

## Research Article

### Clinical report of the spinose ear tick, *Otobius megnini* (Acari: Parasitiformes: Argasidae), from a domestic cat, *Felis silvestris catus*, and first record from Northwest Arkansas

Skvarla, M.J.<sup>1\*</sup>, G. E. Evans<sup>2</sup>, J. R. Fisher<sup>1</sup>, A. P. G. Dowling<sup>1</sup>

<sup>1</sup>Department of Entomology, 319 Agriculture Building, University of Arkansas, Fayetteville, AR, 72701

<sup>2</sup>Pet Protection Clinic, 2087 South School Ave., Fayetteville, AR 72701

\*Corresponding author email: [mskvarla36@gmail.com](mailto:mskvarla36@gmail.com)

Received: 24-VIII-2015 Accepted: 02-XI-2015

---

**Abstract:** We provide a brief overview of the spinose ear tick, *Otobius megnini* (Dugès 1884 ) (Acari: Parasitiformes: Argasidae), describe a clinical case from a domestic cat, *Felis silvestris catus* L. 1758, and report the species for the first time from Northwest Arkansas.

**Key Words:** Soft tick

---

## Introduction

Spinose ear tick, *Otobius megnini* (Acari: Parasitiformes: Argasidae) (Fig. 1), is a single-host soft tick that parasitizes mammals, particularly domestic cattle (Cooley and Kohls 1944, Hoskins and Cupp 1988), though it has been collected from a wide variety of native and domestic animals (Table 1).

Spinose ear ticks are native to North America west of the 97<sup>th</sup> meridian (USA: Bishopp and Trembley 1945, Cortinas and Spomer 2014, Canada: Rich 1957, Mexico: Hooker et al 1912, Valdez 1923, Hoffman 1930, Hoffmann 1962) but have spread to eastern North America (Reeves et al 2002, Goddard 2006) and Hawaii (Abbott 1941), as well as around the world (Africa: Bedford 1912, MacLeod et al. 1970, Horak and Matthee 2003, Horak et al 2010, India: Kingston 1936, Sri Lanka: Diyes et al. 2014, Australia: Mayberry 2003), probably through infested livestock shipments (Bowman et al. 2002). Populations in Central (Hoskins and Cupp 1988) and South America (Argentina: Aragao 1935, Brazil: Pinto 1930, Peru, Bolivia, Chile: Rich 1957) have been hypothesized to introduced as well, however, considering the known range is now nearly continuous between North and South America, they may be naturally occurring there and further investigation into population genetics is needed.

Larvae and nymphs feed on blood inside the ears of infested animals while adults are non-feeding and live off host. Larva feed for one to two weeks while nymphs feed for one to seven months (Imos 1918). After feeding, nymphs drop off the host and crawl to a secluded location, such as cracks in trees, fences, or buildings, where they molt into adults, mate, and lay eggs (Imos 1918).

Nymphal feeding in domestic animals can cause enough pain for animals to develop a number of clinical signs, including head shaking, colic, hyperesthesia, tremors and muscle spasms, paralysis, and emaciation (Chandler 1922, Madigan et al 1995, Pecina 2012, Zarate-Ramos et al. 2014). Feeding may cause destruction of the ear canal and tympanic membrane and cause otitis interna (Ballweber 2014) and infested animals might develop secondary microbial infections or acquire maggot infestations in tick feeding wounds (TickApp 2011). Additionally, spinose ear ticks are suspected vectors of *Coxiella burnetii*, the causative agent of Q fever (Hoskins and Cupp 1988).

Acaricide treatment of large areas such as pastures is impractical, though treatment in confined areas such as stables and kennels may help reduce the number of adult ticks and larvae that have not found a host (Ballweber 2014), elimination of protected sites where females can lay eggs may also help decrease populations (Ballweber 2014). When treating individual animals, small infestations might be treated by manually removing the ticks. Pesticides such as avermectins, phenylpyrazoles, thiophosphates, and organophosphates have proven effective control when applied into the ear of infested animals (Drummond et al 1967, Mayberry 2003, Ballweber 2014, Zarate-Ramos et al. 2014). One study investigating systemic biocides found them to be ineffective (Nava and Guglielmo 2009), though further work should be done to characterize common systemic agents in other animals.

