Ectoparasites of the Woodchuck, *Marmota monax* (Rodentia: Sciuridae), from Arkansas, with a Summary of Ectoparasite Records from *M. monax*

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Abstract: Examination of the pelage of a dead-on-the-road woodchuck, *Marmota monax*, opportunistically collected from western Arkansas for ectoparasites, yielded two fleas and two ticks. The two ticks were both nymphs of *Amblyomma americanum*. One of the fleas was a female *Ctenocephalides felis* and other was a male *Pulex simulans*. Although all three ectoparasites have been reported from Arkansas hosts, we document *C. felis* from *M. monax* for the first time anywhere. We also provide a summary of previously reported ectoparasites from this host.

Introduction

The woodchuck, *Marmota monax* (L.), also commonly known as the groundhog or marmot, is a large, heavy-bodied member of the order Rodentia, family Sciuridae. In addition to harboring numerous helminth parasites (Twitchell 1939; Fleming et al. 1979), it has been reported as a host of several ectoparasites (Whitaker and Schmelz 1973), including lice (Olsen 1938), mites (Whitaker and Wilson 1974), ticks (Cooley and Kohls 1938; Twichell 1939; Ko 1972a, 1972b), and fleas (Baker 1904; Ewing and Fox 1943). Various studies on fleas, lice, ticks and other mites, or a combination of ectoparasitic arthropods, from mammals, in different localities in North America, have also included records of ectoparasites from *M. monax.*

More recently, McAllister et al. (2016, 2017) provided a summary of the hosts of ticks and fleas of Arkansas, respectively, but *M. monax* was not listed as a host. Here we provide new host records one species of tick and two species of fleas from *M. monax* from western Arkansas. One of the flea records is the first of this species reported from *M. monax* anywhere. In addition, a summary of the ectoparasites of woodchucks

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is provided.

Methods

On 30 August 2025, a single *M. monax* was found freshly dead on the road, apparently hit by an automobile, and salvaged off St. Hwy. 8 at Big Fork, Polk County, Arkansas (34°29'31.0"N, 93°58'21.0"W). The pelage was brushed vigorously over a white enamel tray and ectoparasites were collected and placed in individual vials of 95% (v/v) DNA grade ethanol. Samples were shipped to Durden for processing and identification. Fleas were cleared in 10% potassium hydroxide, dehydrated through an ethanol series, further cleared in xylene, and slide-mounted in Canada balsam (Price et al. 2003); ticks were examined in situ.

The host was deposited as a photovoucher (Fig. 1) in the Northeast Texas Community College Vertebrate Collection, Mt. Pleasant, Texas. Ectoparasites were deposited in the General Ectoparasite Collection in the Department of Biology at Georgia Southern University, Statesboro, Georgia, under accession lot number L3981.

Figure 1. Photovoucher (DOR) host *Marmota monax* from Polk County, Arkansas.

Results and Discussion

Two individual ticks and two individual fleas were collected from *M. monax*. Data are presented below in an annotated format as follows:

Arthropoda: Arachnida: Acari: Ixodida: Ixodidae
***Ambylomma americanum* (L.)**

Host: Woodchuck, *Marmota monax* (L., 1758) adult, salvaged 30 September 2025 off the road.

Locality: USA: Polk County, off St. Hwy. 8, Big Fork (34°29'31.0"N, 93°58'21.0"W).

Deposited material: L-3981.

Prevalence: 1 of 1.

Site of infection: Pelage

Intensity: 2 nymphs.

Other reported hosts in Arkansas of A. americanum: domestic cattle, *Bos taurus*, domestic dog, *Canis lupus familiaris*, domestic horse, *Equus caballus*, domestic cat, *Felis catus*, human, *Homo sapiens*, river otter, *Lontra canadensis*, *M. monax*, eastern woodrat, *Neotoma floridana*, whitetail deer, *Odocoileus virginiana*, domestic sheep, *Ovis aries*, fox squirrel, *Sciurus niger*, and cottontail rabbit, *Sylvilagus floridanus* (Tugwell and Lancaster 1952; McAllister et al. 2016).

