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The Siphonaptera (Fleas) of Upper Michigan Mammals: Problems in Zoology

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THE SIPHONAPTERA (FLEAS) OF UPPER MICHIGAN MAMMALS

PROBLEMS IN ZOOLOGY

SUBMITTED AS A PARTIAL FULFILLMENT
OF THE REQUIREMENTS
FOR A M.A. IN SCIENCE (BIOLOGY)

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PREFACE

"The Siphonaptera of Upper Michigan Mammals" marks the beginning rather than the end of this author's work with one of the smallest and most misunderstood insects, the flea. The very nature of its size has caused it to be overlooked by biologists as well as laymen. A glance through the literature on record will quickly show that the Upper Peninsula of Michigan has been almost completely neglected with respect to the study of fleas and their relationships to other members of the fauna of the region.

The large gaps in the distributional records of most species of the order tend to leave a confused picture of the insect and its host relationships. Work completed in the past has shown the importance of the insect as a vector for such diseases as murine typhus, sylvatic plague in animals, which expressed in man becomes bubonic plague, and possibly tuleremia. Fleas may also be the intermediate hosts for tapeworms. Add to these the fact that they may be a cause of great discomfort to animals, especially man when allergic to them, and the knowledge of their range and distribution becomes of utmost importance.

With this knowledge in mind the author decided to attempt to personally collect and identify as many species of fleas of this region as possible, as well as establish some sort of host-flea relationship pattern for the area. The very nature

of this area lends itself admirably to a study of this type as it abounds with a great variety of mammals which serve as hosts to fleas. The collections of host mammals are not difficult in such an area as this.

This paper is being written as a partial requirement for the author's M.A. degree and therefore his works are not complete at this time. It includes reports on fleas from three of the five families of the order. Thirteen of the fifty-five species known to exist east of the 100th meridian are represented herein. The study has covered limited sections of five counties of the Upper Peninsula: Marquette, Delta, Dickinson, Iron, and Menominee. There has been significant progress to report, but much still remains and it is in this sense that the work is referred to as a beginning rather than as an end.

A copy of the records and findings of this study will be offered to Mr. R. R. Dreisbach and his associates who are presently involved in a project compiling a complete listing of the insects of Michigan. It is the hope of this author that this will be of significant value to them in their work.

Thanks are extended to Dr. William L. Jellison of the Rocky Mountain Spotted Fever Laboratory at Hamilton, Montana, for his kind help in confirming the identifications of the specimens described herein as well as for the technical assistance he provided.

Thanks are also extended to the various people associated with the author who provided some of the mammalian hosts for examinations.

The author also wishes to acknowledge Northern Michigan University and Dr. Gordon Gill in particular for the materials donated and the technical information which they provided.

A complete series of mounted slides of all fleas reported in this paper shall be presented to the Entomology Collection at Northern Michigan University where they will be available for examination by interested persons whenever the need arises.

G. D. M.

INTRODUCTION

The medical importance of fleas, which has been touched upon briefly in the preface of this paper, is perhaps the most significant reason for attempting the arduous task of compiling distributional records of the various species of this insect. Diseases such as plague, murine typhus, and tularemia are known to be carried from organism to organism by fleas such as the Oriental Rat Flea (Xenopsylla cheopis), the European Rat Flea (Nosopsyllus fasciatus), and the Mouse Flea (Leptopsyllus segnis) which are all exotic to this country, having been introduced through shipping lanes. Once the vectors had reached our shores, however, the vectorship was soon passed to the fleas of several native mammals such as those of squirrels, marmots, and even coyotes. The movements of animals from one region to another, hence, the transfer of their fleas, increase with the mobility of the country. This has led to the widespread dispersal of the insect and undoubtedly has set up the possibilities of infection from the afore mentioned diseases in virtually all of this country. The geographic proximity of the Upper Peninsula of Michigan to Canada compounds the degree of dispersion, for animals can pass unmolested over the border thus transmitting their fleas to other animals native to the region. The distributional possibilities become apparent.

