caught polar bears (*Ursus maritimus*) from Svalbard collected 1991–2000 (Period 1) and 2006–2008 (Period 2) and from the pack ice of the Barents Sea collected in Period 1, were assayed for antibodies against *Trichinella* spp. by ELISA. Of 54 cubs-of-the-year included in the Period 1 sample, 53 were seronegative, indicating that exposure to *Trichinella* infected meat is uncommon during the first months of life for polar bears in the Svalbard region. Of 30 mother–offspring pairs, 18 mothers were seropositive with seronegative offspring ($n = 27$), suggesting (1) that maternal antibodies had dropped to levels below detection limit by the time of capture in April (offspring approximately 4 months old), and (2) supporting experimental studies in other animal models showing that vertical transmission of *Trichinella* spp. is uncommon. Bear 1 year and older had higher prevalence in Svalbard (78%) than in the Barents Sea (51%). There was no temporal change in prevalence for bears from Svalbard during the time between the two periods. The prevalence increased with age in both sexes. A positive correlation was found between anti-*Toxoplasma gondii* and anti-*Trichinella* spp. antibodies.

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1. Introduction

Nematodes in the genus *Trichinella* are among the most widespread zoonotic pathogens in the world (Murrell et al., 2000; Pozio, 2001; Dupoy-Camet, 2000; Pozio, 2007).

Humans are infected by ingestion of raw or lightly cooked meat from domestic animals or wildlife harbouring muscle tissue larvae (ML) (Pozio, 2001). In Greenland and northern Canada, numerous human outbreaks of trichinellosis have been noted after consumption of meat most commonly from polar bear (*Ursus maritimus*) and walrus (*Odobenus rosmarus*) (Thorshaug and Rosted, 1956; Serhir et al., 2001; Møller et al., 2005b, in press; McIntyre et al., 2007). *Trichinella nativa* is the most prevalent species in the

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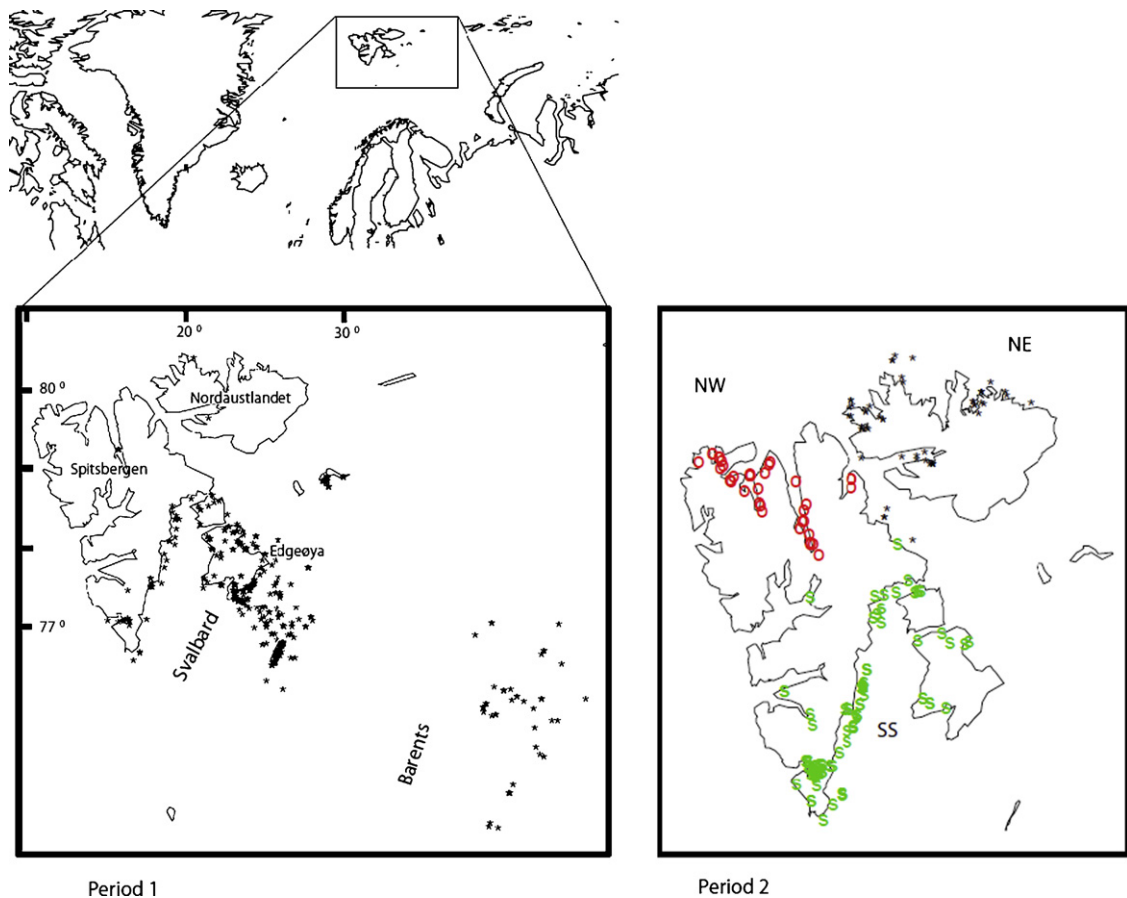


