Fleas and Lice Parasitizing Mammals in Missouri

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ABSTRACT: Three species of chewing lice, 11 species of sucking lice, and 28 species of fleas are recorded from mammals in Missouri. Of these, seven species of sucking lice (Hoplopleura acanthopus, Hoplopleura hesperomydis, Hoplopleura sciuricola, Neohaematopinus sciuri, Neohaematopinus sciurinus, Neohaematopinus sciuroperti, and Solenopotes ferrisi) and one species of flea (Doratopsylla blarinae) represent new state records. From 1993 to 1995, 773 individual mammals were examined for ectoparasites in southeastern Missouri. One species of chewing louse, 6 species of sucking lice, and 11 species of fleas were recovered from 18 of the 21 mammal species examined. Ctenophthalmus pseudagyrtex was recovered from more mammal species (6) than any other flea species; and the white-footed mouse, Peromyscus leucopus, was parasitized by more flea species (5) than other hosts examined. Except for H. sciuricola, which was recovered from two congeneric species of tree squirrels, each species of louse was confined to a separate host species.

Keyword Index: Fleas, lice, host associations, new state records, Missouri.

INTRODUCTION

Except for a statewide flea survey by Palmer and Wingo (1972), few studies on the fleas and lice of Missouri mammals have been completed. Pratt and Good (1954) documented the geographical distributions of domestic rat ectoparasites in the United States including Missouri; and Fox (1940), Trembley and Bishopp (1940), Portman (1944), Enns (1947), Johnson and Traub (1954), and Lewis (1957) provide additional flea records for this state. More recently, McLean et al. (1996) documented some mammal fleas from southeastern Missouri as part of a study on the enzootiology of Potosi virus. Kim et al. (1986) provide records of three species of sucking lice, and Timm and Price (1980) document two species of chewing lice from Missouri. During a Lyme disease survey, an opportunity was afforded to collect fleas and lice from various species of mammals in southeastern Missouri and to compare the results with previous species records for these two groups of ectoparasites for the state.

MATERIALS AND METHODS

Mammals were captured using a variety of live traps and baits in Bollinger, Cape Girardeau, Scott, Stoddard, and Wayne counties in southeastern Missouri from 1993 to 1995. White-tailed deer were examined at hunter check stations and by monthly sampling. Individual mammals were either killed, anesthetized, or restrained before being combed for ectoparasites. Mammal taxonomy in this paper follows Wilson and Reeder (1993).

Fleas and lice were stored in individually labelled vials containing 70% ethanol until they could be further examined. Unless identification could be completed without clearing, ectoparasites were cleared in 10% potassium hydroxide, rinsed in distilled water, dehydrated in an alcohol series of ascending strengths, further cleared in xylene, and then slide-mounted in Canada balsam for microscopical identification. Voucher fleas and lice from this study are deposited in the Institute of Arthropodology and Parasitology at Georgia Southern University.
RESULTS

The following species and numbers of mammals were examined for fleas and lice: Virginia opossum, _Didelphis virginiana_ Kerr (31); northern short-tailed shrew, _Blarina brevicauda_ (Say) (11); white-tailed deer, _Odocoileus virginianus_ (Zimmermann) (81); bobcat, _Lynx rufus_ (Schreber) (1); raccoon, _Procyon lotor_ (L.) (10); coyote, _Canis latrans_ Say (1); southern flying squirrel, _Glaucomys volans_ (L.) (5); eastern gray squirrel, _Sciurus carolinensis_ Gmelin (14); fox squirrel, _Sciurus niger_ L. (9); eastern chipmunk, _Tamias striatus_ (L.) (7); prairie vole, _Microtus ochrogaster_ (Wagner) (80); pine vole, _Microtus pinetorum_ (Le Conte) (16); golden mouse, _Ochrotomys nuttalii_ (Harlan) (24); cotton mouse, _Peromyscus gossypinus_ (Le Conte) (6); white-footed mouse, _Peromyscus leucopus_ (Rafinesque) (317); deer mouse, _Peromyscus maniculatus_ (Wagner) (11); western harvest mouse, _Reithrodontomys megalotis_ (Baird) (24); rice rat, _Oryzomys palustris_ (Harlan) (11); house mouse, _Mus musculus_ L. (34); and eastern cottontail, _Sylvilagus floridanus_ (J. A. Allen) (80).

