

Fleas of Vigo County, Indiana

JOHN O. WHITAKER, JR. and KENNETH W. CORTHUM, JR.
Indiana State University

Introduction

During study of the mammals of Vigo County, Indiana, by the senior author, and during work on reproduction of *Microtus ochrogaster* and *M. pennsylvanicus* by the junior author, the fur of all live or freshly killed mammals was examined for fleas. Fleas were mounted and identified and many of the identifications were verified by Nixon Wilson, Acarologist, Bernice P. Bishop Museum, Honolulu, Hawaii. This paper is a report on the fleas known to occur on the mammals (generally excluding man and domestic animals and with emphasis on the smaller species) of Vigo County.

Mammals Found to Harbor Fleas

Of the 42 species of mammals known to exist in Vigo County, at least one individual of 37 of the species has been examined and fleas were taken from 15 (Table 1). A total of 2251 wild mammals was examined from which 474 fleas were taken.

Didelphis marsupialis. Opossum. Thirteen opossums were examined, but only one flea, *Orchopeas leucopus*, was found.

Scalopus aquaticus. Common mole. Two of 14 moles each had one flea, but one was lost. The other flea was *Ctenophthalmus pseudagyrtes*.

Cryptotis parva. Small short tailed shrew. Forty-six shrews were examined of which 12 yielded fleas. Six shrews, harbored a total of 82 *Corrodopsylla hamiltoni* with 73 specimens on one individual. One specimen each of *Peromyscopsylla scotti* and *Epitedia wenmanni* were taken. Ten individuals of *Ctenophthalmus pseudagyrtes* were taken from five shrews of this species.

Blarina brevicauda. Short-tailed shrew. A total of 15 fleas were taken from 7 of 59 short-tailed shrews examined. Nine of the fleas were *Ctenophthalmus pseudagyrtes*, four were *Doratopsylla blarinae* and two were *Stenopomia americana*.

Citellus tridecemlineatus. A total of 26 fleas were collected from ten of 60 ground squirrels examined. All were *Opistocrastis bruneri*.

Tamias striatus. Chipmunk. Eight chipmunks were examined for fleas during the present study. Two each yielded one flea. One was *Ctenophthalmus pseudagyrtes*, and one was *Tamiohyla grandis*. The latter species is relatively uncommon in Indiana, only two specimens being reported, both from northern Indiana (1).

Sciurus niger. Fox squirrel. Thirteen fox squirrels were examined of which five yielded a total of 18 fleas. All were *Orchopeas howardi*.

Glaucomys volans. Southern flying squirrel. Of ten flying squirrels examined, two yielded 11 fleas. Eight were of the relatively uncommon species, *Conorhinopsylla stanfordi*, and three were the common sciurid flea, *Orchopeas howardi*.

Peromyscus maniculatus bairdi. Prairie white-footed mouse. A total of 486 mice of this species was examined, of which 25 or 5.14% yielded fleas, totalling 40. Included were 31 fleas *Orchopeas leucopus*, 6 *Ctenopthalmus pseudagyrtes*, 2 *Epitedia wenmanni*, and one *Stenopomia americana*.

Peromyscus leucopus. Deer-mouse. A total of 434 deermice were examined, of which 97 or 22.35% yielded fleas of five species. The most common was *Orchopeas leucopus* which occurred on 58 or 13.36% of the mice. A total of 140 fleas of this species was taken. The second most common was *Epitedia wenmanni*, of which 43 individuals were taken from 38, or 8.75% of the mice. Seven fleas, *Peromyscopsylla scotti*, five *Ctenopthalmus pseudagyrtes*, and four *Stenopomia americana* were also taken.

Microtus pennsylvanicus. Common meadow mouse. A total of 282 common meadow mice was examined, of which 25 or 8.86% had fleas. The most common flea on this species was *Ctenopthalmus pseudagyrtes*, with 13 mice, or 4.6% each having one individual. Six individuals each had one flea *Epitedia wenmanni*, 5 each had one *Orchopeas leucopus*, and one had one *Peromyscopsylla hamifer*.