Geographic range of A. americanum: USA: Arkansas (Tugwell and Lancaster 1952; this report). Eastern and Central USA (Springer et al. 2014).

Remarks

The Lone Star tick is one of the most abundant tick species in the eastern United States (Cooley and Kohls 1944) and on Arkansas hosts. Tugwell and Lancaster (1962) previously reported this tick from *M. monax* in Arkansas. There are additional records of *A. americanum* (mostly nymphs) from this host in five other eastern states (Table 1) but it does not appear to be common on *M. monax.*

Insecta: Siphonaptera: Pulicidae
***Ctenocephalides felis* (Bouché, 1835)**

Host: Woodchuck, *Marmota monax* (L., 1758) adult, salvaged 30 September 2025 off the road.

Locality: USA: Polk County, off St. Hwy. 8, Big Fork (34°29'31.0"N, 93°58'21.0"W).

Deposited material: L-3981.

Prevalence: 1 of 1.

Site of infection: Pelage

Intensity: 1 ♀.

Other reported hosts in Arkansas of C. felis: C. l. familiaris, Virginia opossum, *Didelphis virginiana*, *F. catus*, striped skunk, *Mephitis mephitis*, Norway rat, *Rattus norvegicus*, spotted skunk, *Spilogale putorius*, and gray fox, *Urocyon cinereoargenteus* (McAllister et al. 2016).

Geographic range of C. felis: Nearly cosmopolitan. USA: **Arkansas (this report).**

Remarks

The common "cat flea" is a nuisance biter of domestic cats and wild felids and is also common on domestic dogs (Durden and Hinkle 2019), wild canids, and other mammals, including, rodents and the Virginia opossum (Hastriter 2023). However, this is the first time it has been reported from *M. monax*.

***Pulex simulans* Baker, 1895**

Host: Woodchuck, *Marmota monax* (L., 1758) adult, salvaged 30 September 2025 off the road.

Locality: USA: Polk County, off St. Hwy. 8, Big Fork (34°29'31.0"N, -93°58'21.0"W).

Deposited material: L-3981.

Prevalence: 1 of 1.

Site of infection: Pelage.

Intensity: 1 ♂.

Other reported hosts in Arkansas of P. simulans: northern raccoon, *Procyon lotor* (Richardson et al. 1994; McAllister et al. 2016).

Geographic range of P. simulans: From Canada to the southern regions of South America (Hopla 1980; Hastriter 2023). USA: **Arkansas (this report).**

Remarks

This flea is distributed widely in the Western Hemisphere and has been confused with the cosmopolitan species, *Pulex irritans* (L.). It is an ectoparasite of carnivores and some other medium-sized and large mammals. Hopla (1980) recorded *P. simulans* from yellow-bellied marmot, *Marmota flaviventris* in a Table of host records from Colorado, Montana, and Wyoming. The only previous records of this flea from *M. monax* are from Alabama and Missouri (Palmer and Wingo 1972; Sanford and Hays 1974).

Based on morphology, only male specimens of *Pulex simulans* and *Pulex irritans* can be reliably separated (Lewis and Eckerlin 2024). In cleared, slide-mounted males, the genitalia of *P. simulans* can be seen to have a broad dorsal aedeagal sclerite (d.a.s.) and a ventral crochet that is narrow throughout, whereas *P. irritans* has a narrow d.a.s. and a crochet that is very broad apically. Baker (1895) described *P. simulans* as a new species but Jordan and Rothschild (1908) synonymyzed it with *P. irritans,* before Smit (1958) reinstated *P. simulans* as a distinct species and illustrated the morphological differences between the male genitalia of these two species. Both species are widespread in North America and have been recorded from a variety of large and medium-sized mammals plus a few species of birds (Hopla 1980).

