

THE BRODIE CLUB



Established 1921

Website: <http://thebrodieclub.eeb.utoronto.ca>

THE 1,093rd MEETING OF THE BRODIE CLUB

The 1,093rd meeting of the Brodie Club was held on Tuesday, 17 May, 2016 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chair: John Riley

Secretary: Ed Addison

The meeting was called to order at 7:30 pm and was attended by 29; 21 members and 8 guests.

Roll Call:

Present: E. Addison, R. Addison, Aird, Carley, Currie, Curry, Daniels, Dengler, Eadie, Hussell, King, Kotanen, Martyn, Peter, Reading, Riley, J. Rising, T. Rising, Seymour, Slessor, Speakman.

Guests: Steve Forest (guest of T. Rising), Margaret Shilton (R. Addison), Ron Dengler (N. Dengler) and 5 guests of Seymour: Sandra Stinson, Rose Cheung, Colin Hewitt, John Nishikawa and Greg Stuart.

Regrets: Abraham, Bertin, Bryant, Dunn, A. Falls, B. Falls, Iron, A. Juhola, H. Juhola, Obbard, Pittaway, Rapley, Sutherland, Tomlinson, Zoladeski

Minutes: Approved as presented.

Committee Reports:

Membership Committee: Trudy Rising welcomed Carolyn King to her first meeting as a new member. Carolyn was welcomed with a round of applause.

Field Trip Committee: Bob Curry updated the Club on plans for the field trip. It will begin at 10 A.M. on Saturday June 25 at the N entrance (not the main entrance) of the Metro Toronto Zoo. Admission is free and each member may bring up to one friend. The intent is to keep the free entry of the group to no more than 35 people out of concern for attendance revenue at the zoo. In order to meet this attendance target, members are requested to notify Ron Pittaway of attendance of themselves and any guests well in advance (email jeaniron@sympatico.ca or call 416-445-9297). Bring your own lunch. Coffee and muffins will be provided by our hosts.

Program Committee: Ed Addison mentioned the September members' program and encouraged members willing to provide an approximate 10 minute presentation to contact any members of the committee (E. Addison, B. Falls, H. Currie, G. Bryant, D. Sutherland, M. Johnson). Members were also encouraged to suggest speakers for future meetings.

New Business: John Riley announced publication in late April of a 40 year study of "The Vascular Flora of the Bruce Peninsula" by Joe Johnson of Wiarton. This contribution was self-published and

copies are apt to disappear quickly. (Note: Information at <https://vascularplantsofthebrucepeninsula.wordpress.com/>. Books can be ordered from The Ginger Press in Owen Sound, 519-376-4233, for \$28 plus taxes and postage.)

SPEAKER:



Dr. Andrew Peregrine grew up in Oxfordshire, England, completed his undergraduate, veterinary and Ph.D. degrees from the University of Glasgow and spent 10 years studying diseases of domestic animals in Nairobi, Kenya before accepting a position as a clinical parasitologist at the Ontario Veterinary College (OVC), University of Guelph. We knew that we were about to experience something special when it was noted that Andrew had been selected on numerous occasions during the past 19 years as the top teaching professor at OVC. Andrew's presentation was entitled **"Lyme Disease: is the risk of infection increasing in Ontario?"**

Andrew's talk was exceptional for many reasons including his focus, his self-deprecating humour, his illustrations, the occasional test for Club members, and the clarity of his presentation and answers to questions. Andrew did not talk about the effects of Lyme Disease in humans, instead addressing how, when and where most cases of Lyme Disease may be acquired in Ontario and how potential for changes in transmission in Ontario have occurred in the past and are expected to change in the future.

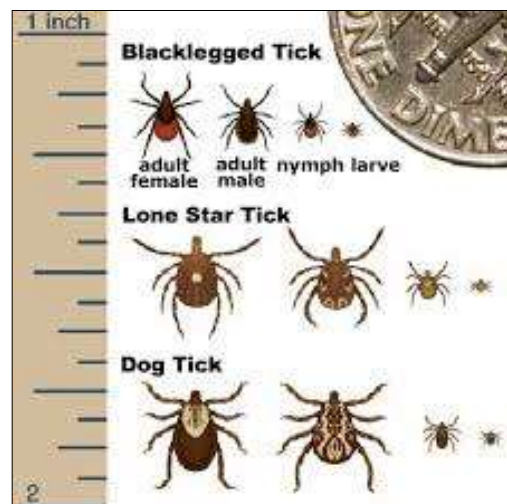
If ticks are found on dogs, they will be found on people. Although there are a number of species of ticks that have been reported from dogs in Ontario [secretary's comment], only two are found commonly. These two species can be readily distinguished from one another; important since one species (*Ixodes scapularis*, commonly called the black-legged tick or deer tick) can transmit the spirochete bacterium (*Borrelia burgdorferi*) that is the cause of Lyme Disease while the other species (*Dermacentor variabilis*, the wood tick or American dog tick) cannot. Thus, if one identifies a tick that has bitten them to be a wood tick, they know that *B. burgdorferi* has not been transmitted to them.

