

Article

Detection of *Borrelia burgdorferi* Sensu Lato and Relapsing Fever *Borrelia* in Feeding *Ixodes* Ticks and Rodents in Sarawak, Malaysia: New Geographical Records of *Borrelia yangtzensis* and *Borrelia miyamotoi*

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Abstract: Members of the *Borrelia burgdorferi* sensu lato (Bbsl) complex are etiological agents of Lyme disease (LD), and *Borrelia miyamotoi* is one of the relapsing fever *Borrelia* (RFB). Despite the serological evidence of LD in Malaysia, there has been no report from Sarawak, Malaysian Borneo. Thus, this study aimed to detect and characterize *Borrelia* in rodents and *Ixodes* ticks from primary forests and an oil palm (OP) plantation in Sarawak. *Borrelia yangtzensis* (a member of the Bbsl complex) was detected in 43.8% (14/32) of *Ixodes granulatus*; most of the positive ticks were from the OP plantation (13/14). Out of 56 rodents, *B. yangtzensis* was detected in four *Rattus* spp. from the OP plantation and *B. miyamotoi* was detected in one rodent, *Sundamys muelleri*, from the primary forest. Further, the positive samples of *B. yangtzensis* were randomly selected for multilocus sequence analysis (MLSA). The MLSA results of successfully amplified tick samples revealed a clustering with the sequences isolated from Japan and China. This study is the first evidence of *B. miyamotoi*, a known human pathogen in Malaysia, and *B. yangtzensis*, which is circulating in ticks and rodents in Sarawak, Malaysian Borneo, and presenting a new geographical record of the *Borrelia* spp.

Keywords: *Borrelia miyamotoi*; *Borrelia yangtzensis*; *Ixodes granulatus*; rodent; Sarawak; Malaysia

1. Introduction

Members of the *Borrelia burgdorferi* sensu lato (Bbsl) complex are etiological agents of Lyme disease (LD), and *Borrelia miyamotoi* is one of the relapsing fever *Borrelia* (RFB) [1]. There are currently