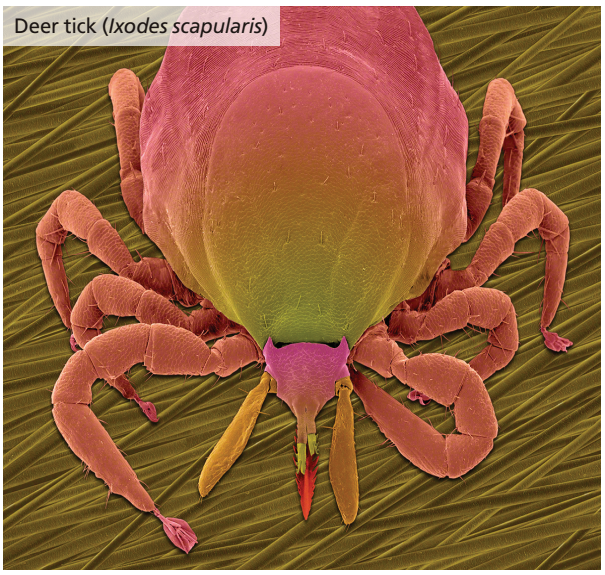
Tracking the Deer Tick

Emerging Lyme Disease Threat in Canada

Lyme disease was first diagnosed during an outbreak in the Northeast and upper Midwest of the United States in the late 1970s. Since that time, the disease has become well established in the northeastern United States. A new study now indicates Lyme disease is continuing to spread north into Canada and, because of a convergence of environmental factors, is poised to emerge as a potential public health threat in southern Quebec [*EHP* **118(7):909–914; Ogden et al.**].

Caused by the bacterium *Borrelia burgdorferi*, Lyme disease is spread through the bite of the deer tick (*Ixodes scapularis*). Symptoms can include skin rash, joint pain, fatigue, and more serious neurologic disorders if the disease is left untreated. Until recently, cooler climate patterns in Canada did not favor the infiltration of *I. scapularis* and consequent spread of Lyme disease, but a warmer climate in southern Quebec may be easing the way for "adventitious" ticks—nonnative ticks introduced most likely by migratory birds—to become established.



Deer tick (*Ixodes scapularis*)

In the current study, researchers analyzed data for *I. scapularis* presence and *B. burgdorferi* infection based on passive surveillance (that is, ticks collected voluntarily by medical and veterinary clinics in Quebec were submitted to the provincial public health laboratory) and active surveillance (the research team's own field analysis of 71 woodland sites in three regions of southern Quebec) to identify areas where Lyme disease is emerging.

I. scapularis have been collected through passive surveillance in Quebec since 1990, but the investigators observed that between 2004 and 2008 the number of ticks collected increased exponentially to more than 1,700 per year. Given that no marked increase occurred in the number of participating clinics during this time, the increase suggests that in addition to the presence of adventitious ticks, breeding populations of *I. scapularis* have now become established in the region. The authors observed a *B. burgdorferi* infection rate of 13.2% in ticks collected through passive surveillance but a lower prevalence of infection in ticks collected at the active surveillance sites (7.7% overall), implying the *I. scapularis* populations that are becoming established are initially free of *B. burgdorferi*. Ticks that did carry *B. burgdorferi* carried strains that were mostly identical to those seen in the northeastern United States.

The authors postulate that warming climate conditions, a growing tick population, and infected ticks hitchhiking from the United States have set up a favorable scenario for increasing the threat of Lyme disease in southern Quebec. They write that increased surveillance in Quebec and the rest of southeastern Canada would help track the progression of risk areas and protect public health.

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From Roadways to Wheeze

Child Asthma Associated with Traffic Exposures at Home and at School

Approximately 6.2 million children in the United States are affected by asthma, a chronic respiratory disease that is becoming increasingly common in developed countries. Air pollution has been identified as one potential cause for the increase, with proximity of children's homes to heavy vehicular traffic being a particular investigative focus. However, research results have not been definitive. A unique prospective study has explored the role of traffic-related pollution in causing asthma by estimating children's exposure both at home and at school against the backdrop of regional ambient air pollution [*EHP* **118(7):1021–1026; McConnell et al.**]. The results associate both school and home exposures with new-onset asthma in young children.

The prospective study included 2,497 children who were asthma-free upon enrollment in the Children's Health Study during the 2002–2003 school year, when they were in kindergarten or first grade. The cohort represented 13 Southern California communities and 45 schools, and the children were followed for 3 years. Parents completed baseline and yearly surveys providing information on demographic characteristics, respiratory illnesses, and risk factors for asthma. Children with physician-diagnosed asthma, symptoms suggesting undiagnosed asthma, or incomplete health symptom data were excluded from the study.

Temperature, relative humidity, and ambient air levels of ozone, nitrogen dioxide, and particulate matter were measured continuously at a central monitoring station in each community. Local traffic-related pollutants were estimated for each child's home and school using a model that incorporated roadway proximity, local traffic density, vehicle emission rates, and meteorologic variables.

During the study, 120 children developed asthma. Development of asthma was independently associated with traffic-related pollution at school and at home; the authors observed a statistically significant association with nitrogen dioxide and nonsignificant associations with fine and ultrafine particulate matter. However, an overall measure of traffic-related pollution (from both freeway and nonfreeway sources) and estimated exposures to individual pollutants were all associated with a significantly increased risk of asthma regardless of whether the exposures occurred at school or at home.

Estimated effects of exposures at school and home were comparable, despite the fact that children spent less time at school than at home. The authors offer possible explanations for this finding: panting during playtime and physical education can increase the dose of pollutants delivered to the lungs, plus children typically arrive at school during morning rush hour, when pollutant levels may be particularly high.

This study strengthens the evidence that nearby vehicular traffic contributes to asthma development and highlights a critical public health concern given that large populations of children are exposed to traffic-related pollutants at school. Controlling vehicular emissions and planning transportation and urban development to limit exposure to traffic-related pollutants could significantly benefit children's health.

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