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AN ISOLATING MECHANISM BETWEEN IXODES DAMMINI AND IXODES SCAPULARIS

Because of the distribution of the immatures of *Ixodes scapularis* and *Ixodes dammini* on birds along the Atlantic flyway, and their common requirements for an established population (Rogers A. J., 1953: A study of the Ixodid ticks of Northern Florida. PhD thesis, Univ. MD — College Park; McEnroe W. D., 1976: Acarology 18: 618—625; Anderson J. F., Magnarilli L. A., 1984: Yale J. Biol. Med. 57: 627—641) these ticks would be expected to be a sympatric along the Atlantic coast of USA.

I. scapularis, the dominant pest tick on Florida, is present north to the eastern shore of Maryland (collected by C. Tartanian). *I. dammini* is present from New Jersey north to Massachusetts (Schulze T. L. et al., 1984: J. Med. Ent. 21: 741—749; McEnroe W. D., 1984: Acarology 25: 223—229).

The distance that birds can carry the immatures was shown by the few adult *I. dammini* (identifield by J. E. Kerians) found in Nova Scotia, ca 500 km from Massachusetts, in the absence of any sign of an established population (Specht H. B., personal observation), and the adult *I. scapularis* found on the eastern end of Long Island, New York (collected by A. MacDonald) ca 500 km from Maryland.

In the south, *I. scapularis* has a one year generation time from fall to fall. After the fall breeding season, development continues through the mild winter up to the summer diapause adults, a cycle which avoids the exposure of eggs to lethal summer temperature (McEnroe W. D., 1978: Acarology 20: 58—64).

In the north, *I. dammini* also has an adult summer diapause and a fall breeding season, but in addition to the fall adult cohort, there is a spring adult cohort. The generations alternate between the fall and spring adults with a generation time of 1 1/2 years. (McEnroe W. D., 1984: Acarology 25: 223—229; 1985: Exp. Appl. Acarol. 1: 179—184). In their immature development tages, all were similar except the nymphal molt of *I. dammini* was 50 % longer than that of *I. scapularis* which was postulated as a specific difference. (Krinsky W. L., 1979: J. Med. Ent. 16: 354—355). This extension of a development stage in the north is unexpected. In contrast *Dermacentor variabilis*, when it invaded the cooler climate of Nova Scotia, shortened its development periods (Specht H. B., McEnroe W. D., 1984: Can. J. Zool. 62: 742—743).

In the life cycle of *I. scapularis*, rapid intrastage development is required to produce the cohort of diapause adults for entering the fall breeding period over one year. In contrast, the delayed nymphal molt, starting in December, of *I. dammini* is optimum for the production of the spring cohort. (McEnroe W. D., Specht H. B., 1987: Can. J. Zool. 65: 455—475.) Because the nymphs for the fall adult cohort, enter activity in the spring, it would not affect the production of fall adults.

I. dammini is found in the coastal area where the normal fall mean (September—November) is between ca 12 to 15 °C. *I. scapularis* is found where the fall mean is greater than 15 °C. The difference in the response of the nymphal molt versus temperature between these ticks results in a misfit of their life cycle outside their range and unable to compete against each other.

The rapid nymphal molt of *I. scapularis* is adapted to its 1 year generation time in the south. The slower nymphal molt of *I. dammini* is adapted for the production of spring and fall adults in its 1 1/2 year generation period. Both the difference in the nymphal molting time and in the presence of a spring breeding period can serve as geographic and temporal isolating mechanism between these species.

On Long Island, two females had the internal spur of Coxa 1, diagnostic for females (Spielman A. et al., 1979: J. Med. Entomol. 15: 218—234), intermediate between *I. dammini* and *I. scapularis*. The rare occurrence of this form indicated the absence of a hybrid swarm.

Females collected in the fall of 1987 on Marthas Vineyard island had spurs which showed continuous variation between *I. dammini* and *I. scapularis*. The types for *I. dammini* were collected in this area when the species was separated from *I. scapularis*. There has been a secular trend of above normal late fall temperature with heavy infestation the past 4 years of *I. dammini*. It would appear that the suture zone between *I. dammini* and *I. scapularis* moves north and south under climatic control.

Natural selection for a locally important adaption can result in substantial difference in a few gene loci, and correlation of this trait to fittness can lead to speciation (Felsenstine J., 1981: Evolution 35: 124—134) with post-mating reproductive isolation between the different but closely related species (Dobzhansky T., 1970: Genetics of the Evolutionary Process, Columbia Univ. Press, N. Y., N. Y.).

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