New State Records for the Flea, *Foxella ignota* (Siphonaptera: Ceratophyllidae) from Oklahoma and Sucking Louse, *Hoplopleura sciuiricola* (Phthiraptera: Hoplopleuridae), from Iowa and Oklahoma

Chris T. McAllister
Science and Mathematics Division, Eastern Oklahoma State College, Idabel, OK 74745

Lance A. Durden
Department of Biology, Georgia Southern University, Statesboro, GA 30458

Matthew B. Connior
Health and Natural Sciences, South Arkansas Community College, 300 S. West Ave., El Dorado, AR 71730

Little is known about the ectoparasites of the wild mammals (excluding bats) of Oklahoma (Ellis 1955; Stark 1970; Reisen and Best 1973; Tyler and Buscher 1975). Here we report two new state records for a hoplopleurid sucking louse from Iowa and Oklahoma, and a state record for a ceratophyllid flea from Oklahoma.

During September 2012, 14 adult plains pocket gophers, *Geomys bursarius* (Shaw) from Boiling Springs State Park, Woodward County (36.453877ºN, 99.302671ºW) were taken using Victor® gopher traps. During March 2013, a single adult female fox squirrel, *Sciurus niger* was found dead on a road 8.0 km W of Broken Bow off St. Hwy. 3, McCurtain County (34.064338ºN, 94.828566ºW). Ectoparasites were collected, preserved in 70% ethanol, and processed and identified using appropriate guides (Benton 1983; Kim et al. 1986). Voucher ectoparasites are deposited in the General Ectoparasite Collection in the Department of Biology at Georgia Southern University (accession nos. L3548, L3580). Host vouchers of *G. bursarius* are deposited in the Henderson State University (HSU) Collection, Arkadelphia, Arkansas as HSU 699; the *S. niger* is in the Eastern Oklahoma State College (EOSC) teaching collection.

Nine fleas (three males, six females) were taken from two (14%) *G. bursarius* and identified as the ceratophyllid, *Foxella ignota* (Baker). This flea is fairly widespread in the western two-thirds of North America (from the Mississippi River west to Alberta and British Columbia in the north and Arizona and California in the south) where preferred hosts are pocket gophers (*Geomys* spp. and *Thomomys* spp.) although it has occasionally also been reported from mammalian ecological associates of these rodents (Lewis 1975; Benton 1980; Traub et al. 1983; Lewis and Wilson 2006). *Foxella ignota* has not previously been reported from Oklahoma. Eleven subspecies of *F. ignota* are recognized by both Lewis (1975) and Traub et al. (1983). The specimens from Oklahoma belong to the nominate subspecies, *F. i. ignota* Jordan. Previous records of this subspecies are from Kansas, Illinois, Indiana, Iowa (including the type locality, Ames), Minnesota and Nebraska (Benton 1980; Traub et al. 1983) (Fig. 1). The Oklahoma record therefore extends the known southern distributional limit of *F. i. ignota*. Further southward in Mexico, *F. ignota* is replaced by three congeneric pocket gopher-associated fleas, *F. hoogstraali* Traub, *F. macgregori* Barrera and *F. mexicana* I. Fox as discussed by Lewis (1975).