Thus far in the study, although a scant thirteen species have been recorded, two rare species have been uncovered. According to Jellison, both Megabotheris acerbus and Nearctopsylla genalis are or were virtually unknown to this area as far as the available literature is concerned. The former was taken in good numbers from an Eastern Chipmunk while the latter was taken from two different specimens of Least Weasel and seems to be quite a common flea to this small carnivore.

In order to establish the relationships among the host mammal, the flea, and the region where the occurrence was reported, a rather simple cross reference file system was set up. (See fig. 1 and 2, page 5) One card would be for the host animal and contained, besides the name of the host, the date, the vicinity from which the host was taken, and the numbers and kinds of ectoparasites found. The second set of cards was preestablished on the basis of a careful search of the literature. A separate card was prepared for any flea having even a remote possibility of occurring in the area. Spaces were provided on the second set of cards for entries each time a host was taken with that type of flea as a parasite. The distribution charts on pages 24 and 25 were then easily set up from these card entries. Valuable information was obtained from two pieces of literature: data as to host-flea relationships was taken from C. Andresen Hubbard's "The Fleas of Western North America" and Fox's "Fleas of Eastern North America". These were the principal guides in setting up the card file cross index list. Fox's book was also particularly valuable as a key for identification of the specimens taken.

For the purposes of this study the work was divided into three distinct phases. Because time was limited, this became necessary, but it is doubtful that the same process will be adhered to in the future. In the beginning as much field work as possible was attempted to obtain mammal hosts for collections of ectoparasites. Once this was well under way, phase two, the laboratory work, was begun and, finally, the identification of ectoparasites started. For a time all three phases were run concurrently and then the work was halted in the same sequence as originally used.

The collecting of mammalian hosts was done in almost any way it was possible to obtain specimens. Live trapping, shooting, and examination of roadkills became the prominent means. Several people donated carcasses for examination also.

My laboratory work in preparing the fleas for identification was the standard employed by most collectors. They were cleared and readied for mounting as prescribed by George P. Holland, Canadian biologist. Once sufficiently cleared, they were mounted on slides in Canada Balsam medium and allowed to dry. The identifications were then carried out. In the beginning the fleas were mounted several different ways, but, according to Jellison, most collectors mount them with the legs up and head facing right. Thus it would be advisable for future students to do likewise.

The results of this study will appear in the following pages in two different ways. First a listing of the species

identified and information pertinent to each will be recorded. The second half of the paper will contain a listing of each mammalian host examined and the findings which resulted. Also for a handy reference, two charts will appear at the end of the report, containing information as to host-flea relationships and flea-region distributional information, which will provide a detailed account of the types of fleas located and the area in which they were found.

Host Number Species:

Locality:

Date Collected: Collector:

Method of Collection:

Deposition of Host:

Parasites Identified:

Biting Lice:

Sucking Lice:

Fleas:

Ticks:

Mites:

Remarks:

SPECIES

Host No.	Host Species	Locality	Date	Det. By	Remarks

CLASSIFICATION OF SPECIES

The descriptions used here have been taken from Hubbard's "The Fleas of Western North America" and "Fleas of the Eastern United States" by Fox.

FAMILY PULICIDAE STEPHENS

The members of this family are characterized particularly by the possession of a single row of bristles on each abdominal tergite. These fleas are further distinguished by having large, well developed eyes. The frontal notch is absent. The club of the antenna is segmented only on one side. A series of small, spine-like bristles is present on the inner side of the hind coxa. Four pairs of lateral planatar bristles and a distal submedian pair are present on the fifth tarsal segment of each leg. One long antepygidial bristle is flanked on each side by a much smaller bristle.

The Pulicidae are represented in the East by five genera which include several species of great medical importance. Fleas belonging to two genera of this family have been reported herein.

