

**Chiggers (Acarina: Trombiculidae)
From the Mammals of Indiana**

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Abstract

Twenty species of chiggers were recovered from 32 of 52 species of mammals examined from Indiana: *Chelodonta ouachitensis*, *Eutrombicula alfreddugesi*, *Euschoengastia hamiltoni*, *E. marmotae*, *E. ohioensis*, *E. peromysci*, *E. pipistrelli*, *E. setosa*, *E. trigenuala*, *Leptotrombidium myotis*, *Leptotrombidium peromysci*, *Microtrombicula trisetica*, *Miyatrombicula cynos*, *M. jonesae*, *Neotrombicula fitchi*, *N. lipovskyi*, *N. microti*, *N. sylvilagi*, *N. whartoni*, and *Walchia americana*.

Introduction

The purpose of this paper is to bring together available information on chiggers of wild mammals of Indiana, including new host and state records.

Materials and Methods

Chiggers for this study were collected by the senior author and his students during studies of mammals of Indiana by Russell E. Mumford (Purdue University) and John O. Whitaker, Jr. Larval chiggers were detected by scanning mammals with a 10 to 70 power zoom dissecting microscope, and were preserved in 70% alcohol. After transfer to Nesbitts solution containing acid fuchsin for relaxing and staining for 6 to 14 days, they were mounted in Hoyers solution. Cover slips were ringed with euparal.

Prior to published records from the present study, there were only two reports of chiggers from Indiana. Jenkins (1) named *Eutrombicula alfreddugesi* (Oudemans) from several counties in Indiana, and Nadchatram and Wilson (2) described *Mackiena (Tinpinia) migratoria* based on larvae from South Korea and from a bank swallow taken at Lafayette, Indiana.

Previous records of chiggers from Indiana mammals consist of the following: *Euschoengastia pipistrelli* from *Eptesicus fuscus*, *Pipistrellus subflavus*, *Myotis austroriparius*, and *M. lucifugus* (6) and on *M. keenii* (3); *Euschoengastia hamiltoni*, *Leptotrombidium myotis* and *Neotrombicula microti* on *Eptesicus fuscus* (3); *Euschoengastia peromysci*, *Neotrombicula whartoni*, *Eutrombicula alfreddugesi* and *Leptotrombidium* sp. from *Zapus hudsonius* (7); *Euschoengastia marmotae* and *Eutrombicula alfreddugesi* from *Marmota monax* (8); *Euschoengastia trigenuala* from *Scalopus aquaticus* (9); *Neotrombicula fitchi*, *Walchia americana*, *Neotrombicula sylvilagi*,

Miyatrombicula cynos, *Neotrombicula whartoni*, *Eutrombicula alfreddugesi*, *Leptotrombidium* sp. and *Microtrombicula trisetica* on squirrels of the genus *Sciurus* (10); and *E. alfreddugesi* from *Rattus norvegicus* (4), and the same chigger plus *Neotrombicula whartoni* from the opossum (5). Thus 15 species of chiggers including members of seven genera have been reported from Indiana mammals. This paper summarizes these and new records of chiggers from the fur of mammals of Indiana.

Results

Most (52) of the 54 species of native and feral mammals of Indiana have now been examined, and 33 species were infested with chiggers. Neither big-eared bats, *Plecotus rafinesquii*, nor bobcats, *Lynx rufus*, were examined, and the following species of mammals lacked chiggers (number examined is in parentheses): INSECTIVORA: *Sorex longirostris* (13), *Blarina brevicauda* (133), *Cryptotis parva* (108), *Condylura cristata* (21). CHIROPTERA: *Myotis grisescens* (1), *M. sodalis* (43), *Lasionycteris noctivagans* (8), *Nycticeius humeralis* (12), *Lasiurus borealis* (234), *L. cinereus* (25). RODENTIA: *Spermophilus tridecemlineatus* (123), *S. franklinii* (14), *Geomys bursarius* (85), *Castor canadensis* (2), *Reithrodontomys megalotis* (80), *Mus musculus* (475). CARNIVORA: *Canis latrans* (15), *Taxidea taxus* (11). ARTIODACTYLA: *Odocoileus virginianus* (4).

Mammals with chiggers are listed in Table I, along with chiggers and relative abundance. The species of chiggers are listed in Table II, together with the hosts for each. A total of 20 species of chiggers, representing eight genera, have been found on mammals of Indiana. All of the records included here have resulted from the present series of studies, and 5 of these species are reported for the first time from the state, along with many new host records.

