Fleas of the National Reactor Testing Station

Dorald M. Allred
Brigham Young University

Follow this and additional works at: https://scholarsarchive.byu.edu/gbn

Recommended Citation
Available at: https://scholarsarchive.byu.edu/gbn/vol28/iss2/5
FLEAS OF THE NATIONAL REACTOR TESTING STATION

Dorald M. Allred

From June, 1966 to September, 1967, 4050 mammals and 561 birds were examined for ectoparasites at the National Reactor Testing Station in southern Idaho (Table 2; Figs. 1, 2). This paper lists the fleas which were collected. A previous report (Allred, 1968) discussed the area, field activities, study sites, techniques, and ticks collected.

I am indebted to Dr. D Eelden Beck for the identification of most of the fleas prior to his untimely death in August, 1967. Dr. William

Fig. 1. Geographic position of the National Reactor Testing Station in southeastern Idaho.

1. BYU-AEC report no. C00-1559-2.
2. Department of Zoology and Entomology, Brigham Young University, Provo, Utah.
Fig. 2. Major installations, roads, and study areas at the National Reactor Testing Station.

L. Jellison, Hamilton, Montana, identified several hundred additional fleas, and verified some tentative identifications made by Dr. Beck of unusual specimens.

**Flea-Host Associations**

Data in the list below are arranged as follows: (1) The species of flea collected is given without subspecific relegation. An asterisk preceding the name of the flea indicates that in other studies it has been shown to be of medical importance in the epidemiology of plague (Stark, 1958). After the name of the flea, its general seasonal occurrence (in parentheses) and its geographic distribution at the
station as indicated by our collections are given. (2) Indented under the name of the flea are the hosts from which it was taken at the station. Where more than one host is listed, an asterisk preceding the name of the host indicates that it is the one from which the flea was most commonly taken and/or for which the flea-host index (number of fleas taken divided by the number of hosts infested) was high. After the host's name the number of hosts examined (in parentheses) is listed. This number is given only once for each host—the first time the host's name is listed. The number not in parentheses and immediately in front of the colon is the flea-host index. Behind the colon the numbers of each sex of flea taken during each month are given. Records for June, July, and August are the combined collections for 1966 and 1967; others as indicated represent only one month's data.

**Amphipsylla siberica** (summer-fall) limited distribution

<table>
<thead>
<tr>
<th>Host</th>
<th>July</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Microtus montanus</em></td>
<td>25: 2♂ July</td>
</tr>
</tbody>
</table>

*Peromyscus maniculatus* (1866) 2: 2♂ Oct.

**Anomopsyllus amphibolus** (winter) limited distribution

<table>
<thead>
<tr>
<th>Host</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Neotoma cinerea</em></td>
<td>1: ♀ Dec.</td>
</tr>
</tbody>
</table>

**Callistopsyllus terinus** (spring-summer) limited distribution

<table>
<thead>
<tr>
<th>Host</th>
<th>March, July, Aug., Sept.</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Peromyscus maniculatus</em></td>
<td>2: 2♂ 4♀ Feb., 3♂ 1♀</td>
</tr>
</tbody>
</table>

**Catallagia decipiens** (year round) limited distribution

<table>
<thead>
<tr>
<th>Host</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dipodomys ordii</em></td>
<td>(808): 1: ♀</td>
</tr>
</tbody>
</table>

*Eutamias minimus* (398) 1: 2♂ 1♀ March, ♀ June

*Peromyscus maniculatus* 2: 3♀ January, 6♂ 12♀ March, 3♂ 2♀ May, 4♀ 5♀ June, 4♀ 5♀ July, 10♀ 6♀ Aug., 2♀ Oct., 3♀ Nov.

*Junco oreogranus* (30) 1: 3♀ April

**Cediopsylla inaequalis** (year round) moderate distribution

<table>
<thead>
<tr>
<th>Host</th>
<th>April</th>
</tr>
</thead>
</table>


*Peromyscus maniculatus* 4: 8♀ 6♀ Feb., 3♀ March, 3♀ July

*Sylvilagus idahoensis* (13) 21: 62♀ 109♀ Feb., 2♀ April, ♀ July, 7♀ 13♀ Nov.


