

The Great Lakes Entomologist

Volume 50
Numbers 1 & 2 -- Spring/Summer 2017
Numbers 1 & 2 -- Spring/Summer 2017

Article 6

September 2017

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Recommended Citation

Scharf, William 2017. "Recent Siphonaptera Host and Distribution Records from Northern Michigan," *The Great Lakes Entomologist*, vol 50 (1)

Available at: <https://scholar.valpo.edu/tgle/vol50/iss1/6>

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Cover Page Footnote

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Recent Siphonaptera Host and Distribution Records from Northern Michigan

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Abstract

Along with colleagues and students I collected fleas from mammals during the period 1998-2007 in five Upper Peninsula counties, and three northern Lower Peninsula counties. Also included here are a few fleas from Grand Traverse County that were mistakenly omitted from earlier publications. Identified specimens were compared to existing distribution records for both parasite and host. Only newly documented distributions for the county or the state of Michigan are listed here. One parasite record is NEW FOR MICHIGAN: *Nearctopsylla genalis genalis* (Baker) from the Least Weasel *Mustela nivalis* L. Three parasite records are NEW FOR THE UPPER PENINSULA. In addition, 15 new county host/parasite combinations are recorded from the Upper Peninsula, and 8 new county host/parasite combinations are recorded from the northern Lower Peninsula.

Seven previous studies document flea and host species distributions in Michigan's Upper Peninsula, northern Lower Peninsula and northern islands of the Great Lakes (Lawrence et al. 1965; Wilson and Johnson 1971; Scharf and Stewart 1980; Scharf et al. 1990; Scharf 1991, 1998; Scharf and Lederle 1998). Additional comparisons were made with Timm (1975) for northern Minnesota and Benton (1980) for the northeastern United States. Despite the semblance of thorough coverage by previous studies, much of the large geographic area of northern Michigan and a number of flea hosts remain unexamined. The goal of this paper is to further the knowledge of flea and host species distributions with new records from the region.

Materials and Methods

I collected or received from collaborators 100 fleas of 13 flea species from 16 mammal host species. All new host records and county records are described here. Mammals were either live trapped in Sherman live traps and released, legally harvested during furbearer trapping, or, in the case of bats, captured in mist nets permitted to Philip Myers at the University of Michigan Biological Station. A few small mammals were found as road-kills.

Locations for trapping are as follows: Cheyboygan Co.—bats 45°33'33"N-84°40'32"W; Chippewa Co.—large carnivores 46°24'56"N- 84°22'06"W; weasels,

46°24'26"N-84°24'26"; rodents and shrews 46°25'40"N-84°30'04"W; Delta Co.—rodents 45°56'30"N—86°38'20"W; Grand Traverse Co. fox, 44°53'34"N-84°30'28"W; rodents, 44°38'28"N-85°32'07"W to 44°41'55"N-85°37'16"W; Kalkaska Co. rodents, 44°48'36"N85°17'05"W. There are no lat/long locations available for collecting sites in Houghton and Keewenaw Counties.

Mammalian hosts were brushed and examined, and fleas were picked up with forceps or an alcohol wetted finger. All fleas were stored in 70% ethyl alcohol, and later mounted in Canada balsam on glass slides for microscopic examination. Most Siphonaptera were identified with the use of Holland (1949 and 1985), but Benton (1983) was useful for comparisons. Holland's nomenclature is followed except that *Nearctopsylla genalis genalis* (Baker) follows the accepted nomenclature of Hopkins and Rothschild (1953). Slides from this study and previous studies are deposited in the University of Minnesota Entomology Collection. Mammal names are according to Wilson and Reeder (2005).

Results

The following list by parasite family and species consists minimally of new county records for the parasite on the host listed. New records for Michigan, the Upper Peninsula or the northern Lower Peninsula are noted. Additional specimens that were reported in earlier works are not repeated. Following each county name is the distribution of the sexes of the fleas and collection

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dates to indicate phenology and temporal abundance.

VERMIPSYLLIDAE Wagner

***Chaetopsylla lotoris* (Stewart)** – Coyote, *Canis latrans* Say, 1 male, 1 female, Chippewa Co., 16 November 2002 NEW UPPER PENINSULA RECORD; American Marten, *Martes americana* (Turton), 2 females, Chippewa Co. 10 December 2003; Raccoon, *Procyon lotor* (L.), Chippewa Co., 15 October 2000. NEW UPPER PENINSULA RECORD

HYSTRICHOPSYLLIDAE

Tiraboschi

***Ctenophthalmus pseudagyrtis* Baker** – Eastern Chipmunk, *Tamias striatus* (L.), 1 male, 2 females, Grand Traverse Co., 18 May 1987.

***Corrodopsylla curvata curvata* (Rothschild)** – Northern Short-tailed Shrew, *Blarina brevicauda* (Say), Chippewa Co. 1 male 8 September 2000.

***Doratomylla blarinae* C. Fox** – Cinereus Shrew, *Sorex cinereus* Kerr. Chippewa Co., 1 female, 27 October 2000.

***Nearctopsylla genalis genalis* (Baker)**—American Marten, *Martes americana*, Chippewa, 5 males, 5 females, 6 December 2003; Chippewa Co., 2 males 3 female 10 December 2003. Ermine, *Mustela erminea* L., Chippewa Co., 1 male, 3 females, 2 December 2003. Least Weasel, *Mustela nivalis* L., Grand Traverse Co., 2 males, 28 December 2003. NEW STATE RECORD. Cinereus Shrew, *Sorex cinereus*, Chippewa Co., 1 male 28 July 2000, 8 October 2003, 1 female, 1 male, 11 October 2000, 1 male, 27 October 2000, 1 female, 3 females, 29 October 2000.

