

日本におけるライム病ボレリア媒介ベクターで  
あるシュルツェマダニから分離された  
新種ボレリア *Borrelia miyamotoi* について

福長将仁、高橋幸江、鶴田泰人、松下 治\*、  
David Ralph\*\* , Michael McClelland\*\* , 中尾 稔\*\*\*

Int.J.Syst.Bacteriol. 45 (4), 804-810 (1995)

**Genetic and phenotypic analysis of *Borrelia miyamotoi*  
sp. nov., Isolated from the ixodid tick *Ixodes  
persulcatus*, the vector for Lyme disease in Japan**

Masahito Fukunaga, Yukie Takahashi, Yasuto Tsuruta,  
Osamu Matsushita\*, David Ralph\*\*, Michael McClelland\*  
\* and Minoru Nakao\*\*\*

The ixodid tick *Ixodes persulcatus* is the most important vector of Lyme disease in Japan. Most spirochete isolates obtained from *I. persulcatus* ticks have been classified as *Borrelia burgdorferi* sensu lato because of their genetic, biological, and immunological characteristics. However, we found that a small number of isolates obtained from *I. persulcatus* contained a smaller 38-kDa endoflagellar protein and single 23S-5S rRNA gene unit. Representative isolate, HT31<sup>T</sup> (T = type strain), had the same 23S rRNA gene physical map as *Borrelia turicatae*. The DNA base composition of strain HT31<sup>T</sup> was 28.6 mol% G+C. DNA-DNA hybridization experiments showed that strain HT31<sup>T</sup> exhibited moderate levels of DNA relatedness (24 to 51%) with *Borrelia hermsii*, *B. turicatae*, *B. parkeri*, and *B. coriaceae*. However, the levels of DNA reassociation with the previously described Lyme disease borreliae (*B. burgdorferi*, *B. garinii*, and *B. afzelii*) were only 8 to 13%. None of the previously described species examined exhibited a high level of DNA relatedness with strain HT31<sup>T</sup>. In addition, the 16S rRNA gene sequence (1,368 nucleotides) of strain HT31<sup>T</sup> was determined and aligned with the 16S rRNA sequences of other *Borrelia* species. Distance matrix analyses were performed, and a phylogenetic tree

was constructed. The results showed that isolate HT31<sup>T</sup> is only distantly related to both previously described Lyme disease borreliae and relapsing fever borreliae. Thus, the spirochetes isolated from *I. persulcatus* and closely related isolates should be classified as members of a new *Borrelia* species. We propose the name *Borrelia miyamotoi* sp. nov. for this spirochetes; strain HT31 is the type strain.

日本におけるライム病ボレリアのベクターであるシュルツェマダニから、少数ではあるがライム病ボレリアとは生化学的、免疫学的、遺伝学的性質の異なった株が分離された。これらの株は回帰熱ボレリアのグループに近縁で、数種の分類学的基準から新種であることが明らかとなり、HT31<sup>T</sup>を標準株とし *Borrelia miyamotoi* と命名した。

\* Department of Microbiology, Kagawa Medical School

香川医科大学微生物学研究室

\*\* California Institute of Biological Research

\*\*\* Department of Parasitology, Asahikawa Medical College

旭川医科大学寄生虫学教室