Until the mid-1990s, *I. scapularis*, the black-legged tick or deer tick, was the only tick usually found on dogs in southern Ontario. It has been present on Long Point, Ontario for decades [the secretary and others studied *I. scapularis* on Long Point in 1972-73 where it was common on deer]. The wood or American dog tick is becoming increasingly prevalent in southern Ontario and although it is known to transmit other organisms that can cause serious disease in humans in other areas, none of these diseases are as yet recognized from the wood tick in Ontario. Wood ticks have been common in northwestern Ontario and adjacent Manitoba for decades without serious concerns for transmission of diseases to humans.

Borrelia burgdorferi was described in 1981 and the disease in humans was called Lyme Disease based on a cluster of cases in people in Old Lyme, Connecticut. Although relatively recently described, study of museum specimens of small rodents has revealed the presence of the bacteria in North America from more than 100 years. Based on more recent genetic work, scientists have concluded that the bacterium was in Europe prior to the last ice age. The black-legged tick and the bacterium are considered to have been endemic on Long Point since the 1990s [although a colleague working with the secretary on Long Point in 1972-73 was retrospectively diagnosed with the disease once the bacterium was discovered 10 years later].

The scutum (thoracic plate) of the black-legged tick that can transmit *B. burgdorferi* is a uniform brown in colour and the scutum of the wood/American dog tick is multi-coloured. (Illustration from Healthunit.org)

All hard ticks have four stages: the egg, larva, nymph and adult. The egg hatches and the larvae climb on to vegetation (called questing) and attach to passing animals. In most cases, the larvae attach for their blood meal onto a small rodent. It is primarily white-footed mice that are the reservoir for the bacterium, *B. burgdorferi*. If tick larvae feed on an infected mouse, they acquire the bacteria. After their blood meal, the larvae drop from their first host, shed their cuticle and as freshly emerged nymphs climb vegetation awaiting a passing encounter with another ground-dwelling mammal (usually raccoons, opossums, rabbits) upon which to feed. Nymphs (including infected individuals) can attach to ground-dwelling birds (e.g. robins, sparrows) and be transported large distances during bird migrations. Seventy percent of human cases of Lyme Disease are acquired from nymphal ticks. After the nymphs feed, they detach shed their cuticle and again seek attachment, this time as adults, to passing hosts. The most common hosts of the adult ticks are dogs, raccoons, coyotes, deer and humans.



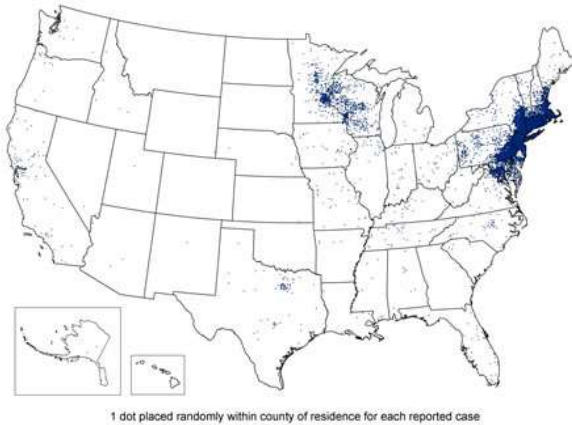
There are peaks of questing *I. scapularis* in spring and autumn with nymphs being the stage most common between the peaks. In contrast, *D. variabilis* mainly attaches to humans only in spring. Thus, if a tick attaches to you in the autumn, it is most likely *I. scapularis*.

