Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

COMMENTARY

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SARS-CoV-2 is Emerging in White-Tailed Deer and Can Infect and Spread Among Deer Mice Experimentally: What About Deer Ticks?

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection of humans is often regarded as a zoonotic infection that originated in bats. Recently, a substantial proportion of white-tailed deer (*Odocoileus virginianus*) in the United States have become infected with SARS-CoV-2, an event regarded as a reverse zoonosis in which the virus presumably was originally spread to deer from humans.[1-3] Deer mice (*Peromyscus maniculatus*) can be infected with SARS-CoV-2 experimentally, and infected mice can transmit the virus to uninfected mice of the same species.[4,5] Whether deer mice or other mice found in nature have become infected is unknown at present. Of interest, certain data indicate that the omicron variant may actually have originated in mice rather than in humans.[6]

Ixodes scapularis ticks (also known as deer ticks or as blacklegged ticks) frequently feed on field mice (including deer mice), as well as on deer and other animals, raising the question of whether they have become, or will become, infected with SARS-CoV-2. Based on genomic data, *I. scapularis*, and certain other ectoparasites, would be expected to have an angiotensin-converting enzyme similar enough to human angiotensin-converting enzyme sequences for there to be a concern that *I. scapularis* would be susceptible to infection with SARS-CoV-2.[7] To determine if SARS-CoV-2, or another coronavirus, may have already infected *I. scapularis* ticks, would require collection of ticks followed by appropriate molecular testing to detect SARS-CoV-2 or another coronavirus, a project that we have recently initiated in the Hudson Valley region of New York State.

How *I. scapularis* ticks might become infected with SARS-CoV-2 is unclear. Based on a study of camels infected with Middle East respiratory syndrome coronavirus (MERS-CoV), the *Hyalomma dromedarii* ticks present on these animals did not demonstrate the presence of MERS-CoV.[8] Although multiple other viruses have been found in or on *I. scapularis* ticks collected before COVID-19 first appeared in the United States, none was a coronavirus.[9] To our knowledge, the only *Ixodes* tick species known to potentially carry a coronavirus is *Ixodes uriae*, based on a study of ticks that had been collected in Norway.[10]

Only one virus is known to be transmissible to humans when an infected *I. scapularis* tick takes a blood meal; this virus is the deer tick virus subtype of the Powassan virus. Thus, it would not be surprising if *I. scapularis* ticks were found to be carrying SARS-CoV-2, that they would not transmit the virus to humans or animals through tick feeding. However, whether mechanical transmission might occur by touching a crushed, or even an intact tick is an open question and would depend on where the virus may be found. Addressing the question of whether SARS-CoV-2 or other coronaviruses can now be identified in or on *I. scapularis* ticks needs more investigation.

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