Eighteen of the 21 mammal species examined were infested by fleas and/or lice; uninfested species were the coyote, golden mouse, and house mouse. TABLES 1 and 2 show the flea and louse associations, respectively, recorded for these mammal species.

DISCUSSION

Collections of the shrew flea _Doratopsylla blarinae_. C. Fox reported here, represent a new state record for Missouri. Three species of rabbit fleas were collected from eastern cottontails: _Europsyllus glacialis affinis_ (Baker) (17 of 80 infested = 21 %), _Cediopsylla simplex_ (Baker) (10 of 80 infested = 13 %), and _Odontopsyllus multispinosus_ (Baker) (4 of 80 infested = 5 %). Interestingly, these same three flea species were also recovered from the bobcat, suggesting that it had been feeding on rabbits. _Ctenocephalides pulgaris_ Baker was the most frequently collected flea in this study and it parasitized more species of mammals (6) than any other flea species collected (TABLE 1). More species of fleas (5) were recovered from the white-footed mouse than from any other mammal species examined (TABLE 1). Predictable flea records include the cat flea _Ctenocephalides felis_ (Bouché) from the Virginia opossum, the squirrel flea _Orchopeas howardi_ (Baker) from both species of tree squirrels (_Sciurus_ spp.), and _Stenoponpy americana_ (Baker) from _Peromyscus_ spp. An unusual flea record, presumed to reflect an accidental infestation, is that of _O. howardi_ from a white-tailed deer.

Other notable records of fleas from Missouri mammals are provided by Fox (1940), Johnson and Traub (1954), Pratt and Good (1954), Lewis (1957), and Palmer and Wingo (1972). The statewide survey of Palmer and Wingo (1972) documented the presence of 26 species of fleas. Based on our findings, _D. blarinae_ should be added to that list as an additional species occurring in Missouri. Also in southeastern Missouri, McLean et al. (1996) collected _C. felis_ from the Virginia opossum and raccoon, _C. pseudagyrtes_ and _O. howardi_ from the Virginia opossum, and _Orchopeas sexdentatus_ (Baker) (subspecies not stated) from the eastern woodrat, _Neotoma floridana_ (Ord). Recently, Lewis (1998) has described an additional species of flea, _Orchopeas illinoiensis_, from Illinois and Missouri.

With the exception of _Trichodectes octomaculatus_ Paine, all species of lice we report from southeastern Missouri—_Hoplopleura acanthopus_ (Burmeister), _Hoplopleura hesperomydis_ (Osborn), _Hoplopleura sciricola_ Ferris, _Neoemaetopus scirui_ Jancke, _Neoemaetopus sciriopteris_ (Osborn), and _Solenopotes ferrisi_ (Fahrenheit)—represent new state records (Kim et al. 1986). Sucking lice previously documented from wild mammals in Missouri are _Enderleinellus marmota_ Ferris, _Hoplopleura pacifica_ Ewing, and _Polyplax spinolosa_ (Burmeister) (Ferris 1919, Pratt and Good 1954, Kim et al. 1986). We also report a new state record of _Neoemaetopus scirui_ (Mjöberg) recovered from a fox squirrel near Potosi in Washington county.

Because of the host specificity exhibited by many species of lice (Emerson and Price 1985, Kim 1985) it is not surprising that six of the seven species we collected were associated with separate host species (TABLE 2). The only exception, _H. sciricola_, was recorded from both species of _Sciurus_ and is known to parasitize several species of New World tree squirrels belonging to this genus and to the genus _Tamiasciurus_ (Durden and Musser 1994).