Fig. 1. Locations in Svalbard and the Barents Sea where polar bear blood samples were collected for a study of prevalence of anti-*Trichinella* spp. antibodies. For statistical analyses, the samples from Period 1 (1991–2000) were allocated to two groups; Svalbard (west of longitude 30° E) and Barents Sea (east of longitude 30° E), see lower left panel. For Period 2 (2006–2008), the samples were allocated to three groups: southern Svalbard (SS), northwest Svalbard (NW) or northeast Svalbard (NE), see lower right panel. Samples allocated to the different geographic areas are shown by different symbols. Families (mother–offspring) are shown with one mark only.

Arctic (Murrell et al., 2000; Pozio and Zarlenga, 2005), with polar bear as the main reservoir (Pozio, 2001). Larvae of *T. nativa* may survive freezing in muscle of carnivores for several years, while the same freeze tolerance is not expressed in non-carnivore muscles (Kapel et al., 1999; Kapel, 2000; Dick and Pozio, 2001).

Thorshaug and Rosted (1956) demonstrated *Trichinella* ML in 59% of polar bears collected 1949–1953 from the region between Novaya Zemlya and Svalbard, and in 17% of young and 79% of older polar bears from Edgeøya (Fig. 1) collected 1950–1951. Larsen and Kjos-Hanssen (1983), examining polar bear from Svalbard, demonstrated ML in 58% of bears from around 1950, in 48% of bears from 1954, and in 23–33% of bears from 1966 to 1970. Infection rates after 1966 were found to be significantly lower than those reported for earlier periods (Larsen and Kjos-Hanssen, 1983). To see whether there is a change in infection rate after the most recent previous study in Svalbard (Larsen and Kjos-Hanssen, 1983), the present study assesses the presence of antibodies against *Trichinella* spp. in polar bears from Svalbard in 1991–2000 and 2006–2008 and from the Barents Sea in 1991–2000.

2. Materials and methods

2.1. Animals and samples

As part of a larger population study, polar bears were live-caught in Svalbard and at the pack ice of the Barents Sea (74.3°N–80.5°N, 15.7°E–43.6°E, see Fig. 1) during two periods; 1991–2000 (Period 1) and 2006–2008 (Period 2). A total of 667 blood samples from 587 different bears were collected; 441 samples in Period 1 (24 bears caught two times, two caught three times), 226 samples in Period 2 (29 bears caught two times, seven caught three times, additional nine bears caught once in Period 1 and re-captured once in Period 2, no individual caught more than once within a year). The Period 1 sample included 30 mothers caught with cubs-of-the-year, COYS (45 in total, 15 mothers with one and 15 with two COYS each) and an additional nine samples from other COYS not accompanied by mother samples. Immobilizing and handling of the bears were as described by Stirling et al. (1989). Blood was drawn from the femoral vein and serum or plasma was stored at –20 °C for subsequent analysis.

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