

Lyme borreliosis (LB)

- is a tick-transmitted bacterial infection caused by some members of the spirochete group *Borrelia burgdorferi sensu lato*. It is the most prevalent tick-transmitted infection in temperate areas of Europe, North America and Asia, and its geographic distribution is ever-increasing.

Spirochetes



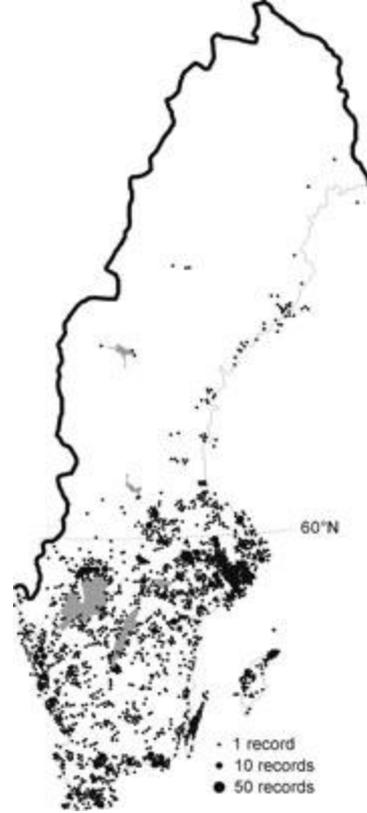
- The *B. burgdorferi* complex comprises at least 15 genospecies worldwide; still, only five are significantly pathogenic to humans.
- All pathogenic genospecies can cause erythema migrans, the early skin rash of LB.

- The overall mean prevalence of *B. burgdorferi* genospecies in ticks in Europe has been estimated at about 12% with higher prevalence in adult ticks than nymphs.
- Central Europe is the region with the highest tick infection rates (nymphs >10%; adult ticks >20%) in Europe, specifically in Austria, Czech Republic, southern Germany, Switzerland, Slovakia and Slovenia

- *Borrelia afzelii* and *B. garinii* are the major pathogenic genospecies found in Europe and are associated with skin and neurological complications, respectively.
- *B. burgdorferi sensu stricto* (the only pathogenic genospecies found in North America) is present in some parts of Europe and can cause neurological and arthritic complications.
- Two other pathogenic genospecies have been identified in Europe: *B. bavariensis*, associated with neurological complications, and *B. spielmanii*.
- *Borrelia valaisiana* and *B. lusitaniae* rarely cause disease in humans.