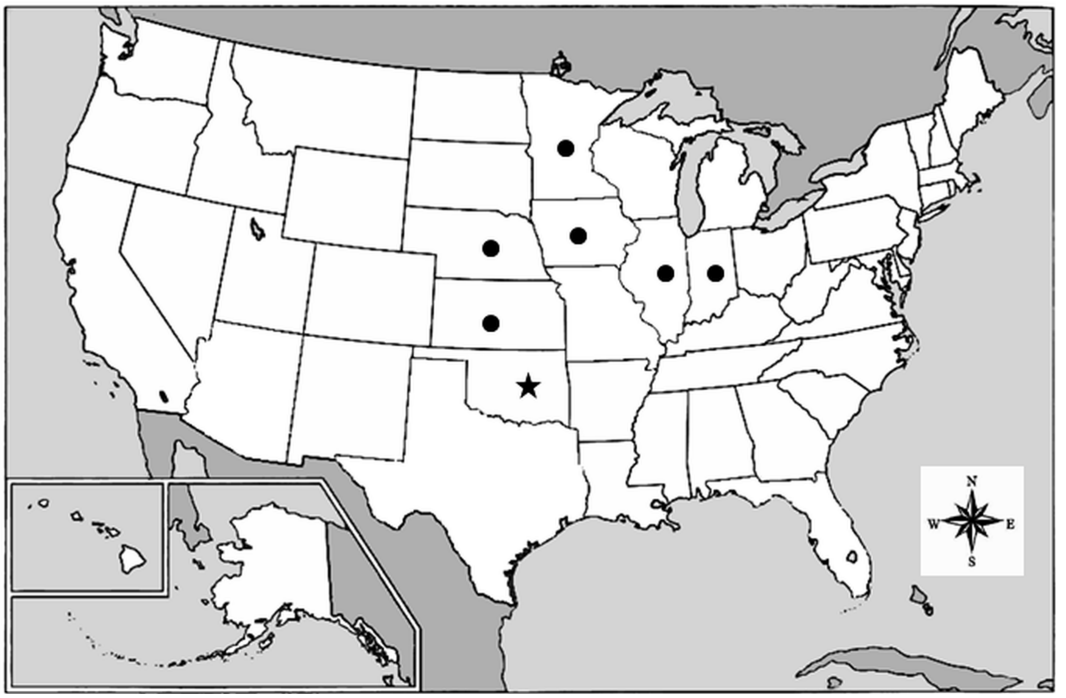

Figure 1. States where *Foxella ignota ignota* has been reported. Dots = previous records; star = new record.

Eight sucking lice (five males, three females) collected from *S. niger* were identified as *Hoplopleura sciuricola* Ferris. This louse is a widespread ectoparasite of tree squirrels in the Americas (Durden and Musser 1994). Kim et al. (1986) state that it occurs throughout the United States. There are previous records of this louse from Canada (Kim et al. 1986), Bolivia, Brazil, Colombia, Peru, and Venezuela (Ferris 1921; Johnson 1972; Barros-Battesti et al. 1998; Smith et al. 2008) and the states of Alaska, Arizona, California, Florida, Mississippi (Ferris 1921), Alabama, Georgia, Illinois, Maine, Maryland, Minnesota, Montana, New Hampshire, New York, North Carolina, Oregon, Rhode Island, Texas (Kim et al. 1986), Indiana (Whitaker and Spika 1976), Michigan (Lawrence et al. 1965), New Jersey (Harlan and Kramer 1979), Ohio (Katz 1938), South Carolina (Reeves et al. 2004), Tennessee (Durden et al. 1997), Virginia (Parker 1968), West Virginia (Karnes and Shoemaker 1966), Wisconsin (Amin 1976), and Utah and Wyoming (Kucera et al. 2007) (Fig. 2). There are also previously unreported specimens of *H. sciuricola* from Iowa (Story County: Ames [42.02335°N, 93.625622°W], 2 males-ex *S. niger*, 17 Feb. 1959, collector Frank E. French, accession no. FF182) and Trinidad (Maingot Estate near Sangre Grande [10.58909°N, 61.133888°W], 1 male, 1 female-ex red-tailed squirrel, *Sciurus granatensis* Humboldt, 6 Oct. 1955, collector Wilbur G. Downs; accession no. TRVL 530) in the collection of L. A. Durden. *Hoplopleura sciuricola* also occurs as an introduced species on non-native, introduced gray squirrels, *Sciurus carolinensis*, in some other parts of the world such as Great Britain (Durden and Musser 1994). Nevertheless, there are no previously published records of *H. sciuricola* from Oklahoma. Ellis (1955) reported ectoparasites from several mammal species in the Wichita Mountains in southwestern Oklahoma and examined three specimens of *S. niger* but he did not record any lice from them. Kim et al. (1986) state that *H. sciuricola* parasitizes tree squirrels and Durden and