Cediopsylla Jordan

Ocular bristle placed higher than the eye. Frons angulate in front with a distinct incrassation. Genal ctenidium obliquely vertical, consisting of stout, robust, blunt spines. Pronotal ctenidium present.

This genus is represented here by one species.

1. Cediopsylla simplex - This flea is a very important parasite of rabbits and carnivores which feed on rabbits. The records are as follows:

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Marquette	3-10-61	One Male	Dog
Delta	5-24-62	Three Females Two Males	Cottontail Rabbit
Delta	5-15-62	Two Females	Cat
Delta	1-2-64	Two Females One Male	Varying Hare
Marquette	10-20-60	One Female One Male	Dog
Delta	12-8-63	One Female One Male	Red Fox
Marquette	8-8-63	One Male	Cottontail Rabbit
Delta	3-26-63	Six Females Five Males	Varying Hare

Ctenocephalides S. and C.

Both genal and pronotal combs present. Genal comb more or less horizontal, consisting of long, sharp spines. Frontal incrassation is quite distinct. Ocular bristle above the eye or on level with it.

This genus is represented here by two species, the common dog flea and the common cat flea.

1. Ctenocephalides felis - This is the common cat flea. It has been recorded as follows:

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Marquette	8-59	One Male	Dog
Marquette	11-60	Two Males	Unknown
Marquette	1-20-61	One Male	Dog
Marquette	5-3-62	Two Females	Dog
Iron	7-6-63	One Female	Red Squirrel

2. Ctenocephalides canis - Only one of these common dog fleas were obtained as follows:

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Marquette	3-61	Two Males	Dog

FAMILY DOLICHOPSYLLIDAE BAKER

In this family there are two or more rows of bristles on each abdominal tergite. The eye is well developed except in Cororhinopsylla and Foxella where it is vestigial. A pronotal ctenidium is present in all cases except Rhopalopsyllus and Trichopsylla where both the pronotal and genal ctenidium are absent. Two genera, Ctenophthalmus and Rectofrontia are armed with both a pronotal and genal ctenidium.

This family is the largest in our fauna and is represented here by five genera.

Oropsylla Wagner

Frontal tubercle small and acuminate. Labial palpas long, extending beyond the apex of the fore coxa by more than a segment. Pronotal ctenidium consisting of about nine spines on a side. Movable finger of the males with long bristles but without spiniforms.

This genus is represented here by a single species which has the woodchuck as its normal host.

1. Oropsylla arctomys - This was the only flea to be taken from a woodchuck in all cases checked by this author. It has been recorded as follows:

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Delta	4-11-64	Three Females One Male	Woodchuck
Delta	4-24-64	Four Females Two Males	Woodchuck
Delta	5-12-64	Four Females One Male	Woodchuck
Delta	5-12-64	One Female Two Males	Woodchuck
Delta	5-5-64	One Female Two Males	Woodchuck

Opisodasys Jordan

Eye well developed. Labial palpus extending slightly beyond the apex of the fore coxa. Frontal tubercle small, acuminate. Frontal ctenidium consisting of ten to twelve spines on a side. Fifth tarsal segment of each leg armed with four pair of lateral planatar bristles, a basal and apical submedian pair. Movable finger of the male with two or three heavily pigmented spiniforms.

This genus is represented by a single species.

1. Opisodasys pseudartomys - This species is commonly parasitic on the flying squirrel. It is reported as follows:

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Marquette	1-61	One Female One Male	Flying Squirrel

Orchopeas Jordan

Pronotal Ctenidium of about twenty spines. Fifth tarsal segment is armed with four pairs of lateral plantar bristles and a basal and apical submedian pair. Movable finger of male

ham-shaped, wedge-shaped, or rectangular and armed with a row of from four to seven short, black spiniforms. Body of female sperma theca is barrel-shaped with crooked appendix. Females have three stout antepygidial bristles on a side; males with two stout and one minute bristle on a side. There is much difficulty determining species of this genus. Jellison recommends use of male specimens for identification. The range may become void as squirrel hosts move rapidly from one area to another.

