

EXPERIMENTAL EXAMINATION OF THE RESERVOIR COMPETENCE  
OF SIX SPECIES OF NATIVE NORTH AMERICAN SONGBIRDS  
FOR THE LYME DISEASE PATHOGEN, *BORRELIA BURGDORFERI*

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## ABSTRACT

During the summers of 1997 and 1998, 40 wild, native North American birds captured at Fire Island National Seashore, Long Island, New York, were tested for reservoir competence for the Lyme Disease spirochete *Borrelia burgdorferi*. In 1997, 954 *Borrelia*-negative *Ixodes scapularis* and *Amblyomma americanum* larvae were applied to 29 birds of six species to determine if they would become *Borrelia*-positive after feeding on the birds. Of all *I. scapularis* recovered from experimental birds, 4 (16.1%) from American Robins tested positive; as did 2 (8.7%) from Northern Cardinals; 5 (4.8%) from Song Sparrows; 8 (4%) from Gray Catbirds; and 6 (1.8%) from Eastern Towhees. The single Brown Thrasher produced no positives. All *Borrelia*-positive ticks were *Ixodes scapularis*, and all *Amblyomma americanum* were *Borrelia*-negative. Additional *I. scapularis* that had not been applied but which were nonetheless recovered from birds also were *Borrelia*-positive: 2 of 4 American Robins (50%) returned positive larvae; as did 1 of 2 Northern Cardinals (50%); 1 of 5 Song Sparrows (20%); and 2 of 6 Eastern Towhees (33%); but none came from the single Brown Thrasher.

In 1998, 233 *Ixodes scapularis* nymphs known to be *Borrelia*-positive were applied to 4 American Robins and 3 Song Sparrows after all wild-attached nymphs and larvae had been allowed to drop. After the infected, laboratory-applied nymphs had dropped, *I. scapularis* larvae known to be *Borrelia*-negative were then applied to the same 4 American Robins and 3 Song Sparrows. All 4 robins then produced between 69.2%–100% positive larvae. Two of 3 Song Sparrows produced 5.3% and 53.8% positive larvae, respectively. These data confirm that native North American birds are capable of becoming infected from *Borrelia*-positive nymphs, acting as reservoirs for spirochetes, and in turn infecting *Borrelia*-negative *I. scapularis* that

attach to them. Of even greater importance is that several bird species yielded higher levels of *Borrelia*-positive *I. scapularis* than the local small mammal *Borrelia* host, White-footed Mouse.

This study also considered average larval body-burdens (relative intensity) for the same 6 species of songbirds. In 1997, American Robins had 31.5 larvae per bird, Eastern Towhees 38.2, Northern Cardinals 11.0, Song Sparrows 9.5, Gray Catbirds 4.2, and the lone Brown Thrasher 4.0. In 1998, American Robins had 32 larvae/nymphs per bird, Song Sparrows 8.7, and Gray Catbirds 5.0. Counting only those *I. scapularis* visible on birds' heads proved an accurate method for estimating the birds' *Ixodes scapularis* total burdens with 82% accuracy, but this technique proved ineffective with *Amblyomma americanum*. Mean *Ixodes* larval engorgement time was 73.3 hours, and nymphal engorgement time was 80.7-94.2 hours; mean *Amblyomma* larval engorgement time was 74.6 hours. Birds dropped ticks of both species by day and by night. Successful larva-to-nymph molting rates averaged 81% in *Ixodes* and 82% in *Amblyomma*. All captive birds lost more body mass in 1997 than in 1998, but within years within species, few changes were statistically significant. Birds held in captivity longer tended to regain weight, so American Robins showed slight but significant weight gains in 1998.