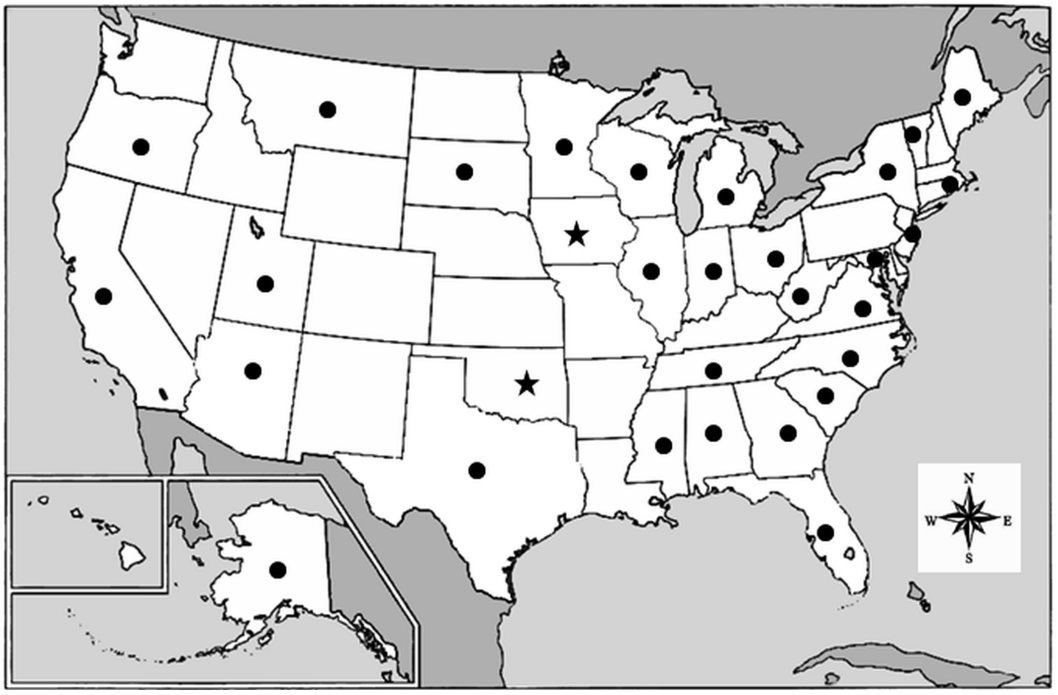

Figure 2. States where *Hoplopleura sciuricola* has been reported. Dots = previous records; stars = new records. Entire distribution not shown (see text).

Musser (1994) list nine species of *Sciurus* (four from North America, five from the Neotropics) and two species of *Tamiasciurus* (both from North America) that have been recorded as hosts for this louse. Smith et al. (2008) report another squirrel host from Peru belonging to the genus *Microsciurus*. This louse is probably widespread as an ectoparasite on both *S. niger* and *S. carolinensis* in Oklahoma, and further collecting of ectoparasites from these squirrels will likely produce more records from the state.

In conclusion, we suggest additional ectoparasite surveys on Oklahoma mammals, which appear to be uncommonly reported from hosts in the state. For example, prior to our study, only seven species of mites have been reported from native mammals in Oklahoma (Whitaker et al. 2007). Of these seven species, two are not true ectoparasites (one is a predator of other ectoparasites, the other is phoretic) and the remaining five are only associated with bats. We suggest that target species to examine for ectoparasites should include various rodents and insectivores.

ACKNOWLEDGMENTS

The Oklahoma Department of Wildlife Conservation provided a scientific collecting permit to C. T. McAllister. We thank James H. Boone (Collection Manager, Field Museum, Chicago, IL) for assistance with their collection of fleas, and Dr. Robert E. Lewis (Iowa St. Univ., Ames, IA) for information on fleas, and Dr. R. Tumlison (HSU) for expert curtatorial assistance. We dedicate this paper to the memory of renowned ectoparasitologist and colleague, Dr. Nixon A. Wilson (1930-2011).

LITERATURE CITED

Amin OM. 1976. Lice, mites and ticks of southeastern Wisconsin mammals. Great Lakes Entomol. 9: 195-198.

Barros-Battesti DM, Arzua M, Linardi PM, Bothelo JR, Sbalqueiro IJ. 1998. Interrelationship between ectoparasites and wild rodents from Tijucas do Sol, State of Parana, Brazil. Mem. Instit. Oswaldo Cruz 93:719-725.