One species is represented here:

1. Orchopeas caedens - This is the most common species located to date and is found on many small mammals.

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Marquette	2-16-61	Five Females Three Males	Red Squirrel
Marquette	2-18-61	Three Females	Red Squirrel
Marquette	2-25-61	Four Females Two Males	Least Weasel
Dickinson	7-12-62	Two Males	Red Squirrel
Dickinson	8-11-58	One Female One Male	House Mouse
Dickinson	10-10-62	One Female One Male	Red Squirrel
Dickinson	10-20-62	Five Females Two Males	Red Squirrel
Delta	3-15-64	Eight Females Two Males	Least Weasel
Delta	3-25-64	18 Females One Male	Longtail Weasel
Delta	4-14-64	Four Females One Male	Red Squirrel
Marquette	7-10-63	Three Females Two Males	Deer Mouse

Marquette	5-30-62	One Female Four Males	Red Squirrel
Iron	7-6-63	Four Females Two Males	Red Squirrel
Delta	5-6-64	One Female One Male	Longtail Weasel

Megabotheris Jordan

Pronotal ctenidium with about ten spines to a side. Fifth tarsal segment of each leg with a basal pair of plantar bristles noticeably displaced toward median line, the other four pairs of lateral plantar bristles unchanged. The movable finger of the male has several heavily pigmented spinaforms on the posterior margin.

This genus is represented here by two species.

1. Megabotheris asio - This identification has not been confirmed and thus may be subject to change.

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Marquette	7-5-63	One Female	Red Squirrel

2. Megabotheris acerbus - This species is said to be quite rare according to Jellison.

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Delta	4-11-64	Eight Females Four Males	Eastern Chipmunk

Monopsyllus Kolenati

The eye is not reduced in this genus. Its longest diameter is longer than the distance of eye from angle of strongly chitinized portion of genal lobe. On the occiput there are two medium bristles, the upper one small. Ctenidium of the

pronotum has twenty-two or fewer spines. No bristles on hind tarsal segments. I and II extend well beyond segment following. This genus is represented here by one species.

1. Monopsyllus vision - This species was second only to Orchopeas in frequency of collection and is quite common on small mammals and their carnivores.

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Delta	12-8-63	One Female	Red Fox
Iron	7-6-63	One Female One Male	Red Squirrel
Marquette	7-29-63	Two Males	Least Chipmunk
Delta	4-14-64	Five Females Two Males	Red Squirrel
Delta	4-17-64	One Female One Male	Eastern Chipmunk
Delta	3-15-64	Two Females One Male	Least Weasel
Delta	3-25-64	Two Females	Longtail Weasel
Delta	5-6-64	One Female	Longtail Weasel
Delta	5-27-64	Two Females One Male	Raccoon

FAMILY HYSTRICHOPSYLLIDAE

Genera of this family are characterized by the presence of a dorsal suleus separating frons from posterior portion of the head, which allows motion between two sections. Opinions differ as to what genera belong to this family.

Peromyscopslla I. Fox

Head well rounded but subangulate at vertex making shape steel jacket bullet-like. Frontal-genal is said to be acute.

Anterior margin of head armed with a series of bristles, two, three, or four at vertex thickened, heavily pigmented, and modified into spiniforms. Genal teeth two in number, not overlapping, more or less horizontal. Genal process prominent and variable in length. Eye is vestigial. Metanotum and abdominal tergites armed with apical spinlets. Spermatheca eliptical, with tail bent over body. Finger of male roughly triangular. Three antepygidial bristles in male, four in female.

This flea could not be keyed down any further than genus ranking and is recorded as follows.

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Dickinson	10-20-62	One Female One Male	Red Squirrel

Ctenophthalmus Kolenati

Head well rounded. Eyes vestigial. Three sharp genal teeth. Frontal tubercle prominent. Labial palpus not longer than apex of fore coxa; apical segment with carved apical bristle. Tarsal segment V. of fore and middle legs armed with four pairs of lateral plantar bristles and basal and distal submedian pair. Same segment of hind legs armed with three pairs of lateral plantar bristles and a basal and distal submedian pair. Three antepygidial bristles present.