One species, *Eutrombicula alfreddugesi*, was widespread on Indiana mammals, being found on thirteen different hosts, but was not abundant on any. Usually reptiles are its major host. *Neotrombicula whartoni* was found on the same number of hosts, 13, but showed certain host affinities, particularly the cottontail rabbit, opossum and fox squirrel. A closely related species, *Neotrombicula lipovskyi*, also occurred on four hosts: two rodents, a carnivore and a rabbit.

Three of the species are bat chiggers, *Euschoengastia pipistrelli*, *E. hamiltoni* and *Leptotrombidium myotis*. The first was the only species found on bats of the genera *Myotis* and *Pipistrellus*, whereas all three species were found on *Eptesicus fuscus*, the big brown bat. However, on this latter species, *E. hamiltoni* was the most abundant chigger.

Three of the species could be termed squirrel chiggers in Indiana, particularly *Neotrombicula fitchii*, the most abundant chigger of all species of tree squirrels (*Glaucomys*, *Sciurus*, and *Tamiasciurus*), but also *Walchia americana* (primarily on *Sciurus*) and *Leptotrombidium peromysci*.

Three species of *Euschoengastia* are primarily rodent (other than squirrel) chiggers, but each had primary hosts. These species, with their primary hosts, were *E. peromysci* on the bog lemming and to a lesser degree on the white-footed

TABLE 1 *Chiggers of Wild Mammals of Indiana.*

Chigger Species	Number of Chiggers		Hosts Infested	
	Total	X	No.	Percent
MARSUPIALIA				
<i>Didelphis virginiana</i> , Virginia opossum (66 examined)				
<i>Neotrombicula whartoni</i>	137	2.08	14	21.2
<i>Eutrombicula alfreddugesi</i>	2	0.03	1	1.5
INSECTIVORA				
<i>Sorex cinereus</i> , Masked shrew (40 examined)				
<i>Euschoengastia ohioensis</i>	11	0.28	1	2.5
<i>Scalopus aquaticus</i> , Eastern mole (104 examined)				
<i>Euschoengastia trigenuala</i>	3	0.03	1	1.0
CHIROPTERA				
<i>Myotis austroriparius</i> , Southeastern myotis (5 examined)				
<i>Euschoengastia pipistrelli</i>	1	0.20	1	20.0
<i>M. keenii</i> , Keen's myotis (33 examined)				
<i>Euschoengastia pipistrelli</i>	48	1.45	9	27.3
<i>M. lucifugus</i> , Little brown myotis (84 examined)				
<i>Euschoengastia pipistrelli</i>	109	1.30	20	23.8
<i>Pipistrellus subflavus</i> , Eastern pipistrelle (56 examined)				
<i>Euschoengastia pipistrelli</i>	54	0.96	13	23.2
<i>Eptesicus fuscus</i> , Big brown bat (491 examined)				
<i>Euschoengastia hamiltoni</i>	34	0.1	5	1.0
<i>Leptotrombidium myotis</i>	7	0.01	4	0.8
<i>Euschoengastia pipistrelli</i>	3	0.01	2	0.4
<i>Neotrombicula microti</i>	1	0.002	1	0.2
LAGOMORPHA				
<i>Sylvilagus floridanus</i> , Eastern cottontail (43 examined)				
<i>Neotrombicula whartoni</i>	159	3.70	14	32.6
<i>Euschoengastia setosa</i>	3	0.07	2	4.7
<i>Neotrombicula lipovskyi</i>	1	0.02	1	2.3
RODENTIA				
<i>Sciurus carolinensis</i> , Gray squirrel (47 examined)				
<i>Leptotrombidium peromysci</i>	14	0.30	3	6.4
<i>Neotrombicula fitchi</i>	13	0.28	8	17.0
<i>Walchia americana</i>	13	0.28	6	12.8
<i>Neotrombicula whartoni</i>	10	0.21	3	6.4
<i>Eutrombicula alfreddugesi</i>	4	0.09	4	8.5
<i>Microtrombicula trisetica</i>	1	0.02	1	2.1
<i>Sciurus niger</i> , Fox squirrel (137 examined)				
<i>Neotrombicula whartoni</i>	68	0.50	9	6.6
<i>Walchia americana</i>	65	0.47	8	5.8
<i>Neotrombicula fitchi</i>	47	0.34	15	10.9
<i>Neotrombicula sylvilagi</i>	5	0.04	1	0.7
<i>Eutrombicula alfreddugesi</i>	4	0.03	3	2.2
<i>Leptotrombidium peromysci</i>	4	0.03	2	1.5

