

SCIENTIFIC NOTE

FIRST RECORD OF THE ASIAN LONGHORNED TICK *HAEMAPHYSALIS LONGICORNIS* IN MISSOURI

LAUREN ROBERTS,¹ BETHANY BRAUER,¹ WILLIAM L. NICHOLSON,² BRYAN N. AYRES,²
KIP R. THOMPSON¹ AND DAVID M. CLABORN^{1,3}

ABSTRACT. The Asian longhorned tick, *Haemaphysalis longicornis*, is an invasive species, originally from eastern Asia, and was first reported in the USA in New Jersey. It is now reported in several eastern states. In 2018, researchers reported *H. longicornis* in northwest Arkansas (Benton County). This tick species is a proven vector of livestock and human diseases, which prompted the current survey of ticks in southwest Missouri. A tick drag in Greene County, Missouri, produced 2 *H. longicornis* nymphs on June 9, 2021. This is the first report of this species for both the state and county.

KEY WORDS Asian longhorned tick, *Haemaphysalis longicornis*, Missouri

The Asian longhorned tick, *Haemaphysalis longicornis* Neumann (ALT), is an exotic East Asian species that has become an important invasive species in Australasian and Western Pacific regions (USDA 2021a). It can reproduce parthenogenetically, a trait that allows it to colonize new geographical areas rapidly. It is also a known vector of several viral, bacterial, and protozoal diseases of humans and livestock. The primary causal agent of a livestock disease to which it has been linked is *Theileria orientalis* Ikeda, which infects both red and white blood cells of the host (USDA 2021b). The role of *H. longicornis* as a vector of other diseases is not well defined. Researchers in Pennsylvania found 1 female adult infected with *Borrelia burgdorferi* (Burgdorfer et al.), the causative agent of Lyme disease, although showing only 0.4% of the ticks infected with the bacterium (Price et al. 2021). In another study, none of the larval ticks were infected after removal from mammals infected with *B. burgdorferi*, *Anaplasma phagocytophilum* (Foggie), *Rickettsia* spp., *Mycoplasma haemocanis*, or *Bartonella* spp. (Tufts et al. 2021). Researchers have isolated several disease agents from *H. longicornis*, including *Ehrlichia chafeensis*, *Anaplasma bovis* Damler et al., and the causative agent of Russian spring-summer encephalitis (Lee and Chae 2010). In Asia, *H. longicornis* is considered the primary vector of severe fever with thrombocytopenia syndrome virus and *Rickettsia japonica* (Levin et al. 2021). As a 3-host tick, *H. longicornis* has the potential to spread disease agents

through a diverse range of hosts. As of September 10, 2021, the ALT had been collected from 27 different hosts in the USA, including white-tailed deer, dogs, raccoons, cattle, humans, and birds (USDA 2021a).

Since the detection of *H. longicornis* on a sheep in New Jersey in 2018 (Rainey et al. 2018), the tick has established itself in much of the eastern United States. Some retrospective identifications indicate that the ALT has been in the USA since 2010 (NRCEVBD 2021). As of May 2021, the United States Department of Agriculture (USDA) confirmed reports of infestations in Virginia, West Virginia, North Carolina, Pennsylvania, New Jersey, Tennessee, New York, Kentucky, Maryland, Connecticut, Delaware, South Carolina, Arkansas, Ohio, and Rhode Island (USDA 2021a). The Arkansas Agriculture Department reported collection of *H. longicornis* in Benton County in 2018 (Arkansas Agriculture Department 2018). Benton County is in the northwest section of Arkansas and borders a region of Missouri where the cattle industry is an important part of the state's economy. A tick survey funded by the Missouri Department of Health and Senior Services was initiated in 2019, using tick flagging and dragging techniques, along with CO₂-baited sticky traps. The survey resumed in the summer of 2021, focusing on collections from veterinary offices supplemented with tick drags. The full findings of the survey will be published upon completion of the study; however, we report here the first collection of *H. longicornis* in Missouri.

We collected 2 *H. longicornis* nymphs using a tick drag in a fallow woodland tract in Greene County, Missouri, on June 9, 2021. The land is owned by Missouri State University (MSU). The land donated to MSU in 2013 had previously been a labor camp during the Depression. Most of the woodland has lain fallow since the 1930s, although a portion of it was a farm several decades ago, and there is currently a right-of-way for a power line through one corner of

¹ Department of Public Health and Sports Medicine, College of Health and Human Services, Missouri State University, 901 South National Avenue, Springfield, MO 65897.