One species of this genus is represented here.

1. Ctenophthalmus pseudagyrtes - One host was found infested with this flea as recorded:

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Delta	5-18-62	One Male	Deer Mouse

Doratopsylla Jordan and Rothschild

Frontal tubercle absent. Eye vestigial. Genal ctenidium with four spines. Labial palpus composed of four segments. Frons rounded, armed with two rows of conspicuous bristles. Fifth tarsal segment of all tarsi armed with four pairs of lateral plantar bristles and a basal median pair. Three antepygidial bristles usually present on a side. One species of this genus is represented here.

1. Doratopsylla blarinae - One flea of this species, which according to literature, is a true shrew flea is reported here.

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Marquette	2-13-61	One Male	Starnosed Mole

Nearctopsylla Rothschild

Frontal tubercle absent. Both genal and pronotal ctenidium present. Genal ctenidium vertical and composed of five spatulate spines. Eyes absent. Labial palpus with five segments. Antepygidial bristles, one in male, two in female, to the side. Fifth segment of fore and middle legs with five pairs of lateral plantar bristles; fifth segment of hind legs with four pairs of lateral plantar bristles. One species of this genus is represented here.

1. Nearctopsylla genalis - This flea was taken in fair numbers from carnivores. Jellison reports it to be rare. It is recorded as follows.

COUNTY	DATE TAKEN	NUMBER AND SEX	HOST
Marquette	2-25-61	Two Females Two Males	Least Weasel
Delta	3-15-64	Four Females One Male	Least Weasel

THE HOSTS OF UPPER MICHIGAN MAMMAL FLEAS

The following list contains only the mammalian hosts personally handled by this author. There are records of other mammals having fleas but they have not been confirmed as to the Upper Peninsula vicinity definitely and so do not appear here. Fleas have been taken from all of the following except those designated with an asterisk.

Condylura cristata ---------- Starnosed Mole

Procyon lotor lotor ---------- Raccoon

Mustela frenata noveboracensis -------- Longtail Weasel

Mustela rixosa allegheniensis --------- Least Weasel

*Mephitis mephitis ---------- Skunk

Vulpes fulva ---------- Red Fox

Marmota monax ---------- Woodchuck

Eutamias minimus jacksoni ---------- Least Chipmunk

Tamias striatus ---------- Eastern Chipmunk

Tamiasciurus hudsonicus ---------- Red Squirrel

Glaucomys sabrinus macrotis ---------- Northern Flying Squirrel

Peromyscus maniculatus ---------- Deer Mouse

*Peromyscus leacopus noveboracensis ---- Whitefooted Mouse

*Microtus pennsylvanicus pennsylvanicus- Meadow Vole

*Rattas norvegicus ---------- House Rat

Mus musculus ---------- House Mouse

Lepus americanus ---------- Snowshoe Hare

Sylvilagus floridanus mearnsii -------- Cottontail Rabbit

Canis familiaris ---------- Domestic Dog

Felis domestica ---------- Domestic Cat

Of the twenty mammals which were listed on the previous page all but four had flea parasites in varying numbers. The following pages contain an account of each host with a detailed record of fleas found on it.

Condylura cristata - Starnosed Mole

NO. EXAMINED	DATE	FLEA TYPE	SEX
One	2-13-61	Doratopsylla blarinae	One Male

Procyon lotor lotor - Raccoon

NO. EXAMINED	DATE	FLEA TYPE	SEX
Two	3-23-61	0	0
	5-27-64	Monopsyllus vison	Two Females One Male

Mustela frenata noucboracensis - Longtail Weasel

NO. EXAMINED	DATE	FLEA TYPE	SEX
Two	3-25-64	Orchopeas caedens	18 Females Five Males
		Monopsyllus vison	Two Females Five Males
	5-6-64	Orchopeas caedens	One Female One Male
		Monopsyllus vison	One Female