TABLE I Chiggers of Wild Mammals of Indiana. Continued

Chigger Species	Number of Chiggers		Hosts Infested	
	Total	X	No.	Percent
<i>Miyatrombicula cynos</i>	2	0.01	2	1.5
<i>Tamiasciurus hudsonicus</i> , Red squirrel (48 examined)				
? <i>Miyatrombicula cynos</i>	1	0.02	1	2.1
<i>Neotrombicula fitchi</i>	28	0.58	1	2.1
<i>Leptotrombidium peromysci</i>	2	0.04	1	2.1
<i>Marmota monax</i> , Woodchuck (91 examined)				
<i>Euschoengastia marmotae</i>	131	1.44	5	5.5
<i>Eutrombicula alfreddugesi</i>	12	0.13	1	1.1
<i>Euschoengastia peromysci</i>	2	0.02	1	1.1
<i>Tamias striatus</i> , Eastern chipmunk (65 examined)				
<i>Neotrombicula whartoni</i>	23	0.35	7	10.8
<i>Eutrombicula alfreddugesi</i>	3	0.05	1	1.5
<i>Euschoengastia peromysci</i>	2	0.03	1	1.5
<i>Walchia americana</i>	1	0.02	1	1.5
<i>Glaucomys volans</i> , Southern flying squirrel (11 examined)				
<i>Neotrombicula fitchi</i>	40	3.64	1	9.1
<i>Peromyscus maniculatus</i> , Deermouse (454 examined)				
<i>Euschoengastia peromysci</i>	1	0.002	1	0.2
<i>Peromyscus leucopus</i> , White-footed mouse (209 examined)				
<i>Euschoengastia peromysci</i>	63	0.30	11	5.3
<i>Euschoengastia setosa</i>	1	0.004	1	0.5
<i>Miyatrombicula jonesae</i>	1	0.004	1	0.5
<i>Neotoma floridana</i> , Eastern woodrat (10 examined)				
<i>Euschoengastia setosa</i>	55	5.50	6	60.0
<i>Neotrombicula lipovskyi</i>	44	4.40	3	30.0
<i>Euschoengastia peromysci</i>	2	0.20	1	10.0
<i>Cheladonta ouachitensis</i>	1	0.10	1	10.0
<i>Synaptomys cooperi</i> , Southern bog lemming (25 examined)				
<i>Euschoengastia peromysci</i>	299	11.96	24	96.0
<i>Euschoengastia ohioensis</i>	26	1.04	8	32.0
<i>Eutrombicula alfreddugesi</i>	8	0.32	1	4.0
<i>Euschoengastia setosa</i>	5	0.20	1	4.0
<i>Ondatra zibethicus</i> , Muskrat (31 examined)				
<i>Euschoengastia peromysci</i>	1	0.03	1	3.2
<i>Microtus ochrogaster</i> , Prairie vole (32 examined)				
<i>Euschoengastia setosa</i>	11	0.34	3	9.3
<i>Eutrombicula alfreddugesi</i>	5	0.16	4	12.5
<i>Neotrombicula whartoni</i>	1	0.03	1	3.1
<i>Microtus pennsylvanicus</i> , Meadow vole (82 examined)				
<i>Euschoengastia peromysci</i>	39	0.48	5	6.1
<i>Neotrombicula whartoni</i>	1	0.01	1	1.2