Despite a history of being listed as a parasite of domestic cats (e.g., Bedford 1925, Dikmans 1945, Benbrook 1954, Hoffmann 1962, Ivens et al. 1978, Rudolph 1985, Bowman et al. 2002) and passing reports of ticks collected on cats (e.g., Brumpt 1936, Cooley and Kohls 1944, Rich 1957, Smith et al. 1969, MacLeod et al 1970), clinical reports are nonexistent. While clinical signs have not been reported from domestic cats, lions have been reported to develop pruritis (Bowman et al. 2002), although they might be asymptomatic (Munao Diniz et al 1987).

Spinose ear ticks were originally reported in Arkansas from localized populations in three counties (Independence, Izard, and Yell). It was hypothesized that they were introduced and became established during the 1950's when large herds of Texas cattle were relocated to Arkansas due to severe drought (Lancaster 1973, Lancaster 1984). Subsequent nation-wide survey efforts have consistently reported spinose ear tick from the state (United States Department of Agriculture 1962, 1964, 1965, 1966, 1968, 1969, 1970, 1971, 1972, 1975, 1978, 1988, 1994), though they did not report county or finer scale distribution data. Therefore, this is the first report of *Otobius megnini* from Northwest Arkansas and the first record of the species on a domestic cat in the state.

## Materials and Methods

Two specimens were removed from the ears of a domestic cat (*Felis silvestris catus*) (see Clinical Case below).

Literature records of *Otobius megnini* on domestic cats and in Arkansas were found by searching Keirans and Pounds (2013) excellent annotated bibliography.

Stereomicrographs were taken with a Nikon SMZ1500 microscope and Cannon EOS 40D camera attached to the microscope with a Diagnostic Instruments DD20NLT 2.0X camera mount.

Specimens are deposited in the Acarology Collection at the University of Arkansas.

## Clinical Case

The patient, Harvey, a 6 year old neutered male domestic short haired feline weighing 10.6 pounds, lives on a cattle farm in Fayetteville, Arkansas. He was first presented to the Pet Protection Clinic and examined on October 23, 2012 for routine annual exam and vaccination for rabies, FVRCP, and feline leukemia. Physical exam was unremarkable with all parameters within normal limits. On examination of the left ear a parasite was noted and extracted in the exam room with the use of a cotton swab. Right ear canal was within normal limits. The parasite was not something routinely seen and since the patient was not bothered by it he was put on topical Revolution<sup>®</sup> (selamectin) for broad spectrum parasite control. Vaccines were administered and patient was discharged.

Owner inconsistently used Revolution<sup>®</sup> and the patient was not seen again in the clinic until January 19, 2015. On presentation, patient appeared healthy and all parameters were within normal limits. Upon this visit one parasite was noted in each horizontal ear canal by the second author. Extraction was unsuccessful with a cotton swab as before. Patient was kept overnight and sedated the next morning with Ketamine dose and Valium dose intravenously. Both parasites were removed and taken to the University of Arkansas entomology department for identification where they were determined to be spinose ear ticks (*Otobius megnini*). Patient was given a dexamethasone intramuscular injection (2 mg/ml) for inflammation and started again on topical parasite control using Revolution<sup>®</sup>. Once the parasites were identified as ticks the patient was switched to Frontline<sup>®</sup> (fipronil) as it has better efficacy for ticks in comparison to Revolution<sup>®</sup>.

**Discussion**

Spinose ear ticks are an important pest of cattle that have been spread around the world through human transport of infested stock. They occasionally infest other animals, including domestic cats, though few clinical reports exist. The lack of clinical reports and the fact that other felids (i.e., lions) exhibit only minor clinical signs suggests domestic cats may exhibit no or only minor clinical signs. The clinical report presented here, while only based on a single patient, supports this hypothesis. This suggests cats associated with cattle production may serve as a host of spinose ear ticks and should be screened when cattle are treated for ticks or if moved to new farms. Additionally, regardless of whether the lack of published clinical reports concerning domestic cats is due to the lack or rarity of infestations, lack of clinical signs, or other causes, we suggest future subclinical cases be reported in order to confirm this hypothesis.