A summary of the ectoparasites reported from *M. monax* from various Canadian provinces and US states is listed in Table 1. Eight species of ticks have been previously reported from *M. monax* (Table 1); three have been reported from various Arkansas hosts, but only one of them, *A. americanum,* from *M. monax* (Tugwell and Lancaster 1962; McAllister et al. 2016). The most abundant and widespread species of tick parasitizing *M. monax*, especially in northeastern states, and in Canada, is *Ixodes cookei* (Table 1). This tick is sometimes referred to as the groundhog tick but adults also parasitize various carnivores (Keirans and Clifford 1978; Durden and Keirans 1996). Notably, *I. cookei* is the principal vector of Powassan virus and groundhogs are a principal reservoir host (Durden and Keirans 1996). Although *I cookei* rarely attaches to humans (Hall et al. 1991), this zoonotic diseases can cause Powasaan encephalitis in humans which can be fatal (Piantadosi and Solomon 2022).

Other ixodid ticks, including *Dermacentor variabilis* (American dog tick), *A. americanum* and *Ixodes scapularis* (blacklegged tick) have also been recorded from *M. monax* in eastern states (Table 1). All three of these generalist tick species that can transmit medically important pathogens to humans (Cooney and Burgdorfer 1974; Durden and Keirans 1996; Cohen et al.

2010; Kennedy et al. 2025). In addition to these ticks, the non-native invasive Asian longhorned tick, *Haemaphysalis longicornis* has been reported from *M. monax* in some northeastern states and there are one or two records of the rabbit tick *Haemaphysalis leporispalustris* and of *Ixodes texanus* and *Ixodes robbinsi* (previously treated as *Ixodes auritulus*) from *M. monax* (Table 1). Adults of *I. texanus* mainly parasitize carnivores and all active stages of *I. robbinsi* parasitize birds (Keirans and Clifford 1978; Durden and Keirans 1996; Apanaskevich et al. 2022) so these are unusual ectoparasite records from *M. monax*.

With the addition of one species reported in this paper, 10 species of fleas have now been recorded from *M. monax* (Table 1). *Oropsylla arctomys* Baker is the most commonly reported flea on this host especially in northern states and Canada (Hamilton 1935; Fox 1968; Fleming et al. 1979; Holland 1985; Poole and Gentilli 1986; Hastriter 2023; Lewis and Eckerlin 2024). Not surprisingly, *O. arctomys* has not been found on any Arkansas hosts as it is from *M. monax* from British Columbia, Canada, Alaska, Montana, and northeastern and midwestern states (Lewis and Eckerlin 2024) (Table 1). The other nine species of fleas recorded from *M. monax* are typically associated with other mammal species and are accidental parasites on groundhogs. One of these species, *Cediopsylla simplex* (rabbit flea) has been reported from swamp rabbit, *Sylvilagus aquaticus*, *S. floridanus*, black-tailed jackrabbit, *Lepus californicus*, and *U. cineroargenteus* in Arkansas (McAllister et al. 2016). Both species of fleas we recorded on *M. monax* in Arkansas represent unusual host associations and one of them, *C. felis,* has not been reported previously from this host anywhere. However, Lewis and Eckerlin (2024) state that *C. felis* has been recorded from more host species than any other flea. The other species, *P. simulans* has been reported previously from several medium-sized to large mammals in the Americas (Hopla 1980; Lewis and Eckerlin 2024) but only twice previously from *M. monax* (Palmer and Wingo 1972; Sanford and Hays 1974).

One species of sucking louse, *Enderleinellus marmotae* Ferris is a host-specific ectoparasite of *M. monax* (Table 1) (Kim et al. 1986; Durden and Musser 1994). This louse may parasitize *M. monax* throughout its range but it has not been recorded from several states where the host occurs, probably because it is a small ectoparasite (< 1 mm long as an adult) that may be missed during host examinations.

None of the species of three species of mesostigmatan mites or three species of chiggers recorded from *M. monax* (Table 1) are host-specific but several collections of the chigger *Euschoengastia marmotae* Ewing are from this host (Farrell 1956; Whitaker and Schmeltz 1973).