Microtus ochrogaster. Prairie meadow mouse. Of 142 prairie meadow voles examined, 17 or 11.97% harbored a total of 27 fleas. Twenty-five of the fleas were *Ctenopthalmus pseudagyrtes*, one was *Stenopomia americana*, and one was *Epitedia wenmanni*.

Microtus pinetorum. Pine mouse. Four of 17 pine mice examined from Vigo County yielded a total of seven fleas, all *Ctenopthalmus pseudagyrtes*.

Mus musculus. House mouse. Of 451 house mice examined, three were found to harbor one flea each. One was *Ctenopthalmus pseudagyrtes*, one was *Orchopeas leucopus*, and one was *Epitedia wenmanni*. The housemouse in Vigo County appears to be nearly free of fleas.

Sylvilagus floridanus. Cottontail. Of nine cottontails examined, two each yielded two fleas, *Cediopsylla simplex*.

List of Fleas Taken

The number of fleas examined and information on the hosts for each are given (Table 2).

Cediopsylla simplex. This is the common cottontail flea of Indiana and of the eastern United States (1). Four fleas were taken from nine cottontails examined during the present study and all were this species.

Ctenocephalides canis. This species is the common dog flea and is probably common in the county. Numerous individuals were taken from one dog.

Ctenocephalides felis. This species is the common cat flea and is probably common since several hundred were seen on one cat.

Conorhinopsylla stanfordi. Apparently there is only one previous report of this species in Indiana (1) who took one specimen from a total of 242 tree squirrels examined. Tree squirrels are the normal host for this species. Eight specimens of *Conorhinopsylla* were taken on *Glaucomys volans*, the flying squirrel, during the present study.

Corrodopsylla hamiltoni. This species was found only on *Cryptotis parva* and was the most abundant flea on that species. A total of 82 fleas of this species were taken from 6 of 46 *Cryptotis* examined. Most specimens previously taken were from *Blarina* or *Cryptotis* and the latter species may be the major host for this flea. Only two specimens of *C. hamiltoni* were taken by Wilson (1).

Ctenophthalmus pseudagyrtes. *C. pseudagyrtes* was found on ten species of small mammals, thus occurred on a greater variety of mammals than any other. It was the dominant flea of *Blarina brevicauda*, *Microtus pennsylvanicus*, *M. ochrogaster*, and *Microtus pinetorum*, and was important on *Cryptotis parva*.

Doratomyss blarinae. This species was found only on *Blarina brevicauda* and comprised 26.7% of the fleas collected from that species. All 16 specimens taken by Wilson (1) were from *Blarina*.

Epididia wenmanni. *Epididia wenmanni* was important on *Peromyscus leucopus* and on *Microtus pennsylvanicus*, but was found on six species of mammals. Wilson (1) states that *E. wenmanni* has been reported from almost 50 different species of mammals. He collected it from nine Indiana species.

Stenopomia americana. Only 8 individuals of this species were found, but four different host species were involved. It appears to occur most often on *Peromyscus leucopus* (1).

Tamiasophila grandis. This flea has been found only on the chipmunk and only in the northern part of its range. Four specimens, these from Carroll and Steuben Counties in northern Indiana, have been previously reported from the state (1). One specimen was taken on a Vigo County chipmunk during the present study.

Peromyscopsylla hamifer. Only one individual of this species was taken. It was on a common vole, *Microtus pennsylvanicus*. Wilson (1) collected it from *M. pennsylvanicus* and *Blarina brevicauda* in Newton and Pulaski Counties in northwestern Indiana. The Vigo record extends the known range of *P. hamifer* in Indiana about 70 miles to the south.

Peromyscopsylla scotti. This flea occurred sparingly on *P. leucopus* and one specimen was taken from *Cryptotis*. Wilson (1) reported it from Porter, Parke and Montgomery Counties and stated that it is "probably uncommon throughout the state."

Opistocrastis bruneri. This was the common *Citellus* flea of Vigo County and was the only flea taken on *Citellus*. Twenty-six individuals were found on 13 of 60 ground squirrels examined. Wilson (1) stated that the range of this species probably coincided with the range of *Citellus* in the state. Vigo County is the southernmost Indiana locality for *Citellus* in Indiana.