Mustela rixosa allegheniensis - Least Weasel

NO. EXAMINED	DATE	FLEA TYPE	SEX
Two	2-25-61	Orchopeas caedens	Four Females Two Males
		Nearctopsylla genalis	Two Females Two Males

	3-15-64	Orchopeas caedens	Eight Females Two Males
		Nearctopsylla genalis	Four Females One Male
		Monopsyllus vison	One Female Two Males

Mephitis mephitis - Skunk

NO. EXAMINED	DATE	FLEA TYPE	SEX
One	4-6-64	0	0

Vulpes fulva - Red Fox

NO. EXAMINED	DATE	FLEA TYPE	SEX
One	12-8-63	Cediopsylla simplex	One Female One Male
		Monopsyllus vison	One Female

Marmota monax - Woodchuck

NO. EXAMINED	DATE	FLEA TYPE	SEX
Seven	3-12-61	0	0
	4-11-64	Oropsylla arctomys	Three Females One Male
	4-12-64	0	0
	4-24-64	Oropsylla arctomys	Four Females Two Males
	5-5-64	Oropsylla arctomys	One Female Two Males
	5-12-64	Oropsylla arctomys	Four Females One Male
	5-12-64	Oropsylla arctomys	One Female Two Males

Eutamias minimus jacksoni - Least Chipmunk

NO. EXAMINED	DATE	FLEA TYPE	SEX
One	7-29-63	Monopsyllus vison	Two Males

Tamias striatus - Eastern Chipmunk

NO. EXAMINED	DATE	FLEA TYPE	SEX
Four	4-8-64	0	0
	4-13-64	0	0
	4-14-64	Megabotheris acerbus	Eight Females One Male
	4-17-64	Monopsyllus vison	One Female One Male

Tamias hudsonicus - Red Squirrel

NO. EXAMINED	DATE	FLEA TYPE	SEX
22	2-16-61	Orchopeas caedens	Five Females Three Males
	2-18-61	Orchopeas caedens	Three Females
	7-12-62	Orchopeas caedens	Two Males
	10-10-62	Orchopeas caedens	One Female One Male
		Peromyscopslla	One Female One Male
	10-20-62	Orchopeas caedens	Five Females Two Males
	4-14-64	Orchopeas caedens	Four Females One Male
		Monopsyllus vison	Five Females Two Males
	5-30-62	Megabotheris asio	One Female

5-30-62	Orchopeas caedens	One Female Four Males
7-6-63	Ctenocephalicles felis	One Female
	Orchopeas caedens	Four Females Two Males
	Monopsyllus vison	One Female One Male

* In the interest of time and space, only those specimens with fleas were reported.

Glaucomys sabrinus macrotis - Northern Flying Squirrel

NO. EXAMINED	DATE	FLEA TYPE	SEX
Three	1-61	Opisodasys pseudartomys	One Female One Male
	3-61	0	0
	1-5-64	0	0

Peromyscus maniculatus - Deer Mouse

NO. EXAMINED	DATE	FLEA TYPE	SEX
Three	5-18-62	Ctenaphthalmus pseudartes	One Male
	7-10-63	Orchopeas caedens	Three Females One Male
	3-15-64	0	0

Peromyscus leucopus noueboracensis - Whitefooted Mouse

NO. EXAMINED	DATE	FLEA TYPE	SEX
Nine	----	---------	---

No fleas were ever found on this mammal. Literature cites that nests of these animals hold most flea.

Microtus pennsylvanicus pennsylvanicus - Meadow Vole

NO. EXAMINED	DATE	FLEA TYPE	SEX
Three	----	---------	---

No fleas were ever found on this mammal. Literature cites that nests of these animals hold most fleas.

