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OUT FOR BLOOD: SPRING TIME IS TICK TIME

by Robert Pinger, PhD, Ball State University

Ticks are a common occurrence throughout Indiana. Because spring usually marks their annual appearance, now is a good time to review what we know about the three species most often encountered by people and their pets.

The American dog tick is ubiquitous, occurring throughout Indiana. *Dermacentor variabilis* (Fig. 1) is a large, slow-moving tick with short mouthparts. It is a cousin of the Rocky Mt. wood tick which occurs in the western United States. Immature stages (larvae and nymphs) of the American dog tick prefer to feed on small mammals and are rarely seen by humans. Adults are active from late March through June.



Fig. 1. American dog tick (adult female).

The lone star tick is more common in southern counties but seems to be occurring with increasing frequency in some central and northern counties. *Amblyomma americanum* (Fig. 2) is a fast crawling tick with long mouthparts. Once confined to Indiana's southernmost counties, lone star ticks have now been reported in at least 67 counties. In some southern counties, such as Warrick, Spencer, Perry and Crawford counties, populations of lone star ticks can become frighteningly high. Unlike the American dog tick, all stages of the lone star tick readily feed on humans. Larvae and nymphs, often referred to as "seed ticks" or "turkey ticks," are small

and difficult to see. It is now thought that lone star ticks do not transmit Rocky Mt. spotted fever, as was once believed, but do transmit a similar, milder disease, human monocytic ehrlichiosis. They also transmit a spirochete, *Borrelia lonestari* that has been associated with southern tick-associated rash illness (STARI). Both of these agents have been isolated from lone star ticks collected in Indiana (Burket et al. 1998; Pinger, unpublished data).



Fig. 2. Lone star tick (adult female).

A third tick species, the blacklegged tick, is now spreading across that state (Fig 3). *Ixodes scapularis*, was virtually unknown in Indiana 30 years ago, but has now been reported in 64 of Indiana's 92 counties. It is much more abundant in the northwestern and western counties. The



Fig. 3. Blacklegged tick (adult female)

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story of the blacklegged tick in Indiana is an interesting one. The first scientific record of *I. scapularis* in Indiana was that of Banks (1908), suggesting that the species had a historical presence in the state. Subsequent surveys, however, failed to produce additional specimens (Cooley & Kohls 1945, Bishopp & Trembley 1945, Wilson 1961). Wilson, who examined more than 4,300 ticks from Indiana mammals, concluded, "I do not believe that *Ixodes scapularis* occurs within the state as a permanent resident at the present time, although occasionally it may be introduced from farther south on domestic animals or man." Whitaker (1982) and Demaree (1986) also failed to confirm *I. scapularis* as a member of the recent tick fauna in Indiana. Demaree, who examined 12,377 tick specimens between 1982-1986, stated that "*Ixodes scapularis* is not an established species in Indiana but is frequently removed from people and pets returning from southern vacation trips."

What happened to the blacklegged tick in Indiana? Why did it disappear during most of the 20th century? Why has it returned? It turns out that the distribution of the blacklegged tick is dependent on the distribution of its primary host, the white-tailed deer. Adult blacklegged ticks, unlike the two other species discussed in this article, are active in the fall. They prefer to feed and mate on the deer. They can, perhaps, survive for a few generations without deer, but they require deer to thrive.

According to Mumford and Whitaker (1982), the white-tailed deer was extinct in Indiana by 1900. It is my view that in the absence of deer, the blacklegged tick also disappeared from Indiana. Occasional reintroduc-

tions from populations outside the state occurred but, in the absence of deer herds, these reintroductions failed to establish a permanent population.

The reintroduction of deer in the 1930s and successful management of these herds over the subsequent decades eventually resulted in the abundance of deer observed in the state today. In 2006, for example, 125,381 deer were legally harvested.

The first specimens of blacklegged ticks collected from indigenous deer were sent to our lab in 1987. These came from Porter, LaPorte, Marshall and Park counties (Pinger & Glancy 1989). In the ensuing years, the species spread throughout much of the state, so that by 2007 specimens had been collected in 65 of Indiana's 92 counties.

The growing distribution of the blacklegged tick in Indiana is a public health concern because the tick's ability to transmit Lyme disease (LD). The first cases of LD in Indiana were reported in the mid-1980s (Pinger et al. 1989). Lyme disease spirochetes were detected in field collected ticks beginning in 1990 (Pinger et al. 1991). During the period 1993-2006, an average of 27 cases of LD was reported annually. A total of 55 cases occurred in 2007, the latest year for which complete data are available (James Howell, Indiana State Department of Health, personal communication).

The presence of ample deer populations throughout most of Indiana suggests that *I. scapularis* will eventually be found in all of Indiana's 92 counties. In some counties, such as Pulaski County, virtually all of the deer arriving at check

stations are infested with deer ticks. At Tippecanoe River State Park the proportion of these ticks that are infected with Lyme disease can exceed 50% (Steiner et al. 2008). As hunters take their deer home they assist in the spread of these ticks. It is important that both scientific and health care provider communities become aware of the health risks posed by the expanding distribution of *I. scapularis* in Indiana. For further information, see the article in the December 2009 issue of the *Proceedings of the Indiana Academy of Science*.

One final note: What is the proper way to remove a tick? While folk remedies abound regarding tick removal, the safety and effectiveness of most of these methods have not been scientifically verified. Glen Needham (1985), of the Ohio State University's Acarology Lab, outlined the correct procedure for removing attached ticks. Blunt curved forceps or tweezers should be used. If fingers are used, shield them with a tissue, or rubber gloves. 1) Grasp the tick as close to the skin surface as possible and pull upward with steady even pressure (Fig. 4). (Do not twist or jerk the tick as this may cause the mouthparts to break off and stay in the skin. Take care not to squeeze,



Fig. 4. Proper tick removal.

crush or puncture the body of the tick as its fluids (saliva, hemolymph, gut contents) may contain infective agents. Do not handle the tick with bare hands, as infectious agents may enter via mucous membranes or breaks in the skin. This precaution is particularly directed to individuals who “detick” domestic animals using unprotected fingers. Children should not be permitted to do this procedure.). 2) After removing the tick, thoroughly disinfect the bite site and wash hands with soap and water. 3) Dispose of the tick safely by placing it in a container of alcohol or flushing it down the toilet. 4) Never remove the tick by using fingernail polish, alcohol, Vaseline, or hot matches.

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Switching Fall and Spring meetings?

In the last Newsletter I wrote about switching the Spring and Fall meetings of the Academy, making the Spring meeting the BIG meeting with presentations and papers and poster presentations, and the Fall meeting to be a business meeting, maybe even including the annual budget meeting as part of the fall meeting.

With the BIG meeting in the spring, we may be more likely to attract students, graduate and undergraduate, who are putting the finishing touches on projects and thus get an opportunity to give reports on their research efforts to the academy as well as a rehearsal for a final defense.

The new fall meeting could also include a debriefing of section chairs and more about their plans for the following spring. Section chairs should remember that we have funds available to sections for special projects in connection with the BIG meeting in the spring and plans for the section to tap into this fund on a competitive basis. (Remember, as section chairs, you are members of the council, and your presence at council/business meetings would be greatly appreciated.)

So, as I wrote earlier, **my challenge to you as individual members of the Academy**, as section chairs or vice chairs, as other members of the council, is to let me know what you are thinking about these suggested changes. E-mail me at johansen@usi.edu with your ideas. I will then be in a position to report on your reactions at our upcoming spring meeting. As the commercial says, let's “think outside the bun.”

-- Nils I. Johansen, P.E.
2009 IAS Past President