CERATOPHYLLIDAE Dampf

***Monopsyllus vison* (Baker)** – Eastern Gray Squirrel, *Sciurus carolinensis* Gmelin, Chippewa Co., 1 male, 2 females, 17 August 1998.

***Oropsylla arctomys* (Baker)** – Red Fox, *Vulpes vulpes* (L.), Chippewa Co., 1 female, 4 November 2000. NEW Upper Peninsula Record.

***Opisodasys pseudarctomys* (Baker)** – Southern Flying Squirrel, *Glaucomys volans* (L.), Chippewa Co., 1 female, 31 August 1998.

***Orchopeas caedens* (Jordan)** – Eastern Chipmunk, *Tamias striatus*, Grand Traverse Co., 1 female, 18 May 1987.

***Orchopeas howardi* (Baker)**– American Marten, *Martes americana*, Chippewa Co., 1 male, 2 females, 10 December 2003.

***Orchopeas leucopus* (Baker)** – White-footed Deer Mouse *Peromyscus leucopus* (Rafinesque), Cheboygan Co., 4 females, 9 July 2000; 2 females, 2 August 2000, Grand Traverse Co., 4 females, 16 July 2007, Grand Traverse Co., 2 males, 2 females 25 July 2007; North American Deer Mouse, *Peromyscus maniculatus gracilis* Le Conte, Delta Co., 2 males, 11 females, 29 July, 2000, Chippewa Co., 5 females, 25 August 2000; Red Fox, *Vulpes vulpes*, Grand Traverse Co. 1 female, 13 February 1988, Meadow Jumping Mouse, *Zapus hudsonius*, (Zimmerman), Grand Traverse Co., 1 female 24 July 2007.

***Peromyscopsylla hesperomys* (Baker)** – White-footed Deer Mouse *Peromyscus leucopus* 1 male, Grand Traverse Co. 16 July 2007, Cheboygan Co.; 1 female, 9 July 2000.

ISCHNOPSYLLIDAE Wahlgren

***Myodopsylla insignis* (Rothschild)** – Little Brown Myotis *Myotis lucifugus* (Le Conte), Cheboygan Co., 7 males, 11 females 31 July 2000.

Discussion

Collections of one or a few fleas indicate a single host was examined. Capture records of larger scale trapping include: the Boardman River Small Mammal Survey in Hess and Scharf (2007), three vials of bat fleas indicating as many bats from Cheboygan Co., and four vials of mouse fleas from Delta Co. from Philip Myers. Weasel captures are enumerated below.

Nearctopsylla genalis genalis is the most common flea found on *Mustela erminea* Miller (2004, unpublished) captured a total of 32 weasels, 9 Long-tailed Weasels (*Mustela frenata* Lichtenstein) and 23 Short-tailed Weasels (*M. erminea*). Of the 11 species of fleas he found on both weasel species, 57.5% were *N. genalis genalis*. The rest of the fleas collected by Miller were ascribed to stragglers from the weasel's prey. They were unavailable for this study. Miller gave me specimens of the emine fleas. Fleas from two other mustelids (American Marten, *Martes americana* and Least Weasel, *M. nivalis*) indicate that *N. genalis genalis* is probably a true parasite of mustelids. Shrews of the genus *Sorex* also regularly harbor this flea.

Orchopeas leucopus is a generalized parasite of mice that has been found on a large variety of hosts including transfer to many mouse predators (Lawrence et al. 1965; Wilson and Johnson 1971; Scharf and Stewart 1980; Scharf et al. 1990; Scharf

1991, 1998; Scharf and Lederle 1998). I found it to be the only flea (with two exceptions of *Peromyscopsylla hesperomys* on the newly immigrant White-footed Mouse (*Peromyscus leucopus*) from southern Michigan which has replaced the North American White-footed Deer Mouse (*Peromyscus maniculatus gracilis*) in much of the northern lower and upper peninsulas due to climate change (Myers et al. 2005, Myers et al. 2009). The close association between *O. leucopus* and the White-footed Mouse was also shown by Mize et al. (2011). They report that of 98 fleas from 164 *P. leucopus* trapped in southern Michigan 96 were *O. leucopus*. By contrast, *P. m. gracilis* has at least five species of flea commonly found on it (Scharf 1991).

Acknowledgments

Lake Superior State University students, Bryan Miller, Kurt Harjala, and Tony Kennedy trapped and collected fleas under their Michigan Furbearer Trapping licenses. Tom Allan, Lake Superior State University, contributed a road-killed specimen. Bryan Miller wrote his Bachelor's Degree thesis based on his collections described here. WCS trapped at Skegemog Preserve, Boardman River Dams sites, and at Nine Mile Point under the Non-Game Collecting Permit of Philip Myers of the University of Michigan Museum of Zoology. Myers also collected fleas for this project at the University of Michigan Biological Station at Douglas Lake. I thank Little Traverse Conservancy for sponsoring ecological inventory work at Nine Mile Point, Grand Traverse Conservancy for permission to trap at Skegemog Preserve and Environmental Consulting and Technology Incorporated for sponsoring the trapping along the Boardman River. Robert Hess, Michigan Department of Natural Resources (retired) Philip Myers, University of Michigan Museum of Zoology, Emeritus and Barbara L. Lundrigan, Michigan State University Museum were part of the Boardman River trapping team. I thank Omer R. Larson, University of North Dakota, Emeritus for early mentoring on Siphonaptera at the University of Minnesota Lake Itasca Biological Station and with recent access to pertinent literature. Two anonymous reviewers greatly improved this manuscript.

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