Overall, a variety of ectoparasites has been reported from *M. monax* across its geographical range including one species of sucking louse, 10 fleas, eight ticks, three mesostigmatan mites and three chigger mites (Table 1). Some of these fleas and ticks, especially the cat flea, *C. felis,* and the groundhog tick, *I. cookei*, are known vectors of zoonotic pathogens. In this paper, we have added one species of flea to the list of ectoparasites reported from *M. monax* anywhere, and also documented, for the first time, another species of flea and one species of tick from this host in Arkansas.

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Table 1. Ectoparasites reported from *Marmota monax*.

Ectoparasites	Localities	References
SIPHONAPTERA (FLEAS)		
Cediopsylla simplex	Canada, Delaware	MacCreary (1945); Holland (1985); Kennedy et al. (2024)
Ctenocephalides canis	Massachusetts	Fox (1968)
*Ctenocephalides felis**	**Arkansas**	**This report**
Orchopeas howardi	Indiana, Missouri, New York, Rhode Island	Geary (1959); Wilson (1961)†; Mathewson and Hyland (1964); Palmer and Wingo (1973)
Orchopeas leucopus	Iowa, New York	Joyce and Eddy (1944); Geary (1959)
Opisocrostis bruneri	Wisconsin	Amin (1976)
Opisodasys pseudarctomys	Canada, New York	Geary (1959); Holland (1985)
Oropsylla arctomys	Canada, Alaska, Connecticut, Delaware, Illinois, Indiana, Maine, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, West Virginia, Wisconsin, Vermont	Hamilton (1934); Hubbard (1935); Jellison (1945); MacCreary (1945); Wilson (1957, 1961†); Geary (1959); Benton and Smiley (1963); Mathewson and Hyland (1964); Humphreys (1967); Holland and Benton (1968); Benton et al. (1969); Main (1970, 1983); Haas and Wilson (1973); Whitaker and Schmeltz (1973); Benton and Kelly (1975); Amin (1976); Fleming et al. (1979); Benton (1980); Scharf and Stewart (1980); Holland (1985); Cohn et al. (1986); Poole and Gentlli (1986); Haas et al. (1989); Farkas and Surgeoner (1990); Scharf et al. (1990); Larson (1997); Eckerlin et al. (2008); Eckerlin (2016); Eckerlin and Gardner (2021); Hastriter (2023); Kennedy et al. (2024); Lewis and Eckerlin (2024)
Pulex simulans	Alabama, **Arkansas,** Missouri	Palmer and Wingo (1972); Sanford and Hays (1974); **This report**
Thrassis spenceri	Canada	Holland (1985)
ANOPLURA (SUCKING LICE)‡		
Enderleinellus marmotae	Indiana, Maine, Maryland, Minnesota, Missouri, New Jersey, New York, North Dakota, Ohio, Rhode Island, South Carolina, Washington (DC)	Wilson (1961)†; Mathewson and Hyland (1962); Whitaker and Schmeltz (1973); Fleming et al. (1979); Kim et al. (1986); Reeves et al. (2004); Nelder and Reeves (2015)
ACARI (MITES OTHER THAN CHIGGERS)		