Finally, while spinose ear ticks have been reported from Arkansas for more than fifty years, this is the first occurrence recorded in northwest Arkansas. As it is likely they have been present in the area for many years, this highlights the importance of reporting county-level rather than state-level occurrence data.

**Acknowledgments**

We thank Harvey's owner, Mrs. Betty Knox, for bringing Harvey in for his examination.

## References

- Abbott, R. T. 1941.** Spinose ear tick is found on cattle in the territory. *Hawaii Farm and Home* 4: 30.
- Aragão, H. de B. 1935.** Observacoes sobre os Ixodideos da Republica Argentina. *Mem. do Inst. Oswaldo Cruz* 30: 519–533.
- Ballweber, L. 2014.** The spinose ear tick – *Otobius megnini*. Veterinary diagnostic laboratories. College of Veterinary Medicine and Biomedical Sciences, Colorado State University. Online posting (<http://csu-cvmb.colostate.edu/vdl/Pages/spinose-ear-tick.aspx>), accessed 22 January 2015.
- Barbará, B., and R.L. Dios. 1918.** Contribucion al estudio de la sistemática y biología de los Ixodidae de la República Argentina y de algunos países vecinos. *Revista del Inst. Bacteriol. del Dep. Nac. de Higiene, Buenos Aires* 1: 285–322.
- Bedford, G. A. 1912.** A tick new to South Africa. Second Rep. of the Dir. of Vet. Res. (Dep. of Agriculture), Cape Town, 343–344.
- Bedford, G. A. 1925.** The spinose ear-tick (*Ornithodoros megnini* Dugès). *J. of the Dep. of Agric. Union of S. Afr.* 10: 147–153.
- Benbrook, E. A. 1954.** List of parasites of domesticated animals in North America. Minneapolis Burgess Publishing Co., Minneapolis, MN.
- Blood, D. A. 1963.** Parasites from California bighorn sheep in Southern British Columbia. *Can. J. of Zool.* 41: 913–918.
- Bishopp, F. C., and H.L. Trembley. 1945.** Distribution and hosts of certain North American ticks. *J. of Parasitol.* 31: 1–53.
- Brumpt, E. 1936.** Contribution a l'étude de l'évolution des Ornithodores. Biologie et longévité de l'*Ornithodoros megnini*. *Ann. de Parasitol. Hum. et Comp.* 14: 647–651.
- Bowman, D. D., C.M. Hendrix, D.S. Lindsay, and S.C. Barr. 2002.** *Feline Clinical Parasitology*. Iowa State University Press, Ames, IA.
- Chandler, A. C. 1922.** *Animal Parasites and Human Disease*. Wiley and Sons, New York, NY.
- Cooley, R. A., and G. M. Kohls. 1944.** The Argasidae of North America, Central America and Cuba. Monograph 1. *Am. Midl. Nat.* University of Notre Dame, Notre Dame, IN.
- Cortinas, R., and S. Spomer. 2014.** Occurrence and county-level distribution of ticks (Acari: Ixodidae) in Nebraska using passive surveillance. *J. Med. Ent.* 51(2): 352–359.
- Dikmans, G. 1945.** Check list of internal and external animal parasites of domestic animals in North America. *Am. J. of Vet. Res.* 6: 211–241.
- Diyes, G. C. P., P. B. Akalanka, and R.S. Rajakaruna. 2014.** Life cycle of spinose ear tick *Otobius megnini* associated with horse otoacariasis in Sri Lanka. *Proc. of the Peradeniya Univ. Res. Ses.* 18: 484.
- Drewek, J., Jr. 1980.** Behavior, population structure, parasitism, and other aspects of coyote ecology in southern Arizona. Ph.D. dissertation, University of Arizona, Tucson, AZ.
- Drummond, R. O., T.M. Whetstone, and S.E. Ernst. 1967.** Insecticidal control of the ear tick in the ears of cattle. *J. of Econ. Entomol.* 60: 1021–1025.
- Eads, R. B. 1948.** Ectoparasites from a series of Texas coyotes. *J. of Mammal.* 29(3): 268–271.
- Eads, R. B., and E. G. Campos. 1984.** Human parasitism by *Otobius megnini* (Acari: Argasidae) in New Mexico. *J. of Med. Entomol.* 21: 244.
- Foreyt, W. J., C. W. Leathers, and G. Hattan. 1994.** Bot fly larvae (*Cephenemyia jellisoni*) as a cause of neurologic signs in an elk. *J. of Wildl. Dis.* 30: 470–471.