Rattus norvegicus - House Rat

NO. EXAMINED	DATE	FLEA TYPE	SEX
One	4-21-64	0	0

Mus musculus - House Mouse

NO. EXAMINED	DATE	FLEA TYPE	SEX
Four	8-11-58	Ochopeas caedens	One Female One Male
	1-30-64	0	0
	3-8-64	0	0
	3-24-64	0	0

Lepus americanus - Snowshoe Hare

NO. EXAMINED	DATE	FLEA TYPE	SEX
Five	1-2-64	Cediopsylla simplex	Two Females One Male
	1-11-64	0	0
	3-6-64	0	0
	3-8-64	0	0
	3-26-64	Cediopsylla simplex	Six Females Five Males

Sylvilagus foridanus mearinsii - Cottontail Rabbit

NO. EXAMINED	DATE	FLEA TYPE	SEX
Two	5-24-62	Cediopsylla simplex	Three Females Two Males

	8-8-63	Cediopsylla simplex	One Male

Canis familiaris - Domestic Dog

NO. EXAMINED	DATE	FLEA TYPE	SEX
Five	8-59	Ctenocephalides felis	One Male
	1-20-61	Ctenocephalides felis	One Male
	3-10-61	Ctenocephalides canis	One Male
		Cediopsylla simplex	One Male
	10-20-60	Cediopsylla simplex	One Female One Male
	3-13-62	Ctenocephalides felis	Two Females

Felis domestica - Domestic Cat

NO. EXAMINED	DATE	FLEA TYPE	SEX
Two	2-3-61	0	0
	5-15-62	Cediopsylla simplex	Two Females

SUMMARY

This paper is best summarized by the charts which follow this brief notation. The first shows detailed accounts of the species of flea found in each county. The second contains host-flea relationship information. The author realizes that what has been written on these pages is not nearly enough to produce conclusive evidence of host-flea relationships or distributional ranges of each species. The beginning, however, is written here--the end may take a very long time. It may never be written by this author but it will be done.

INDEX TO SPECIES BY COUNTY

FLEA SPECIES	IRON	DICKINSON	DELTA	MARQUETTE	MENOMINEE
Cediopsylla simplex	No	No	Yes	Yes	No
Ctenocephalides felis	Yes	No	No	Yes	No
Ctenocephalides canis	No	No	No	Yes	No
Oropsylla arctomys	No	No	Yes	No	No
Opisodasys pseudartomys	No	No	No	Yes	No
Orchopeas caedens	Yes	Yes	Yes	Yes	No
Megabotheris asio	No	No	No	Yes	No
Megabotheris acerbus	No	No	Yes	No	No
Monopsyllus vison	Yes	No	Yes	Yes	No
Peromyscopslla	No	Yes	No	No	No
Ctenopthalmus pseudagyetes	No	No	Yes	No	No
Doratopsylla blarinae	No	No	No	Yes	No
Nearctopsylla genalis	No	No	Yes	Yes	No

HOST - FLEA RELATIONSHIP CROSS REFERENCE CHART

HOST \ FLEA	Cediopsylla simplex	Ctenocephalides felis	Ctenocephalides canis	Oropsylla arctomys	Opisodasys pseudartomys	Orchopea caedens	Megabotheris asio	Megabotheris acerbus	Monopsyllus vison	Peromyscopslla	Ctenapthalmus pseudagrtes	Doratopsylla blarinae	Nearctopsylla genalis
Condylura cristata												X	
Procyon lotor									X				
Mustela frenata						X			X				
Mustela rixosa						X			X				X
Mephitis mephitis													
Vulpes fulva	X								X				
Marmota monox				X									
Eutamias minimus									X				
Tamias striatus								X	X				
Tamiusciurus hudsonicus		X				X	X		X	X			
Glaucomys sabrinus					X								
Peromyscus maniculatus						X				X			
Peromyscus leucopus													
Microtus pennsylvanicus													
Rattus norvegicus													
Mus musculas						X							
Lepus americanus	X												
Sylvilagus floridanus	X												
Canis familiaris	X	X	X										
Felis domestica	X												

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