Androlaelaps fahrenholzi	Canada, Indiana, Minnesota, New York, North Carolina	Whitaker and Schmeltz (1973); Fleming et al. (1979); Cohn et al. (1986); Farkas and Surgeoner (1990); Timm (1975); Reeves et al. (2007)
Macrocheles mesocthonius	Indiana	Krantz and Whitaker (1988); Whitaker (1991)
Eulaelaps stabularis	Canada, Indiana	Banks (1909); Wilson (1961)†; Whitaker and Schmeltz (1973); Whitaker (1982)
TROMBICULIDAE (CHIGGER MITES)		
Euschoengastia marmotae	Indiana, New Jersey, Pennsylvania	Farrell (1956); Manischewitz (1966); Whitaker and Schmeltz (1973)
Euschoengastia peromysci	Indiana	Whitaker and Loomis (1979)
Eutrombicula cinnabaris	Indiana	Whitaker and Schmeltz (1973)
IXODIDA (TICKS)		
Ambylomma americanum	**Arkansas,** Delaware, Kentucky, Oklahoma, Tennessee, Virginia	Bishopp and Trembley (1945); Tugwell and Lancaster (1962); Kokernot et al. (1969); Clymer et al. (1970); Sonenshine et al. (1971); Cooney and Burgdorfer (1974); Zimmerman et al. (1988); White et al. (2020); Kennedy et al. (2025); **This report**
Dermacentor variabilis	Canada, Alabama, **Arkansas,** Connecticut, Delaware, Indiana, Kansas, Kentucky, Massachusetts, New York, North Carolina, Oklahoma, Pennsylvania, Tennessee, Virginia, Wisconsin	Bequaert (1945); Bishopp and Trembley (1945); Wilson (1961)†; Tugwell and Lancaster (1962); Sonenshine et al. (1965); Snetsinger (1968); Clymer et al. (1970); Sonenshine et al. (1971); Cooney and Hays (1972); Conney and Burgdorfer (1974); Fleming et al. (1979); Whitaker and Schmeltz (1973); Sonenshine (1979); Carey et al. (1980); Zimmerman et al. (1988); Fish and Dowler (1989); Brillhart et al. (1994); Reeves et al. (2007); Cohen et al. (2010); Dergousoff et al. (2013); Lee et al. (2019); White et al. (2020); Kennedy et al. (2025)
Haemaphysalis leporispalustris	**Arkansas**	Tugwell and Lancaster (1962)
Haemaphysalis longicornis	Delaware, New Jersey, Virginia	White et al. (2020); Kennedy et al. (2025)
Ixodes cookei	Canada, Alabama, **Arkansas,** Connecticut, Delaware, Illinois, Indiana, Kansas, Kentucky, Maine Maryland, Massachusetts Michigan, Minnesota, Missouri,	Hamilton (1934); Twitchell (1939); Bequaert (1945); Bishopp & Trembley (1945); Wilson (1961)†; Tugwell and Lancaster (1962); Sonenshine et al. (1965); Sonenshine and Stout (1971); Cooney and Kays (1972); Ko (1972a, b); Whitaker and

	New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, Wisconsin	Schmeltz (1973); Keirans and Clifford (1978); Sonenshine (1979); Fleming et al. (1979); Anderson and Magnarelli (1980); Cohn et al. (1986); Fish and Dowler (1989); Farkas and Surgeoner (1990); Durden and Keirans (1996); Walker et al. (1998); Reeves et al. (2007); Lee et al. (2019); White et al. (2020); Kennedy et al. (2025)
Ixodes robbinsi (listed as *Ixodes auritulus*)	North America (State/Province not listed)§	Bishopp and Trembley (1945)
Ixodes scapularis	Connecticut, New Jersey, New York, Virginia, Wisconsin	Fleming et al. (1979); Main et al. (1982); Fish and Dowler (1989); Lee et al. (2019); White et al. (2020)
Ixodes texanus	Missouri, Wisconsin	Twichell (1939); Lee et al. (2019)

*New host record.

†Unpublished Ph.D. dissertation.

‡Kim et al. (1986) also listed the sucking lice *Linognathoides marmotae* and *Linognathoides laeviusculus* from *M. monax* but did not provide details. Unfortunately, we cannot locate records of these sucking lice from *M. monax*. *Linognathoides marmotae* mainly parasitizes yellow-bellied marmot, *Marmota flaviventris* in western North America whereas *L. laeviusculus* mainly parasitizes ground squirrels (Sciuridae) in the Holarctic region (Durden and Musser, 1994).

§North American ticks previously assigned to *Ixodes auritulus* are currently treated as *Ixodes robbinsi* Apanaskevich and Edgy (Apanaskevich et al. 2022).

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