² Ecology and Entomology Team, Rickettsial Zoonoses Branch, Centers for Disease Control and Prevention, Atlanta, GA 30333.

³ To whom correspondence should be addressed.

the property. There are no livestock on the land, and most of the surrounding area is residential. A collector obtained 2 nymphs using a tick drag and identified them microscopically using a pictorial key of Egizi et al. (2019). Both ticks were mailed to the Disease Ecology Laboratory of the Centers for Disease Control and Prevention (CDC) for confirmation. The CDC confirmed the morphological identifications visually as well as with a polymerase chain reaction (PCR)-based test for further confirmation. Confirmation with PCR required sequencing of the mitochondrial 16S rDNA. The test results were reported to MSU on July 7, 2021. The ticks will be donated to the National Tick Collection.

Our tick survey has obtained and identified more than 4,000 ticks during the summers of 2019 and 2021. The 2 nymphs reported here were the only specimens of *H. longicornis* collected. Veterinary sources have provided ticks from dogs, horses, cattle, cats, and donkeys, whereas hunters provided ticks from deer and turkeys. We have not found *H. longicornis* on any of these animals to date. This finding does not prove the existence of an established population of the ALT in Missouri, and additional surveys will be required to determine the population status of this species in the state.

This survey was funded through contract no. DH210049624 from the Missouri Department of Health and Senior Services.

REFERENCES CITED

- Arkansas Agriculture Department. 2018. First detection of the longhorned tick in Arkansas. News Release of June 12, 2018 [Internet]. Little Rock, AR: Arkansas Agriculture Department [accessed July 7, 2021]. Available from: <https://www.nps.gov/buff/learn/news/first-detection-of-longhorned-tick-in-arkansas.htm>.
- Egizi AM, Robbins RG, Beati L, Nava S, Evans CR, Occi JL, Fonseca DM. 2019. A pictorial key to differentiate the recently detected exotic *Haemaphysalis longicornis* Neuman, 1901 (Acari, Ixodidae) from native congeners in North America. *ZooKeys* 818:117–128.
- Lee M-J, Chae J-S. 2010. Molecular detection of *Ehrlichia chaffeensis* and *Anaplasma bovis* in the salivary glands from *Haemaphysalis longicornis* ticks. *Vector Borne Zoonotic Dis* 10:411–413. <https://doi.org/10.1089/vbz.2008.0215>
- Levin ML, Stanley HM, Hartzler K, Snellgrove AN. 2021. Incompetence of the Asian longhorned tick (Acari: Ixodidae) in transmitting the agent of human granulocytic anaplasmosis in the United States. *J Med Entomol* 58:1419–1423.
- NRCEVBD [Northeast Regional Center for Excellence in Vector-Borne Diseases]. 2021. *Asian longhorned tick (cattle tick or bush tick)* [Internet]. Ithaca, NY [accessed September 15, 2021]. Available from: <https://www.neregionalvectorcenter.com/asian-longhorned-tick>.
- Price KJ, Graham CB, Witmier BJ, Chapman HA, Coder BL, Boyer CN, Foster E, Maes SE, Bai Y, Eisen RJ, Andrew DK. 2021. *Borrelia burgdorferi sensu strictu* DNA in field-collected *Haemaphysalis longicornis* ticks, Pennsylvania, United States. *Emerg Infect Dis* 27:608–611.
- Rainey, R, Occi JL, Robbins RG, Egizi A. 2018. Discovery of *Haemaphysalis longicornis* (Ixodida: Ixodidae) parasitizing a sheep in New Jersey, United States. *J Med Entomol* 55:757–759.
- Tufts, DM, Goodman LB, Benedict MC, Davis AD, VanAcker MC, Diuk-Wasser M. 2021. Association of the invasive *Haemaphysalis longicornis* tick with vertebrate hosts, other native tick vectors, and tick-borne pathogens in New York City, USA. *Int J Parasitol* 51:149–157.
- USDA [United States Department of Agriculture]. 2021a. National *Haemaphysalis longicornis* (Asian longhorned tick) situation report [Internet]. Washington, DC: USDA [accessed July 7, 2021]. Available from: https://www.aphis.usda.gov/animal_health/animal_diseases/tick/downloads/longhorned-tick-sitrepreport.pdf.
- USDA [United States Department of Agriculture]. 2021b. Emerging risk notice: *Theileria orientalis* Ikeda [Internet]. Washington, DC: USDA, Animal and Plant Health Inspection Service [accessed July 7, 2021]. Available from: https://www.aphis.usda.gov/animal_health/downloads/theileria-orientalis-ikeda-notice.pdf.