

LYME BORRELIOSIS: OF TICKS AND SPIROCHETES

W. Burgdorfer

ABSTRACT

Lyme disease is now recognized as the most prevalent tick-borne spirochetosis in North America, Europe and in many Asian countries, especially Japan. Its global occurrence coincides with the geographic distribution of ticks belonging to the *Ixodes ricinus/persulcatus* complex. In this complex, four species, *Ixodes ricinus*, *Ixodes persulcatus*, *Ixodes scapularis*, and *Ixodes pacificus* are recognized as efficient vectors of the Lyme disease spirochete, *Borrelia burgdorferi*. At least ten additional species of ixodid ticks have been found occasionally infected, but of these only three, namely *Ixodes ovatus* from Japan, *Ixodes holocyclus* from Australia and *Amblyomma americanum* from the U.S.A., appear to be associated with Lyme disease in humans; the remaining seven ticks usually do not attack humans, but are important in maintaining natural foci in which Lyme disease spirochetes persist. Special attention is given to *Ixodes uriae*, a bird tick that maintains *Borrelia burgdorferi* among seabirds in Sweden.

On the basis of DNA homology, rRNA gene restriction patterns, and immunological reactivities, *Borrelia burgdorferi* has been classified into several gene species. Their distribution and possible relationship to clinical manifestations of Lyme disease will be discussed.

It is speculated that ongoing and future tick/spirochete surveys will discover additional distinct gene types of *Borrelia burgdorferi* as well as hitherto undescribed spirochetes.

KEY WORDS

Lyme disease, tick vectors, spirochetes, taxonomy

Erythema (chronicum) migrans (EM) was initially described as a rare skin disease in the Scandinavian countries (1). Today, it is recognized in various parts of the world, particularly in Europe, North America, and Asia as the most prevalent tick-borne spirochetosis. It is a complex illness that may affect not only the skin but also the skeleton, muscles, heart, eye, and nervous system of children and adults alike (2).

Ever since Afzelius described EM in 1910 (3), ticks had been suspected as vectors of a then unknown causal agent. Once the spirochetal etiology was established in late 1981 (4), intensive tick/spirochete surveys led to the realization that this disease - now known as Lyme disease (LD) or Lyme Borreliosis (LB) - occurs around the globe where it coincides with the geographic distribution of ixodid ticks of the *Ixodes ricinus/persulcatus* complex