Orchopeas howardi. This species is common on members of the family Sciuridae in eastern North America and is common and widespread on squirrels of Indiana (1). During the present study it was taken on *Glaucomys volans* and *Sciurus niger*.

Orchopeas leucopus. This is one of the most common Indiana fleas and has been taken from a variety of mammalian species. It is the most common flea of both species of *Peromyscus* that occur in the

county. It comprised 77.5% and 70.4% of the fleas taken from *Peromyscus maniculatus bairdi* and *P. leucopus* respectively. A total of 178 fleas of this species were taken during the present study, being found on five different species of mammals.

Discussion

Wilson (1) reported 32 species of fleas from Indiana. Fifteen of these were taken during the present study. Of the remaining 17, *Orchopeas* sp., and *Epitidia cavernicola* are from the woodrat, *Neotoma floridana*, and one, *Dactylopsylla ignota*, is from the pocket gopher, *Geomys bursarius*. None of these species of mammals occurs in Vigo County. One species, *Ceratophyllus idius*, is from the tree swallow. No birds were examined.

Two species, *Megabothris asio* of *Microtus pennsylvanicus*, and *Oropsylla arctomys* of *Marmota monax* have been taken only in northern or northeastern Indiana. One species, *Peromyscopsella hesperomys* has been taken only in Harrison County.

One species, *Rhadinopsylla orama*, has been taken only once in Indiana and may be a nest flea (1). It was taken on *Synaptomys*.

Two species are rat fleas and are apparently relatively scarce in Indiana at present (1). They are *Nosopsyllus fasciatus* and *Xenopsylla cheopis*. *Pulex irritans*, found on pigs and man, was not taken during the present study.

Two species of Indiana fleas, *Myodopsylla insignis* and *Nycteriodopsylla chapini*, occur on bats. No bat fleas were taken during the present study although 122 bats were examined.

This leaves four species of fleas which would be expected to be taken in the county with additional collecting. They are *Chaetopsylla lotoris* which has been taken on racoons and red foxes in Clinton and Tippecanoe counties; *Atyphloceras bishopi* which has been reported from Clay, Carroll and Union counties for both species of *Microtus* and from *Blarina*; *Corrodopsylla curvata* of which one specimen was taken on a shrew in Posey County; and *Odontopsyllus multispinosus* which is of widespread occurrence on *Sylvilagus*.

Most of the fleas collected during the present study were from snap-trapped animals. There is some question whether information on fleas from dead animals (but freshly killed ones) compares favorably to information on fleas from live trapped animals. Fleas may leave the animals soon after death. During this study some animals were taken alive and checked for fleas, hence we have some degree of comparison (Table 3). The average number of fleas taken per animal was higher in the snap-trapped individuals in *Peromyscus leucopus* and in *M. pennsylvanicus*, while it was higher in the live trapped individuals of *M. ochrogaster*. Overall, 0.36 fleas per mouse on the average were taken from dead specimens, while only 0.20 per mouse were taken from live trapped specimens. This last comparison is not a good one, however. *P. leucopus* in Vigo County harbors more fleas than do the other two species and *P. leucopus* made up nearly half of the dead animals, while individuals of that species comprised less than 25% of the live trapped animals. Considering this, the two values, 0.36 and 0.20 are fairly close to what

one might expect. It did not appear that appreciable numbers of fleas were escaping between the time of capture of the mice and the time the traps were checked.

Summary

At least one individual of 37 of the 42 species of mammals known to occur in Vigo County were examined for fleas. A total of 2251 wild mammals was examined and these yielded 474 fleas of 13 species. Two additional species were taken from cats and dogs, thus 15, or 46.9 percent of the 32 species of fleas known to occur in Indiana were taken. Species of fleas taken and the numbers examined of each were *Cediopsylla simplex* (4), *Ctenocephalides canis* (num), *C. felis* (num), *Conorhinopsylla stanfordi* (8), *Corrodopsylla hamiltoni* (82), *Ctenophthalmus pseudagyrtes* (78), *Doratopsylla blarinae* (4), *Epitedia wenmanni* (54), *Stenopomia americana* (8), *Tamiphila grandis* (1), *Peromyscopsylla hamifer* (1), *P. scotti* (8), *Opistocrastis bruneri* (26), *Orchopeas howardi* (21), and *O. leucopus* (178). Numbers of fleas taken from mammals trapped alive and those trapped dead were similar.