Dogs are an ideal sentinel species for monitoring where, when and how much *B. burgdorferi* is in a southern Ontario ecosystem. For decades blood samples have been collected from dogs to establish if they have become infected with the 'dog heartworm' nematode, *Dirofilaria immitis*. This has been done coincident with administering drugs to prevent heartworm. These samples are also used to detect evidence of *B. burgdorferi*. By 2006, *I. scapularis* and, of course, dogs and humans, were distributed throughout much of North America. However, in the same year, 75% of all human cases of Lyme Disease occurred in the northeastern United States. *B. burgdorferi* is not common in the southern U.S. because in that part of their range, *I. scapularis* feeds mainly on lizards rather than infected small rodents.

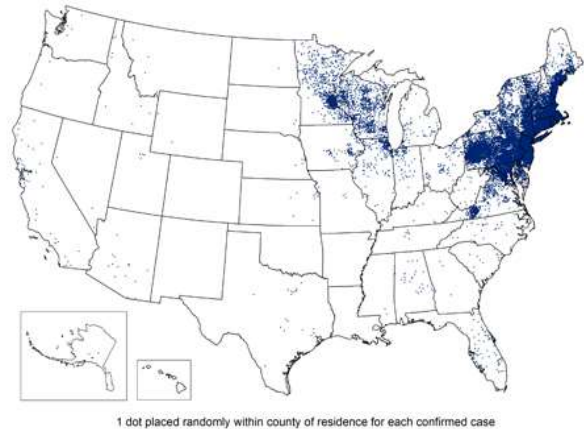
Migrating ground-foraging species of birds are now known to carry *I. scapularis* great distances. When the ticks drop from birds, they seldom establish long-lasting (endemic) populations of ticks. More often, the ticks new to an area by this means of transmission are transitory, usually die without establishing a local population and are referred to as adventitious. In Newfoundland, all *I. scapularis* occurrences are considered adventitious. An estimated 50-175 million ticks enter Canada annually. In 1990, the Long Point area was considered the only endemic area for *I. scapularis* in Ontario. By 2008-2009, all of Pelee, Rondeau, Long Point, Turkey Point, Wainfleet Bog, Prince Edward County and the 1000 Islands area were identified as endemic for *I. scapularis*.

Why is the risk of exposure to *I. scapularis* increasing? There has been a huge spread in the occurrence of human cases of Lyme Disease in the northeastern states from coastal areas north and west into upper New York state reflecting an increase in the black-legged ticks in areas adjacent to southern Ontario and Quebec (see map).

Reported Cases of Lyme Disease -- United States, 2001



Reported Cases of Lyme Disease -- United States, 2014



This is likely one cause for the rapid increase in cases of Lyme Disease and distribution of the black-legged tick in southern Ontario. Some claim that another reason is the expansion of the density/range of white-tailed deer, a host of the adult tick. [The secretary is skeptical as to the importance of this factor since deer numbers have been high for decades in many parts of southern Ontario.] The warming of our annual climate is certainly facilitating the northerly expansion of the ranges of more southerly ticks, as being noted by the increased occurrence of *D. variabilis* in southern Ontario. Increased reforestation of previously opened land also has created more suitable tick habitat.

Overall in Ontario, from 2007-2012, an increasing number of ticks have been tested for *Borrelia* annually and the proportion that are positive continues to increase (see Table).



Outcomes of passive surveillance in 2007-2012 Ontario submissions

Year	<i>Borrelia</i> +ve (%)	<i>Anaplasma</i> +ve (%)	Locations <i>Borrelia</i> +ve
2007	89 (7.5)	4 (0.3)	35
2008	89 (6.4)	3 (0.2)	47
2009	86 (10.0)	3 (0.4)	43
2010	112 (11.6)	3 (0.3)	59
2011	346 (14.3)	8 (0.3)	124
2012	465 (17.3)	8 (0.3)	141
2013	651 (18.4)	10 (0.3)	163