TABLE I Chiggers of Wild Mammals of Indiana. Continued

Chigger Species	Number of Chiggers		Hosts Infested	
	Total	X	No.	Percent
<i>Neotrombicula lipovskyi</i>	1	0.01	1	1.2
<i>Eutrombicula alfreddugesi</i>	1	0.01	1	1.2
<i>Microtus pinetorum</i> , Pine vole (27 examined)				
<i>Euschoengastia ohioensis</i>	69	2.55	5	18.5
<i>Euschoengastia peromysci</i>	13	0.48	1	3.7
<i>Neotrombicula lipovskyi</i>	3	0.11	1	3.7
<i>Zapus hudsonius</i> , Meadow jumping mouse (115 examined)				
<i>Euschoengastia peromysci</i>	12	0.10	2	1.7
<i>Neotrombicula whartoni</i>	5	0.04	1	0.8
<i>Eutrombicula alfreddugesi</i>	3	0.03	2	1.7
<i>Leptotrombidium peromysci</i>	1	0.01	1	0.8
<i>Rattus norvegicus</i> , Norway rat (146 examined)				
<i>Eutrombicula alfreddugesi</i>	1	0.01	1	0.7
CARNIVORA				
<i>Vulpes vulpes</i> , Red fox (14 examined)				
<i>Neotrombicula whartoni</i>	40	2.86	1	7.1
<i>Miyatrombicula jonesae</i>	6	0.43	1	7.1
<i>Urocyon cinereoargenteus</i> , Gray fox (42 examined)				
<i>Neotrombicula lipovskyi</i>	150	3.57	1	2.4
<i>Neotrombicula whartoni</i>	1	0.02	1	2.4
<i>Canis latrans</i> , Coyote (15 examined)				
<i>Eutrombicula alfreddugesi</i>	9	0.60	1	6.7
<i>Procyon lotor</i> , Raccoon (54 examined)				
<i>Neotrombicula whartoni</i>	5	0.09	1	1.9
<i>Neotrombicula microti</i>	4	0.07	1	1.9
<i>Mustela frenata</i> , Long-tailed weasel (16 examined)				
<i>Eutrombicula alfreddugesi</i>	7	0.44	2	12.5
<i>Euschoengastia peromysci</i>	1	0.06	1	6.3
<i>Mustela nivalis</i> , Least weasel (8 examined)				
<i>Euschoengastia peromysci</i>	1	0.12	1	12.5
<i>Mustela vison</i> , Mink (12 examined)				
<i>Neotrombicula whartoni</i>	2	0.17	2	16.7
<i>Mephitis mephitis</i> , Striped skunk (10 examined)				
<i>Neotrombicula whartoni</i>	1	0.10	1	10.0

mouse; *E. ohioensis* on the pine vole; and *E. setosa* on the woodrat and meadow vole.

Seven species of chiggers were found on only one species of host, *Euschoengastia marmotae*, with 131 individuals on the woodchuck, *E.*

hamiltoni and *Leptotrombidium myotis* with 7 and 3 individuals on the big brown bat, *Neotrombicula sylvilagi* with 15 individuals on the fox squirrel, *Microtrombicula trisetica* with one individual on the gray squirrel, *Euschoengastia trigenuala* with 3 individuals on the Eastern mole, and a single larva of *Cheladonta ouachitensis* from a wood rat. Only the first two of these relationships were supported with adequate data to suggest host-specific relationships.

Many of the species of chiggers tend to be either warm or cold weather chiggers, and this was well illustrated during the present study (Table II). The warm weather chigger *Eutrombicula alfreddugesi* is one of the common pest chiggers of humans throughout the summer in the midwest. The remainder are cold weather chiggers, except for a few species such as the bat-infesting *Euschoengastia pipistrelli*, and those inadequately studied.

TABLE II Numbers of chiggers taken from the various species of wild mammals of Indiana, summarized bimonthly. (For numbers of hosts examined, see Table I.)

Host Species	Dec.- Jan.	Feb.- March	April- May	June- July	Aug.- Sept.	Oct.- Nov.	Totals
<i>Cheladonta ouachitensis</i>							
Lipovsky, Crossley & Loomis, 1955							
<i>Neotoma floridana</i>						1	1
<i>Eutrombicula alfreddugesi</i> (Oudemans, 1910)							
<i>Marmota monax</i>				12			12
<i>Synaptomys cooperi</i>				8			8
<i>Mustela frenata</i>				1	6		7
<i>Microtus ochrogaster</i>				5			5
<i>Sciurus niger</i>					4		4
<i>Sciurus carolinensis</i>					4		4
<i>Tamias striatus</i>					3		3
<i>Zapus hudsonius</i>				2	1		3
<i>Didelphis virginiana</i>					2		2
<i>Microtus pennsylvanicus</i>				1			1
<i>Urocyon cinereoargenteus</i>				1			1
<i>Canis latrans</i>					9		9
<i>Rattus norvegicus</i>						1	1
<i>Euschoengastia hamiltoni</i> Brennan, 1947							
<i>Eptesicus fuscus</i>	19		13	2			34
<i>E. marmotae</i> Farrell, 1956							
<i>Marmota monax</i>		128	3				131
<i>E. ohioensis</i> Farrell, 1956							
<i>Microtus pinetorum</i>		8			1	60	69
<i>Synaptomys cooperi</i>		25	1				26
<i>Sorex cinereus</i>					11		11
<i>E. peromysci</i> (Ewing, 1929)							
<i>Synaptomys cooperi</i>		248	51				299
<i>Peromyscus leucopus</i>	1	10	30			22	63
<i>Microtus pennsylvanicus</i>		19			20		39
<i>Microtus pinetorum</i>		13					13
<i>Zapus hudsonius</i>					12		12
<i>Marmota monax</i>		3					3
<i>Neotoma floridana</i>		2					2
<i>Tamias striatus</i>		2					2