- Goddard, J. 2006.** An annotated list of the ticks (Ixodidae and Argasidae) of Mississippi. *J. Vector Ecol.* 31: 206–209.
- Gray, G. G. 1980.** Aspects of Barbary sheep (*Ammotragus lervia*) biology in Palo Duro Canyon, Texas. Ph.D. dissertation, Texas Tech University, Lubbock, TX.
- Gray, G. G., and D. B. Pence. 1979.** Ectoparasites of sympatric Barbary sheep and mule deer in the Texas Panhandle, USA. *J. Med. Entomol.* 16: 448–449.
- Hoffman, C. C. 1930.** Monografias para la entomologia medica de Mexico. Monografia Núm. 1. Los Argasidos de Mexico. *An. del Inst. de Biol. de la Univ. Nac. Auton. de Mex.* 1: 135–164.
- Hoffmann, A. 1962.** Monografia de los Ixodoidea de Mexico. I Parte. *Rev. de la Soc. Mex. de Hist. Nat.* 23: 191–307.
- Hoogstraal, H. 1952.** Biological factors of ticks (Ixodoidea) of the Ethiopian faunal region in relation to human injury and disease. *Trans. of the Ninth Int. Congr. of Entomol.* 1: 959–963.
- Hooker, W. A., F. C. Bishop, and H. P. Wood. 1912.** The life history and bionomics of some North American ticks. Bull. 106. U.S. Dep. of Agric., Bur. of Entomol., Government Printing Office, Washington D.C.
- Horak, I. G., S. Matthee. 2003.** Parasites of domestic and wild animals in South Africa. XLIII. Ixodid ticks of domestic dogs and cats in the Western Cape Province. *Onderstepoort J. of Vet. Res.* 70: 187–195.
- Horak, I. G., H. Heyne, and E. F. Donkin. 2010.** Parasites of domestic and wild animals in South Africa. XLVIII. Ticks (Acari: Ixodidae) infesting domestic cats and wild felids in southern Africa. *Onderstepoort J. of Vet. Res.*, 77: Art. #3, doi: 10.4102/ojvr.v77i1.3
- Hoskins, J. D., and E. W. Cupp. 1988.** Ticks of veterinary importance. Part II. The Argasidae family: Identification, behavior, and associated diseases. *Compend. on Contin. Educ. for the Pract. Vet.*, 699–709.
- Huchzermeyer, H. F. 2002.** Another human ear tick case. *J. of the S. Afr. Vet. Med. Assoc.* 73: 2.
- Imos, M. 1918.** The spinose ear tick and methods of treating infested animals. *Farmers Bulletin 980*, United States Department of Agriculture, Washington D.C.
- Ivens, V. R., D. L. Mark, and N. D. Levine. 1978.** Principal parasites of domestic animals in the United States. Biological and diagnostic information. *Colleges of Agriculture and Veterinary Medicine, University of Illinois, Urbana-Champaign, IL.*
- Keirans, J. E., and J. M. Pound. 2003.** An annotated bibliography of the spinose ear tick, *Otobius megnini* (Dugès, 1883) (Acari: Ixodidae: Argasidae) 1883–2000. *Syst. & Appl. Acarol. Spec. Pub.* 13: 1–68.
- Kingston, J. S. 1936.** Spinose ear tick in India. *J. of the R. Army Vet. Corps* 7: 142–143.
- Lancaster, J. L., Jr. 1973.** A Guide to the Ticks of Arkansas. Bulletin 779. Agricultural Experiment Station, Division of Agriculture, University of Arkansas, Fayetteville, AR.
- Lancaster, J. L., Jr. 1984.** Ear tags provide spinose ear tick control. *Ark. Farm Res.* 33: 8.
- MacLeod, J., M. H. Colbo, and S. Bek-Pedersen. 1970.** Occurrence of the spinose ear-tick in Zambia. *Bull. of Epizoot. Dis. of Afr.* 18: 355–358.
- Madigan, J. E. S., S. J. Valberg, C. Ragle, and J. L. Moody. 1995.** Muscle spasms associated with ear tick (*Otobius megnini*) infestations in five horses. *J. of the Am. Vet. Med. Assoc.* 207: 74–76.
- Matthews, B. R. 1989.** *Otobius megnini* (spinose ear tick) in a dog. *Can. Vet. J.* 30: 180.
- Mayberry, C. 2003.** Spinose ear tick (*Otobius megnini*). Department of Agriculture Factsheet No. 1/2003., Government of Western Australia.