* Bb +ve = *Borrelia burgdorferi*-positive ticks

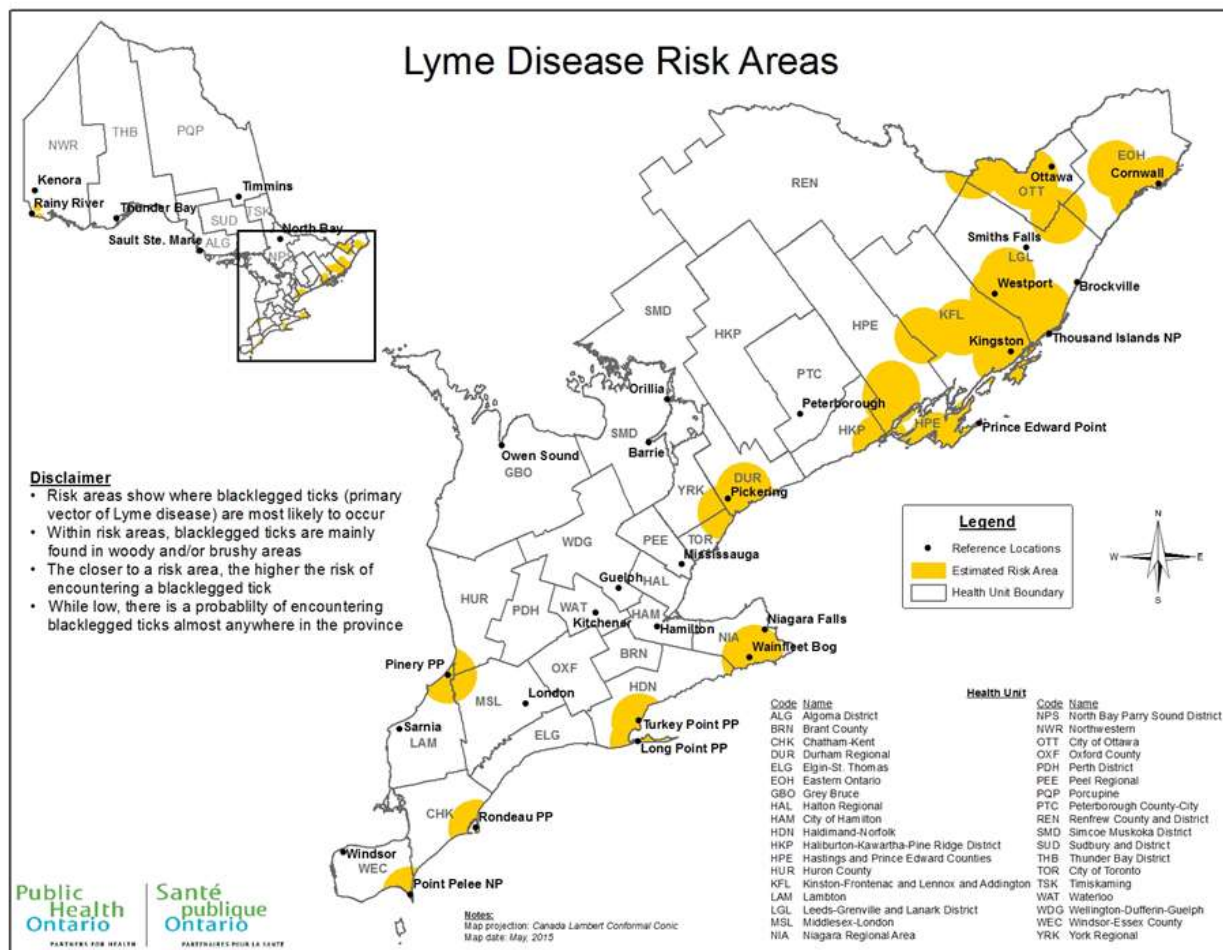
* Ap +ve = *Anaplasma phagocytophilum*-positive ticks

(R. Lindsay, Public Health Agency of Canada)

As of 2013, 18.4% of the black-legged ticks were infected, giving a 1 in 5 chance of acquiring *Borrelia* from attachment of black-legged ticks. On a site specific basis, the chances of being infected are higher. At Point Pelee (2012) 27% of the ticks were infected, on Long Point (2009)

about 60%, and at Murphy's Point Provincial Park where no *I. scapularis* had been observed 5 years ago, 80% of the ticks are now infected. The risk of infection of ticks from Ontario dogs with *B. burgdorferi* was 0.58% in 2007 and increased to 2.31% by 2013-2014. In contrast, 70-90% of ticks from dogs in Connecticut are infected with *B. burgdorferi*.

The Public Health Service used to advise that humans could only acquire Lyme Disease from endemic areas. [Secretary's note: This created great difficulty in getting physicians to consider a diagnosis of Lyme Disease in people from other areas despite cases such as a person who never travelled out from the Chapleau area acquiring Lyme Disease. This led to extreme frustration among those eventually diagnosed with Lyme Disease who had not visited endemic areas.] The Health Service has acknowledged this difficulty and has expanded their designation of areas to include "Lyme Disease Risk Areas", areas where *I. scapularis* has been recovered in two consecutive years (see map).



Infected ticks can only transmit *B. burgdorferi* if attached for 24-36 hours. Thus, when in the field, check yourself for ticks every 24 hours. The ticks prefer moist warm areas which include the back of the neck, armpits and the groin area.