Literature Cited

1. Wilson, N. 1961. The ectoparasites (Ixodides, Anoplura and Siphonaptera) of Indiana mammals. Unpublished Thesis. Purdue.

TABLE 1.

Vigo County Mammals Examined for Fleas.					
Species	No. Exam. for Fleas	No. with Fleas	Percent with Fleas	No. of Fleas	No. Species of Fleas
<i>Didelphis marsupialis</i> , Opossum	13	1	7.7	1	1
<i>Scalopus aquaticus</i> , Common Mole	14	2	14.3	2	1
<i>Sorex cinereus</i> , Masked Shrew	8	0	0.0	0	0
<i>Sorex longirostris</i> , Southeastern Shrew	11	0	0.0	0	0
<i>Cryptotis parva</i> , Small Short-tailed Shrew	46	12	26.1	94	4
<i>Blarina brevicauda</i> , Short-tailed Shrew	59	7	11.9	15	3
<i>Myotis lucifugus</i> , Little Brown Bat	4	0	0.0	0	0
<i>Myotis keenii</i> , Keen's Bat	4	0	0.0	0	0
<i>Myotis sodalis</i> , Indiana Bat	4	0	0.0	0	0
<i>Lasionycteris noctivagans</i> , Silver-haired Bat	2	0	0.0	0	0
<i>Pipistrellus subflavus</i> , Pipistrelle	15	0	0.0	0	0
<i>Eptesicus fuscus</i> , Big Brown Bat	48	0	0.0	0	0
<i>Lasiurus borealis</i> , Red Bat	41	0	0.0	0	0
<i>Lasiurus cinereus</i> , Hoary Bat	3	0	0.0	0	0
<i>Nycticeius humeralis</i> , Evening Bat	1	0	0.0	0	0
<i>Procyon lotor</i> , Raccoon	4	0	0.0	0	0
<i>Mustela nivalis</i> , Least Weasel	1	0	0.0	0	0
<i>Mustela frenata</i> , New York Weasel	2	0	0.0	0	0
<i>Mustela vision</i> , Mink	0	0	0.0	0	0
<i>Mephitis mephitis</i> , Common Skunk	5	0	0.0	0	0
<i>Taxidea taxus</i> , Badger	0	0	0.0	0	0
<i>Vulpes fulva</i> , Red Fox	3	0	0.0	0	0
<i>Urocyon cinereoargenteus</i> , Gray Fox	3	0	0.0	0	0
<i>Marmota monax</i> , Woodchuck	11	0	0.0	0	0
<i>Citellus tridecemlineatus</i> , 13-lined Ground Squirrel	60	10	16.67	26	1

TABLE 1.—Continued

Species	No. Exam. for Fleas	No. with Fleas	Percent with Fleas	No. of Fleas	No. Species of Fleas
<i>Tamias striatus</i> , Chipmunk	8	2	25.0	2	2
<i>Sciurus niger</i> , Fox Squirrel	13	5	38.5	18	1
<i>Glaucomys volans</i> , Southern Flying Squirrel	10	2	20.0	11	2
<i>Castor canadensis</i> , Beaver	0	0	0.0	0	0
<i>Peromyscus maniculatus</i> , Prairie Deer Mouse	486	25	5.1	40	4
<i>Peromyscus leucopus</i> , White-footed Mouse	434	97	22.4	199	5
<i>Synaptomys cooperi</i> , Bog Lemming	3	0	0.0	0	0
<i>Microtus pennsylvanicus</i> , Meadow Mouse	282	25	8.9	25	4
<i>Microtus ochrogaster</i> , Prairie Meadow Mouse	142	17	12.0	27	3
<i>M. pinetorum</i> , Pine Mouse	17	4	23.5	7	1
<i>Ondatra zibethicus</i> , Muskrat	4	0	0.0	0	0
<i>Rattus norvegicus</i> , Norway Rat	9	0	0.0	0	0
<i>Mus musculus</i> , Housemouse	451	3	0.7	3	3
<i>Zapus hudsonius</i> , Meadow Jumping Mouse	21	0	0.0	0	0
<i>Sylvilagus floridanus</i> , Cottontail	9	2	22.2	4	1
<i>Odocoileus virginianus</i> , White-tailed Deer	0	0	0.0	0	0