- Meleney, W. P. 1975.** Arthropod parasites of the collared peccary, *Tayassu tajacu* (Artiodactyla: Tayassuidae), from New Mexico. *J. of Parasitol.* 61: 530–534.
- Munaó Diniz, L. S., H. E. Belluomini, L. P. Travassos Filho, and M. B. da Rocha. 1987.** Presence of the ear mite *Otobius megnini* in the external ear canal of lions (*Panthera leo*). *J. of Zoo Anim. Med.* 18: 154–155.
- Naude, T. W., H. Heyne, I. R. Van der Merwe, and M. J. Benic. 2001.** Spinose ear tick, *Otobius megnini* (Duges, 1884) as the cause of an incident of painful otitis externa in humans. *J. of the S. Afr. Vet. Assoc.* 72: 118–119.
- Nava, S., and A. A. Guglielmo. 2009.** Difficulties to control natural infestations with *Otobius megnini* (Acari: Argasidae) nymphs in cattle with systemic biocides. *Res. in Vet. Sci.* 87: 258–259.
- Pecina, C. A. 2012.** Tick paralysis. *Semin. in Neurol.* 32: 531–532.
- Pinto, C. 1930.** Artrópodes, parasitos e transmissores de doenças. *Bibl. Sci. Am. Bras.* 117: 1–63.
- Reeves, W., L. Durden, and W. Wills. 2002.** New records of ticks (Acari: Argasidae, Ixodidae) from South Carolina. *J. of Agric. and Urban Entomol.* 19: 197–204.
- Rich, G. B. 1957.** The ear tick, *Otobius megnini* (Duges) (Acarina: Argasidae), and its record in British Columbia. *Can. J. of Comp. Med.* 21: 415–418.
- Rudolph, R. R. 1985.** Arthropod pests of pet animals. pp. 315-321. In: R.E. Williams, R.D. Hall, A. Broce, and P.J. Scholl [eds] *Livestock entomology*. John Wiley and Sons, New York, NY.
- Russell, L. J. 1967.** The parasites of the whitetail deer (*Odocoileus virginianus ochrourus*) of British Columbia. M.S. thesis. University of British Columbia, Vancouver, BC.
- Smith, H. H., R. J. Janssen, G. A. Mail, and S. A. Wood. 1969.** Arbovirus activity in southern Arizona. *Am. J. of Trop. Med. and Hyg.* 18: 448–454.
- Texas A&M University. 2011.** The TickApp for Texas and the Southern Region. The Texas A & M University System. Online posting (<http://tickapp.tamu.edu/index.php>), accessed 22 January 2015.
- Ugochukwu, E. I., C. C. Nnadozie. 1985.** Ectoparasitic infestation of dogs in Bendel State, Nigeria. *Int. J. of Zoonoses* 12: 308–312.
- (USDA) United States Department of Agriculture. 1962.** Report of cooperative cattle fever tick eradication activities fiscal year 1962. Animal Disease Eradication Division, Agricultural Research Service.
- (USDA) United States Department of Agriculture. 1964.** National tick survey calendar year 1963. Animal Disease Eradication Division, Agricultural Research Service.
- (USDA) United States Department of Agriculture. 1965.** National tick survey - CY 1964. Animal Disease Eradication Division, Agricultural Research Service.
- (USDA) United States Department of Agriculture. 1966.** National tick surveillance program calendar year 1965. Animal Health Division, Agricultural Research Service.
- (USDA) United States Department of Agriculture. 1968.** National tick surveillance program calendar year 1967. Animal Health Division, Agricultural Research Service.
- (USDA) United States Department of Agriculture. 1969.** National tick surveillance program calendar year 1968. Animal Health Division, Agricultural Research Service.
- (USDA) United States Department of Agriculture. 1970.** National tick surveillance program calendar year 1969. Animal Health Division, Agricultural Research Service, ARS 91-91.
- (USDA) United States Department of Agriculture. 1971.** National tick surveillance program calendar year 1970. Animal Health Division, Agricultural Research Service, ARS 91-102.