TABLE II Numbers of chiggers taken from the various species of wild mammals of Indiana, summarized bimonthly. (For numbers of hosts examined, see Table I.) Continued

Host Species	Dec.- Jan.	Feb.- March	April- May	June- July	Aug.- Sept.	Oct.- Nov.	Totals
<i>Peromyscus maniculatus</i>						1	1
<i>Mustela frenata</i>					1		1
<i>Mustela nivalis</i>			1				1
<i>Ondatra zibethicus</i>					1		1
<i>E. pipistrelli</i> Brennan, 1947							
<i>Myotis lucifugus</i>				22	87		109
<i>Pipistrellus subflavus</i>					54		54
<i>Myotis keenii</i>					42	6	48
<i>Eptesicus fuscus</i>					3		3
<i>Myotis austroriparius</i>					1		1
<i>E. setosa</i> (Ewing, 1937)							
<i>Neotoma floridana</i>		6				49	55
<i>Microtus ochrogaster</i>		11					11
<i>Synaptomys cooperi</i>		5					5
<i>Sylvilagus floridanus</i>	3						3
<i>Peromyscus leucopus</i>		3					3
<i>E. trigenuala</i> Loomis, 1956							
<i>Scalopus aquaticus</i>			3				3
<i>Leptotrombidium myotis</i> (Ewing, 1929)							
<i>Eptesicus fuscus</i>					2		2
<i>Leptotrombidium peromysci</i>							
Vercammen-Grandjean & Langston, 1976							
<i>Sciurus carolinensis</i>					14		14
<i>S. niger</i>					4		4
<i>Tamiasciurus hudsonicus</i>		2					2
<i>Zapus hudsonius</i>					1		1
<i>Microtrombicula trisetica</i> (Loomis & Crossley, 1963)							
<i>Sciurus carolinensis</i>					1		1
<i>Miyatrombicula cynos</i> (Ewing, 1937)							
<i>Sciurus niger</i>		2					2
<i>Tamiasciurus hudsonicus</i>		1					1
<i>Miyatrombicula jonesae</i> (Brennan, 1952)							
<i>Vulpes vulpes</i>		6					6
<i>Peromyscus leucopus</i>		1					1
<i>Neotrombicula fitchi</i> (Loomis, 1954)							
<i>Sciurus niger</i>	31		2			14	47
<i>Glaucomys volans</i>		40					40
<i>Tamiasciurus hudsonicus</i>	28						28
<i>Sciurus carolinensis</i>		13					13
<i>N. lipovskyi</i> (Brennan and Wharton, 1950)							
<i>Urocyon cinereoargenteus</i>						150	150
<i>Neotoma floridana</i>		1				43	44
<i>Microtus pinetorum</i>		3					3
<i>Microtus pennsylvanicus</i>		1					1
<i>Sylvilagus floridanus</i>						1	1
<i>N. microti</i> (Ewing, 1928)							
<i>Eptesicus fuscus</i>						4	4
<i>Procyon lotor</i>			4				4
<i>N. sylvilagi</i> (Brennan and Wharton, 1950)							
<i>Sciurus niger</i>						5	5

TABLE II Numbers of chiggers taken from the various species of wild mammals of Indiana, summarized bimonthly. (For numbers of hosts examined, see Table I.) Continued

Host Species	Dec.- Jan.	Feb.- March	April- May	June- July	Aug.- Sept.	Oct.- Nov.	Totals
<i>N. whartoni</i> (Ewing, 1929)							
<i>Sylvilagus floridanus</i>	36	29	4			90	159
<i>Urocyon cinereoargenteus</i>						1	1
<i>Didelphis virginiana</i>	2	12			1	122	137
<i>Sciurus niger</i>					6	62	68
<i>Vulpes vulpes</i>						40	40
<i>Tamias striatus</i>						23	23
<i>Sciurus carolinensis</i>						10	10
<i>Zapus hudsonius</i>						5	5
<i>Procyon lotor</i>						5	5
<i>Mustela vison</i>	1					1	2
<i>Mephitis mephitis</i>						1	1
<i>Microtus pennsylvanicus</i>						1	1
<i>Microtus ochrogaster</i>						1	1
<i>Walchia americana</i> Ewing, 1942							
<i>Sciurus niger</i>		2			41	22	65
<i>Sciurus carolinensis</i>	3				1	9	13
<i>Tamias striatus</i>						1	1

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