The impact of flea and lice infestations on the health of wild mammal hosts is poorly understood. Large infestations can cause anemia, intense grooming and pelage/skin damage, but small infestations are presumed to have little impact on the host. Because zoonotic diseases, such as plague, murine typhus, tularemia, and sporadic epidemic typhus are rare or absent from Missouri, the importance of fleas and lice infesting reservoir mammals to public health may be small. Similarly, although _Borrelia burgdorferi_ Johnson, Schmid, Hyde, Steigerwalt, and Brenner _s. lat._, the etiologic agent of Lyme disease, has been detected in, or isolated from, a few fleas and sucking lice, the role of these ectoparasites in maintaining or transmitting this pathogen is presumed to be minimal (Teltow et al. 1991, Doby et al. 1994).
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<th>Ctenocephalides felis</th>
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<th>Odontopsyllus multipiniosus</th>
<th>Orchopeas howardi</th>
<th>Orchopeas leucopus</th>
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<th>Hoplopleura sciurola</th>
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ANNOTATED LIST OF LICE AND FLEAS RECOVERED FROM MISSOURI MAMMALS

*Denotes a new county record; **denotes a new state record; REL denotes records of flea specimens in the collection of Robert E. Lewis in Ames, Iowa.

CHEWING LICE

FAMILY TRICHODECTIDAE

*Geomydoyeus geomydys* (Osborn).

*Geomydoyeus spickai* Timm and Price.

*Trichodectes octomaculatus* Paine.
- Bollinger* county, ex *P. lotor* (present survey).

SUCKING LICE

FAMILY ENDERLEINELLIDAE

*Enderleinellus marmota* Ferris.
- Taney county, ex *Marmota monax* (L.) (woodchuck) (Ferris 1919, Kim et al. 1986).

FAMILY HOPLOPLEURIDAE

*Hoplopleura acanthopus* (Burmeister)**.
- Bollinger* county, ex *M. ochrogaster* (present survey).

*Hoplopleura hesperomydis* (Osborn)**.
- Bollinger* county, ex *P. leucopus* (present survey).

*Hoplopleura pacifica* Ewing (tropical rat louse).
- Jackson county, ex domestic rats (Pratt and Karp 1953; Pratt and Good 1954; Kim et al. 1986).

*Hoplopleura sciurola* Ferris**.
- Bollinger* county, ex *S. carolinensis* and *S. niger* (present survey).

FAMILY LINOGNATHIDAE

*Solenopotes farris* (Fahrenholz)**.
- Cape Girardeau* county, ex *O. virginianus* (present survey).
FAMILY PEDICULIDAE

Pediculus mijobergi Ferris.
“Central Missouri,” ex black-handed spider monkeys, Ateles geoffroyi Kuhl, in a roadside petting zoo (Ronald and Wagner 1973). Although P. mijobergi is not native to the United States, this case is noteworthy because it involved several heavily infested monkeys, two of which died of anemia resulting from louse bites. Humans contacting the monkeys were also bitten and one person developed an allergic reaction to the louse bites (Ronald and Wagner 1973).

FAMILY POLYPLACIDAE

Neohaematopinusosciuri Jancke**.
Bollinger* county, ex S. carolinensis (present survey).

Neohaematopinusscirinus (Mjöberg)**.
Washington* county, ex S. niger (present survey).

Neohaematopinus sciuropteri (Osborn)**.
Bollinger* county, ex G. volans (present survey).

Polyplax spinulosa (Burmeister) (spined rat louse).
Charles and Jackson counties, ex domestic rats (Pratt and Karp 1953; Pratt and Good 1954, Kim et al. 1986).

FLEAS

FAMILY CERATOPHYLLIDAE

Nosopsyllus fasciatus (Bosc) (northern rat flea).

Orchopeas howardi (Baker).

Orchopeas illinoiensis Lewis.
Pulaski county, ex N. floridana and its nests (Lewis 1998).

Orchopeas leucopus (Baker).

Orchopeas sexdentatus (Baker) (subspecies not stated).

Opisocrostitbruneri (Baker).
Boone county, ex Spermophilus tridecemlineatus (Mitchill) (13-lined ground squirrel) (Palmer and Wingo 1972).

FAMILY HYSTRICOPSyllIDAE

Conorhinopsylla stanfordi Stewart.
Boone county, ex Urocyon cinereoargenteus (Schreber) (gray fox) (Palmer and Wingo 1972).

Conorhinopsylla nidiola Jelison.
Holt and Pulaski counties, ex N. floridana and nests of P. leucopus (Palmer and Wingo 1972, REL).

Corrodopsylla hamiltoni (Traub).
Boone and Pike counties, ex Cryptotis parva (Say) (least shrew) and its nests (Enns 1947, Palmer and Wingo 1972, REL).