- (USDA) United States Department of Agriculture. 1972.** National tick surveillance program calendar year 1971. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-8.
- (USDA) United States Department of Agriculture. 1975.** National tick surveillance program calendar year 1974. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-28.
- (USDA) United States Department of Agriculture. 1978.** National tick surveillance program calendar year 1977. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-35.
- (USDA) United States Department of Agriculture. 1988.** National tick surveillance program calendar year 1987. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-39.
- (USDA) United States Department of Agriculture. 1994.** National tick surveillance program calendar years 1988-89. Animal and Plant Health Inspection Service, APHIS 91-45-005.
- Valdez, S. M. 1923.** Ensayo de una Monografía sobre Ixodidos Mexicanos vulgo garrapatas. Me. De la Soc. "Alzate" 41: 197–216, pls. 44–54.
- White, S. D., K. V. Scott, and J. M. Cheney. 1995.** *Otobius megnini* infestation in three dogs. Vet. Dermatol. 6: 33–35.
- Worley, D. E., R. E. Barrett, P. J. A. Presidente, and R. H. Jacobson. 1969.** The Rocky Mountain elk as a reservoir host for parasites of domestic animals in western Montana. Proc. Ann. Conf. Bull. Wildl. Dis. Assoc. 5: 348-350.
- Zarate-Ramos, J. J., A. M. Nevárez-Garza, D. E. Zamora-Ávila, and L. E. Rodríguez-Tovar. 2014.** Myotonia and colic associated with the spinose ear tick, *Otobius megnini*, in a horse in northern Mexico. Res. J. of Parasitol 9: 16–20.

**Table 1.** Non-cattle hosts of *Otobius megnini* and select references.

Common name	Scientific name	References
White-tailed	<i>Odocoileus virginianus</i>	Rich 1957, Russell 1967
Mule deer	<i>Odocoileus hemionus</i>	Rich 1957
Elk	<i>Cervus canadensis</i>	Worley 1969, Foreyt <i>et al.</i> 1994
Pronhorn	<i>Antilocapra americana</i>	Cortinas and Spomer 2014
Bighorn sheep	<i>Ovis canadensis</i>	Cooley and Kohls 1944, Blood 1963
Domestic sheep	<i>Ovis aries</i>	Cooley and Kohls 1944, MacLeod <i>et al.</i> 1970
Mountain goat	<i>Oreamnos americanus</i>	Rich 1957
Barbary goat	<i>Ammotragus lervia</i>	Gray and Pence 1979, Gray 1980
Llama	<i>Llama glama</i>	Barbará and Dios 1918
Domestic horse	<i>Equus ferus caballus</i>	Madigan <i>et al.</i> 1995, Zarate-Ramos <i>et al.</i> 2014
Mule	<i>Equus asinus</i> x <i>E. ferus caballus</i>	Cooley and Kohls 1944
Collared peccary	<i>Pecari tajacu</i>	Meleney 1975
Cottontail rabbit	<i>Sylvilagus</i> spp.	Cooley and Kohls 1944
Jackrabbit	<i>Lepus</i> spp.	Cooley and Kohls 1944
Coyote	<i>Canis latrans</i>	Eads 1948, Drewek 1980
Domestic dog	<i>Canis lupus familiaris</i>	Ugochukwu and Nnadozie 1985, Matthews 1989, White <i>et al.</i> 1995, Horak and Matthee 2003
Bobcat	<i>Lynx rufus</i>	Meleney 1975
Lion	<i>Panthera leo</i>	Munaó Diniz <i>et al.</i> 1987
Ostrich	<i>Struthio camelus</i>	Cooley and Kohls 1944, Hoogstraal 1952
Human	<i>Homo sapiens</i>	Eads and Campos 1984, Naudé <i>et al.</i> 2001, Huchzermeyer 2002, Cortinas and Spomer 2014



**Fig. 1.** *Otobius megnini*, dorsal. Specimen removed from the ear of a domestic cat.