Diagnosis of cases of Lyme Disease in humans in Ontario peaks in July but occurs from May to October. With continuing changes to our climate, the endemic range of *I. scapularis* is expected to reach Cochrane in northern Ontario by 2050.

Questions following the presentation:

Daniels: What will your doctor do if you find a big engorged tick?

Every doctor should now have guidelines. There will still be some that are not up to date. They should also have map with risk areas. If it is the right tick (black-legged deer tick), if you have the symptoms (rash/ fever/ flu) and if you have been in an area with risk, treatment will be with antibiotic on the spot. If it is less than 3 days since tick attached, one dose of antibiotic. If longer, then a longer treatment of antibiotic will be prescribed.

Seymour: What percentage will not show skin lesions?

About 20% do not have the typical “bull’s eye” rash. Most will develop flu-like symptoms within a month and since most cases are in the summer when it is not usual to have flu these should be suspect for Lyme.

Eadie: Can the parasite be found in the blood by testing?

It can be found in the blood but rarely is. It can also be found in joint fluid. Recently a new species of bacterium was discovered in a few U.S. patients that may also cause Lyme disease.

Curry: A pharmacist/naturalist takes tetracycline preventatively on a regular basis....would you consider this effective?

Because of increasing resistance to antibiotics it would seem a questionable practice. Tetracycline is a very broad spectrum antibiotic and perhaps not as effective as some other antibiotics. Perhaps in someone who was profoundly immuno-suppressed it would be more appropriate.

Peter: Will adults survive over winter?

They can remain dormant under the snow. If there is little snow and the ticks are exposed, they may suffer from dehydration.

Currie: Will the Lone Star tick (*Amblyomma americanum*) cause problems here?

Yes!!! It is a voracious blood feeder and is the one tick that frightens me. It transmits several bugs including *Ehrlichia*. Wild turkeys are a common host of the Lone Star tick.

Curry: I have friends who will get ticks whereas I won’t pick them up....same with mosquitoes.

Yes- it is sickening that there seems to be something biochemical that attracts them. Ticks and mosquitoes seem to prefer women.

Riley: Are some people immune?

There is so much variation in the responses to infection with *B. burgdorferi* that, yes, one has to think that there is individual variation in immunosuppression. If someone could develop a vaccine for Lyme they would be very rich. There is post-Lyme Disease phenomenon where you can no longer find the bacterium but something is going on in the immune systems.

Eadie: At Rainy River 20 years ago wood ticks were numerous- you could have 25 ticks after a short time.

Showering is critical in finding ticks. If you find an attached tick remove it with fine tweezers immediately behind the head.... Do not squeeze the abdomen.

R. Addison: Is permethrin effective to keep ticks off clothing?

Yes. The Canadian army is using permethrin (a synthetic) on their clothing. It can be purchased as a spray and pretreated outdoor clothing is available.

Sid Daniels thanked the speaker.

OBSERVATIONS

H. Juhola sent a note on observations made in April on the train through the prairies, especially Saskatchewan. She and Aarne observed (for the 3rd year in a row) large numbers of migrating Snow Geese and Pelicans. The fields were white with birds.

Carley brought copies of the trees, shrubs and vines brochure which is part of the Toronto biodiversity series. Addition copies may be available at some Toronto libraries.

Curry: Some specialists have revisited the taxonomy of azure butterflies and have proposed differing classifications from those previously accepted. See Schmidt, C., and R. Layberry. 2016. What azure blues occur in Canada? A reassessment of *Celastrina* Tutt species (Lepidoptera, Lycaenidae) ZooKeys. April. (viewable online at <http://zookeys.pensoft.net/articles.php?id=7882>)

T. Rising: A day last week at Point Pelee was exceptional for migrating birds. G. Bryant told Rising that it was the best birding day in 60 years. Carly replied that yes it was exceptional but that birds were mostly warblers.

NEXT MEETING

Field trip and picnic: 10 am Toronto Zoo North Entrance. Details will be sent separately.

The meeting was adjourned at approximately 9:30 with many members lingering for further discussion and visiting over coffee.

CORRESPONDENCE

R Addison has forwarded an excellent website by the Vermont Department of Health. http://healthvermont.gov/prevent/lyme/lyme_disease.aspx. There you will find a concise pdf booklet "Be tick smart," a teacher's guide for grade 3-5 curriculum and other information from a state which is dealing high numbers of ticks.