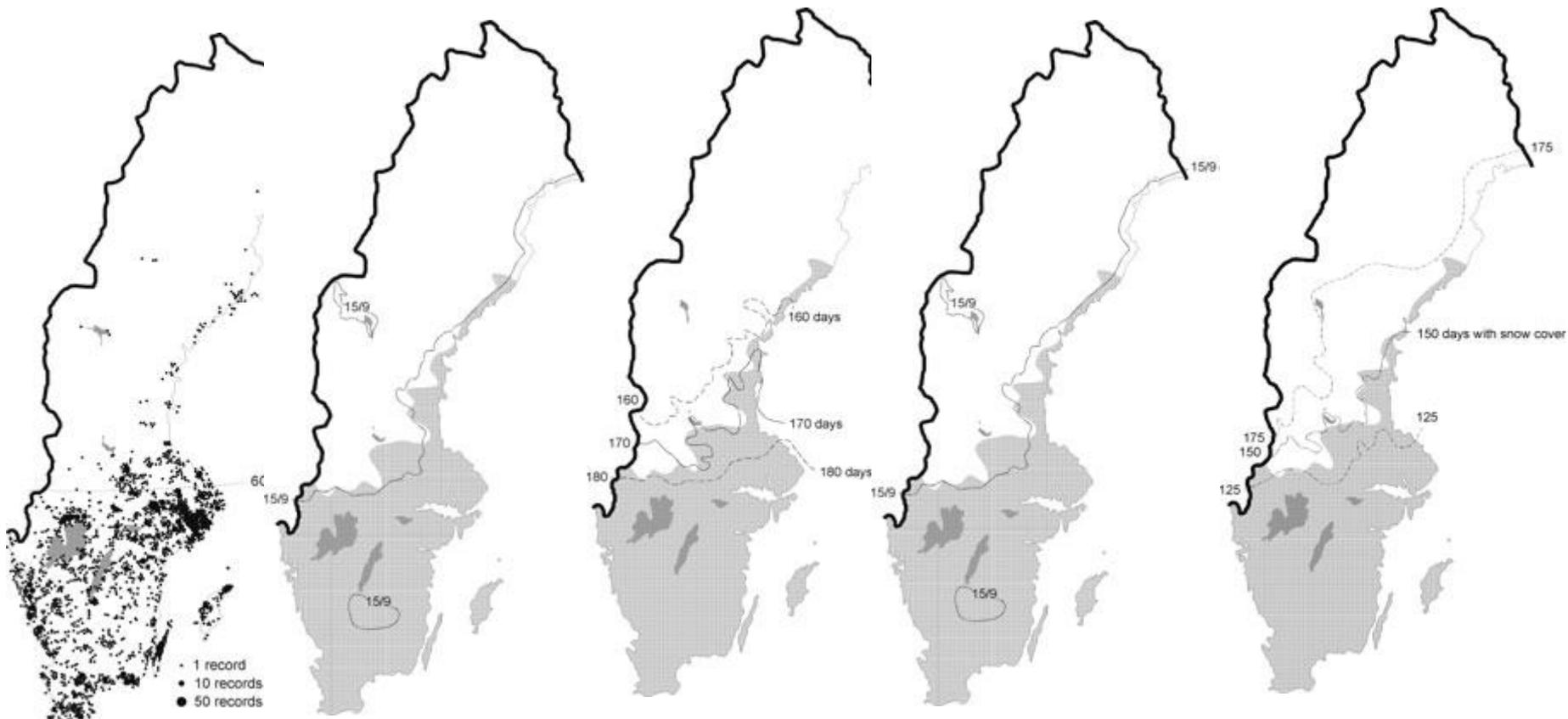
Ixodes ricinus





Swedish records of *Ixodes ricinus* ticks from the late 1980s to early 1990s

- Lyme disease is a spirochetal infection caused by *Borrelia* species (*B. burgdorferi* in the United States, and primarily *B. afzelii* and *B. garinii* in Europe and Asia), which is transmitted by the bite of infected *Ixodes ricinus* complex ticks. In the northeastern US, rodents such as the white-footed mouse are the primary reservoir of *Borrelia* species.



(a) Swedish records of *Ixodes ricinus* ticks from the late 1980s to early 1990s. The smallest dots represent individual records; larger dots indicate 10 and 50 records, respectively. (b) Comparative matching of the estimated distribution of *I. ricinus* in Sweden (shaded area) with the northern limit of the southern boreal zone (solid line) and the northern limit of the boreo-nemoral zone (dashed line). Vegetation Zone data refer to 1961–1990; tick distribution data refer to the period from the late 1980s to early 1990s. (c) Comparative matching of the estimated distribution of *I. ricinus* in Sweden (shaded area), showing isopleths for vegetation periods of 170 days (solid line) and 160 and 180 days (dashed lines). Vegetation period data refer to 1961–1990; tick distribution data refer to the period from the late 1980s to early 1990s. (d) Comparative matching of the estimated distribution of *I. ricinus* in Sweden (shaded area) with the average date of first frost (15 September; solid line). First frost data refer to 1961–1990; tick distribution data refer to the period from the late 1980s to early 1990s. (e) Comparative matching of the estimated distribution of *I. ricinus* in Sweden (shaded area) with snow cover of 150 days (solid line) and 125 and 175 days (dashed lines). Snow cover data refer to 1961–1990; tick distribution data refer to the period from the late 1980s to early 1990s. Jaenson et al Med Vet Entom 23, 226-237, 2009

Tick surveillance

- Since 2005 the Health Protection Agency has promoted an enhanced tick surveillance program. Through engagement with a variety of public and veterinary health agencies and practitioners (e.g., clinicians and veterinarians), wildlife groups (deer society, zoos, animal refuge centers, and academics), and amateur entomologists, >4000 ticks from 900 separate records across Great Britain have been submitted, representing 14 tick species

Tick surveillance in the UK

- It is possible to run a cost-effective nationwide surveillance program to successfully monitor endemic tick species, identify subtle changes in their distribution, and detect the arrival and presence of exotic species.