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博士の専攻分野の名称：博士（獣医学）

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The role of sika deer in the transmission of *Borrelia* spp. in Hokkaido, Japan.
(北海道における *Borrelia* spp. の伝播に対する鹿の役割)

The intent of this research was to describe the role of deer in the transmission of different species of *Borrelia* spp. Sika deer (*Cervus nippon yezoensis*) is the host of ticks of various species and stages in Hokkaido. As the overpopulated number of deer has caused problems with forestry and agricultural productions, the potent of deer involving in zoonoses is being watched, too. In this study, deer caught in the nuisance control and ticks collected from deer and field were tested to detect *Borrelia* spp. and analyzed for following two subjects.

Firstly, a survey was held related with a relapsing fever *Borrelia* sp. recently found in Hokkaido. A relapsing fever *Borrelia* sp. similar to *Borrelia lonestari* was detected from wild sika deer and *Haemaphysalis* ticks in the eastern part of Hokkaido, Japan. The total prevalence of this *Borrelia* sp. in tested deer blood samples was 10.6% using conventional PCR and real-time PCR. The prevalence was significantly higher in deer fawns compared to adults (21.9% and 9.4%, respectively). Additionally, there was a significant regional difference between two sampling areas, Shiretoko and Shibetsu with 17% and 2.8% prevalence, respectively. Regional differences were also found in tick species collected from field and on deer. In the Shiretoko region, *Haemaphysalis* spp. were more abundant than *Ixodes* spp., while in Shibetsu, *Ixodes* spp. were more abundant. Using real-time PCR analysis, *B. lonestari*-like was detected from 2 out of 290 adult *Haemaphysalis* spp. ticks and 4 out of 76 pools of nymphs. This is the first report of a *B. lonestari*-like organism in *Haemaphysalis* spp. ticks, and the first phylogenetic analysis of this *B. lonestari*-like organism in Asia. Based on this result, *Haemaphysalis* spp. are the most likely candidates to act as a vector for *B. lonestari*-like;

furthermore, regional variation of *B. lonestari*-like prevalence in sika deer may be dependent on the distribution of these ticks.

Second survey was on Lyme disease borreliae with deer in a different aspect from vector-reservoir relationship. To determine whether and which types of borrelial spirochetes are extracted from *Ixodes persulcatus* ticks during feeding on sika deer, the infection rates of *Borrelia* spp. among *I. persulcatus* were compared between the two groups; the feeding ticks on deer and the questing flat ticks in the field. Lyme disease *Borrelia* spp. were detected in about 42 % of adult and 6% of nymph questing ticks, while it was 3% and 1 % from each group of feeding ticks, respectively. Whereas infection rate of *B. miyamotoi* which belong to RF borreliae sharing same vector, were not significantly different between groups, just below 1% among both feeding and questing ticks. Therefore, it could be said that sika deer could be the zooprophylactic host for ticks harboring Lyme disease borreliae in Hokkaido.