Benton AH. 1980. An atlas of the fleas of the eastern United States. Fredonia, New York: Marginal Media. 157 p.

Durden LA, Musser GG. 1994. The sucking lice (Insecta, Anoplura) of the world: a taxonomic checklist with records of mammalian hosts and geographical distributions. Bull. Amer. Mus. Nat. Hist. 218:1-90.

Durden LA, Kollars TM Jr, Patton S, Gerhardt RR. 1997. Sucking lice (Anoplura) of mammals of Tennessee. J. Vector Ecol. 22:71-76.

Ellis LL Jr. 1955. A survey of the ectoparasites of certain mammals in Oklahoma. Ecology 36: 12-18.

Ferris GF. 1921. Contributions toward a monograph of the sucking lice. Part II. Stanford Univ. Publ., Univ. Ser. Biol. Sci. 2:53-133.

Johnson PT. 1972. Sucking lice of Venezuelan rodents, with remarks on related species. Brigham Young Univ. Sci. Bull., Biol. Ser. 17:1-62.

Kim KC, Pratt HD, Stojanovich CJ. 1986. The sucking lice of North America: An illustrated manual for identification. University Park: Pennsylvania State University Press. 241 p.

Kucera JR, Durden LA, Kim KC. 2007. New records of sucking lice (Phthiraptera: Anoplura) from the western United States. J. Vect. Ecol. 32:366-370.

Lewis RE. 1975. Notes on the geographical distribution and host preferences in the order Siphonaptera. Part 6. Ceratophyllidae. J. Med. Entomol. 11:658-676.

Lewis RE, Wilson N. 2006. A review of the ceratophyllid: subfamily Dactylopsyllinae. Part 2. *Dactylopsylla* Jordan, 1929, and *Foxella* Wagner, 1929 (Siphonaptera: Ceratophyllidae). Ann. Carnegie Mus. 75:203-229.

Parker JC. 1968. Parasites of the gray squirrel in Virginia. J. Parasitol. 54: 633-634.

Reeves WK, Durden LA, Wrenn WJ. 2004. Ectoparasitic chiggers (Acari:Trombiculidae, Leeuwenhoekiidae), lice (Phthiraptera), and Hemiptera (Cimicidae and Reduviidae) from South Carolina, U.S.A. Zootaxa 647:1-20.

Reisen WK, Best TL. 1973. An ectoparasite survey of *Dipodomys ordii* (Rodentia: Heteromyidae) from central Oklahoma. Ann. Entomol. Soc. Amer. 66:599-601.

Smith VS, Light JE, Durden LA. 2008. Rodent louse diversity, phylogeny and cospeciation in the Manu Biosphere Reserve, Peru. Biol. J. Linn. Soc. 95: 598-610.

Stark HE. 1970. A revision of the flea genus *Thrassis* Jordan 1933 (Siphonaptera: Ceratophyllidae), with observations on ecology and relationships to plague. Univ. Calif. Publ. Entomol. 53:1-184.

Traub R, Rothschild M, Haddow JF. 1983. The Rothschild Collection of fleas: The Ceratophyllidae: Keys to the genera and host relationships, with notes on their evolution, zoogeography and medical importance. Cambridge, U.K.: Cambridge University Press. 228 p.

Tyler JD, Buscher, HN. 1975. Parasites of vertebrates inhabiting prairie dog towns in Oklahoma. I. Ectoparasites. Proc. Okla. Acad. Sci. 55:166-168.

Whitaker JO Jr., Schmeltz LL. 1976. Ectoparasites of squirrels of the genus *Sciurus* from Indiana. Proc. Indiana Acad. Sci. 85:431-436.

Whitaker JO Jr., Walters BL, Castor LK, Ritzi CM, Wilson N. 2007. Host and distribution lists of mites (Acari), parasitic and phoretic, in the hair or on the skin of North American wild mammals north of Mexico: records since 1974. Fac. Publ. H. W. Manter Lab. Parasitol. 1:1-173.

Received: August 5th, 2013, Accepted: November 3rd, 2013