Ctenophthalmus pseudagyrtes Baker.

Doratopsylla blariniae C. Fox**.
Bollinger* county, ex B. brevicauda (present survey).

Epitedia neotoma Jameson.
Pulaski county, ex N. floridana and its nests (Palmer and Wingo 1972, REL).

Epitedia wenmani (Rothschild).
Bollinger*, Boone, Holt, Marion, and Scotland counties, ex F. sylvestris, P. leucopus O. palustris, R.
megalotis, nests of *P. leucopus*, and nests of undetermined species of mice (Palmer and Wingo 1972, present survey).

**Rhadinopsylla orama** Smit.

Holt county, ex *P. leucopus* (Palmer and Wingo 1972).

**Stenopsenia americana** (Baker).


**FAMILY ISCHNOPSyllidae**

**Nycteridopsylla chapini** Jordan.

Pulaski county, ex *Episcicus fuscus* (Beauvois) (big brown bat) (Lewis 1957, Palmer and Gunier 1975, REL).

**Myodopsylla insignis** (Rothschild).

Atchison and Boone counties, ex *Myotis lucifugus* (LeConte) (little brown bat) (Jellison and Good 1942, Palmer and Wingo 1972, Palmer and Gunier 1975).

**FAMILY LEPTOPSyllidae**

**Odontopsyllus multispinosus** (Baker).


**Peromyscopsylla scotti** I. Fox.


**FAMILY PULICidae**

**Cediopsylla simplex** (Baker) (rabbit flea).

Atchison, Barry, Bollinger*, Boone, Carter, Dent, Jackson, Linn, Marion, Mercer, Osage, Polk, Pulaski, Saline, Scott*, St. Charles, Stoddard, Vernon, and unspecified county, ex *D. virginiana*, *C. latrans*, *L. rufus*, *Vulpes vulpes* (L.) (red fox), *U. cinereoargentus*, *F. sylvestris*, *S. floridanus* and *Sylvilagus aquaticus* (Bachman) (swamp rabbit) (Kohls 1940, Portman 1944, Hopkins and Rothscild 1953, Palmer and Wingo 1972, present survey).

**Ctenocephalides canis** (Curtis) (dog flea).

Boone, Jackson, Macon, Marion and St. Louis counties, ex *C. lupus*, *F. sylvestris*, *S. floridanus* and unspecified hosts (Trembley and Bishopp 1940, Fox 1940, Palmer and Wingo 1972).

**Ctenocephalides felis** Bouché (cat flea).

Bollinger*, Boone, Carter, Marion, Pulaski, St. Louis, Washington and unspecified counties, ex *D. virginiana*, *C. lupus*, *U. cinereoargentus*, *P. lotor*, *F. sylvestris*, *S. floridanus* and unspecified host (Trembley and Bishopp 1940, Portman 1944, Palmer and Wingo 1972, McLean et al. 1996).

**Echidnophaga gallinacea** (Westwood) (sticktight flea).

Butler, Mississippi and Wayne counties, ex domestic rats, domestic chickens and unspecified hosts (Trembley and Bishopp 1940, Enns 1947, Pratt and Good 1954).

**Euhoplopsyllus glacialis affinis** (Baker).

Bollinger*, Scott*, and unspecified counties, ex *L. rufus* and *S. floridanus* (Portman 1944, present survey).

**Pulex irritans** L. (human flea).

Audrain, Boone, Macon, Mississippi, Saline counties and unspecified county, ex *Sus scrofa* L. (swine), *Homo sapiens* L. (humans) and unspecified hosts (Ewing 1931, Bishopp and Trembley 1940, Fox 1940, Becklund 1964).

**Pulex simulans** Baker.


**Xenopsylla cheopis** (Rothschild) (Oriental rat flea).

Jackson and St. Louis counties, ex domestic rats (Pratt and Good 1954, REL).

**FAMILY VERMIPSYLLidae**

**Chaetopsylla latoris** (Stewart).

Boone, Jefferson, Saline and Shelby counties, ex *P. lotor* and *U. cinereoargentus* (Palmer and Wingo 1972).

**Acknowledgments**

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