FIRST ISOLATION OF LYME DISEASE SPirochete, BORRELIA BURGDORFERI FROM BLACKLEGGED TICK, IXODES SCAPULARIS, COLLECTED AT RONDEAU PROVINCIAL PARK, ONTARIO

The Lyme disease spirochete, Borrelia burgdorferi, has been isolated from blacklegged ticks, Ixodes scapularis, collected at Rondeau Provincial Park. The Park is a peninsula located on the north shore of Lake Erie, in Chatham-Kent, and consists of Carolinian hardwood forest. This 3,254 hectare cusparse sandspit was formed by water currents depositing sand over several thousand years. The Park attracts high numbers of birds in the spring.

PREMIER ISOLEMENT DE BORRELIA BURGDORFERI, LE SPIROCHÈTE RESPONSABLE DE LA MALADIE DE LYME, CHEZ IXODES SCAPULARIS, LA TIQUE À PATTES NOIRES, AU PARC PROVINCIAL RONDEAU EN ONTARIO

Le spirochète qui cause la maladie de Lyme a été isolé chez des tiques à pattes noires, Ixodes scapularis, recueillies au Parc provincial Rondeau. Le parc est une péninsule située sur la rive nord du Lac Érié, dans la municipalité de Chatham-Kent, et consiste en une forêt carolinienne de feuillus. Cette sablière en pointe de flèche de 3 254 hectares a été formée par des dépôts laissés par les courants d'eau sur plusieurs milliers d'années. Le parc attire un grand nombre d'oiseaux au printemps.
In the fall of 1998, veterinarians from southwestern Ontario submitted blacklegged ticks that had been removed from dogs which had visited the Park within the previous 3 weeks. One of these dogs had three fully engorged female blacklegged ticks which all laid eggs that developed into viable larvae. Subsequently, during follow-up surveillance on 29 November 1998, a total of 50 adults (25 males, 25 females) were collected by flagging various locations in the Park. In April 1999, the British Columbia Centre for Disease Control (BCCDC), the University of British Columbia, and the Lyme Disease Association of Ontario initiated epidemiologic research in the Park to study *I. scapularis*, a competent vector of Lyme disease.

During the summer of 1999, immature (larva, nymph) blacklegged ticks were removed from small mammals most commonly on white-footed mice, *Peromyscus leucopus*. From 5 to 7 November 1999, a total of 108 live adults (52 males, 56 females) blacklegged ticks were collected by flagging various locations throughout the Park. These were sent by courier to the Vector-Borne Diseases Laboratory, BCCDC, Toronto, British Columbia, for spirochetological analysis.

At BCCDC, the identification of ticks was confirmed. All ticks were surface sterilized using 10% hydrogen peroxide followed by 79% isopropyl alcohol, and transferred to sterile tissue to remove excess water. Ticks were cultured in pools of approximately three adults, according to areas surveyed within the Park. The midgut contents from live ticks were cultured in Barbour-Stoesser-Kelly II medium at 34°C, and cultures were checked weekly by dark-field microscopy. Within 4 days, characteristic motile spirochetes were observed in three cultures.

The isolates were immunostained with monoclonal antibodies for *B. burgdorferi*, namely (OspA 31 kilodalton [kDa], P39 [39 kDa], and flagellin [41 kDa]), and were reactive. Using polymerase chain reaction, DNA amplification of the OspA gene was conducted on the isolates and confirmed positive for *B. burgdorferi*.

Many animals act as hosts in the Park for the three stages (larva, nymph, adult) of blacklegged ticks. The white-footed mouse, *P. leucopus*, is the principal host for larval and nymphal *I. scapularis*. Adult blacklegged ticks are common on the white-tailed deer, *Odocoileus virginianus*, especially in the spring and fall. In North America, *I. scapularis* has been found in over 50 species of mammals and over 55 species of birds.

Across Ontario, the blacklegged tick has widespread distribution, and *B. burgdorferi*-positive *I. scapularis* have been found in various locations. Birds act as hosts for immature blacklegged ticks. Some songbirds act as competent reservoirs of *B. burgdorferi*, and are involved in transporting these immature blacklegged ticks to non-endemic areas. During the 1999 spring bird migration, a *B. burgdorferi*-infected *I. scapularis* nymph was removed from a common yellowthroat, *Geothlypis trichas*, on Bon Portage Island, Nova Scotia. This discovery shows that birds are involved in bringing *B. burgdorferi*-infected blacklegged ticks long distances into Canada from the United States of America.

The highest concentration of blacklegged ticks is located on the South Point Trail in the southwest area of the Park. Visitors are advised to walk in the centre of trails, tuck long pants into socks, and wear light colored clothing (to make ticks more visible). Application of tick repellent on the skin and clothing will help to reduce tick bites. Tick checks after an outing and prompt removal of attached ticks with fine-pointed tweezers are important preventative measures.

Enzootic transmission of *B. burgdorferi* from *I. scapularis* to dogs has been reported at some locations in northern and southern
Ontario(1,4). Host dogs were seropositive for Lyme disease using indirect immunofluorescence assay and Western blot testing.

From 1981 to the end of 1998, a total of 280 human cases of Lyme disease were reported in Ontario. Of these cases, 127 patients had no history of out-of-province travel (C. Le Ber, Public Health Branch, Ontario Ministry of Health and Long-Term Care, Toronto; personal communication, 1999).

In an earlier study, seropositive *Peromyscus* spp. have been reported from Rondeau Provincial Park, however, no *B. burgdorferi* was isolated during that period and *I. scapularis* (reported as *I. dammini*) was not found(5).

This is the first report of the isolation of *B. burgdorferi* at Rondeau Provincial Park. Isolation of *B. burgdorferi* and the occurrence of all three stages (larva, nymph, adult) of live *I. scapularis* ticks on mammalian hosts and in the environment confirms the presence of *B. burgdorferi* and the establishment of an *I. scapularis* tick population in the Park. Further studies are required to determine the endemicity of *B. burgdorferi* in small mammals and the immature stages of *I. scapularis*.

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References


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