TABLE 2

Host List for Species of Fleas Taken in Vigo County, Indiana.				
	No. Examined	Total No. Fleas	No. This Species	Per Cent of Fleas of This Species
<i>Cediopsylla simplex</i>				
<i>Sylvilagus floridanus</i>	9	4	4	100.0
<i>C. canis</i>				
taken from a dog	1	num		
<i>Ctenocephalides felis</i>				
taken from a cat	1	num		
<i>Conorhinopsylla standfordi</i>				
<i>Glaucomy's volans</i>	10	11	8	72.7
<i>Corrodopsylla hamiltoni</i>				
<i>Cryptotis parva</i>	46	94	82	87.2
<i>Ctenophthalmus pseudagyrtes</i>				
<i>Scalopus aquaticus</i>	14	2	1	50.0
			(one lost)	
<i>Cryptotis parva</i>	46	94	10	10.6
<i>Blarina brevicauda</i>	59	15	9	60.0
<i>Peromyscus maniculatus</i>	486	40	6	15.0
<i>P. leucopus</i>	434	199	5	2.5
<i>Microtus pennsylvanicus</i>	282	25	13	52.0
<i>M. ochrogaster</i>	142	27	25	92.6
<i>M. pinetorum</i>	17	7	7	100.0
<i>Mus musculus</i>	451	3	1	33.3
<i>Tamias striatus</i>	8	2	1	50.0
			78	
<i>Doratomy'ssella blarinae</i>				
<i>Blarina brevicauda</i>	59	15	4	26.7
<i>Epitedia wenmanni</i>				
<i>Cryptotis parva</i>	46	94	1	1.1
<i>Peromyscus maniculatus</i>	486	40	2	5.0
<i>P. leucopus</i>	434	199	43	21.6
<i>Microtus pennsylvanicus</i>	282	25	6	24.0
<i>M. ochrogaster</i>	142	27	1	3.7
<i>Mus musculus</i>	451	3	1	33.3
			54	

TABLE 2—Continued

Host List for Species of Fleas Taken in Vigo County, Indiana.				
	Examined No.	Fleas No. Total	Species No. This	Per Cent of Fleas of This Species
<i>Stenopomia americana</i>				
<i>Blarina brevicauda</i>	59	15	2	13.3
<i>Peromyscus maniculatus</i>	486	40	1	2.5
<i>P. leucopus</i>	434	199	4	2.0
<i>Microtus ochrogaster</i>	142	27	1	3.7
			8	
<i>Tamioiphilia grandis</i>				
<i>Tamias striatus</i>	8	2	1	50.0
<i>Peromyscopsylla hamifer</i>				
<i>Microtus pennsylvanicus</i>	282	25	1	4.0
<i>Peromyscopsylla scotti</i>				
<i>Cryptotis parva</i>	46	94	1	1.1
<i>Peromyscus leucopus</i>	434	199	7	3.5
			8	
<i>Opistocratis bruneri</i>				
<i>Citellus tridecemlineatus</i>	60	26	26	100.0
<i>Orchopeas howardi</i>				
<i>Sciurus niger</i>	13	18	18	100.0
<i>Glaucomys volans</i>	10	11	3	18.2
			21	
<i>Orchopeas leucopus</i>				
<i>Didelphis marsupialis</i>	13	1	1	100.0
<i>Peromyscus maniculatus</i>	486	40	31	77.5
<i>P. leucopus</i>	434	199	140	70.4
<i>Microtus pennsylvanicus</i>	282	25	5	25.0
<i>Mus musculus</i>	451	3	1	33.3
			178	

TABLE 3

Comparison of Fleas Taken from Live and Dead Mice.			
<i>Freshly-Killed Animals</i>			
Number Examined	291	221	116
Number of Fleas	193	25	10
Average Number of Fleas per individual	0.66	0.11	0.08
<i>Live Animals</i>			
Number Examined	25	61	26
Number of Fleas	6	0	17
Average Number of Fleas per individual	0.24	0	0.65