**Epiedia stanfordi** (spring) limited distribution

*Peromyscus maniculatus* 2: 3♀ 3♀ Feb., 3♀ 3♀ April

*Epiedia wenmanni* (year round) moderate distribution

<table>
<thead>
<tr>
<th>Host</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dipodomys ordii</em></td>
<td>1: ♀ Oct.</td>
</tr>
</tbody>
</table>

*Neotoma cinerea* 1: ♀ Nov.

*Peromyscus maniculatus* 2: 2♂ 1♀ Jan., 3♂ 5♀ Feb., 4♀ 5♀ March, 2♂ April, 2♂ May, ♀ June, ♀ Aug., ♀ Sept., 3♂ 4♀ Oct., 4♀ 3♀ Nov., 4♀ Dec.

*Fozella ignota* (spring-summer-fall) limited distribution

<table>
<thead>
<tr>
<th>Host</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dipodomys ordii</em></td>
<td>1: ♀ June</td>
</tr>
</tbody>
</table>

*Mastomys frenata* (4) 2: 2♂ 2♀ July

*Onychomys leucogaster* (63) 8: 4♂ 5♀ March, ♀ April, 14♀ 18♀ June, 16♀ 26♀ July, 6♀ 9♀ Aug., 41♀ 57♀ Sept., 3♀ Oct.


*Thomomys talpoides* (8) 8: 2♂ 7♀ March, 19♀ 14♀ June, ♀ Sept., 5♀ 9♀ Oct., 2♂ 7♀ Nov.
Hystrichopsylla occidentalis (summer-fall) limited distribution
Peromyscus maniculatus 1: ♀ May, ♂ ♀ Nov.

Malaraeus bitterrootensis (summer) limited distribution
Neotoma cinerea 2: ♀ 3♀ Aug., ♀ 2♀ Sept.

Malaraeus euphorbi (fall-winter-spring) moderate distribution
Microtus montanus 3: 3♀ Aug.
*Peromyscus maniculatus 3: 2♂ 1♀ Feb., 4♀ 5♀ March, ♂ May, 2♂ 2♀ Aug.

*Malaraeus telchinum (winter-spring-summer) moderate distribution
Microtus montanus 1: ♀ Aug.
Neotoma cinerea 1: ♀ Aug.
Onychomys leucogaster 1: ♀ July
Perognathus parvus (47♀) 1: ♀ June

*Megabothris abantis (summer) limited distribution
Host unknown: ♀ June, 2♂ July

Megabothris obscurus (fall) limited distribution
Host unknown: ♀ Nov.

*Megarthroglossus divisus (summer) limited distribution
Neotoma cinerea 1: ♀ Aug.

Meringis hubbardi (spring-summer-fall) moderate distribution
Dipodomys ordii 2: ♀ 3♀ May, 6♀ 3♀ June, 4♀ ♀ July, 3♀ 2♀ Aug., ♀ Sept., ♀ Nov.
Mustela frenata 1: ♀ July
*Onychomys leucogaster 4: ♀ March, 3♀ June, 13♀ 8♀ July, 22♀ 7♀ Aug.
Peromyscus maniculatus 2: 6♀ March, ♀ April, 3♀ ♀ May, 19♀ 10♀ July, 18♀ 10♀ Aug., 2♀ ♀ Oct.
Reithrodontomys megalotis (39♀) 1: ♀ ♀ Aug.
Sorex merriami (9♀) 1: ♀ Aug.

Meringis parkeri (year round) extensive distribution
Lepus californicus 1: ♀ Dec.
Microtus montanus 1: ♀ Oct., ♀ Nov.
Mustela frenata 1: ♀ July
Neotoma cinerea 1: ♀ Aug.
Reithrodontomys megalotis 1: ♀ Oct.
Sorex merriami 3: ♀ ♀ ♀ Aug.
Spermophilus townsendii (60♀) 1: ♀ March, ♀ ♀ June, ♀ ♀ July

*Monopsyllus eumolpi (year round) moderate distribution
Dipodomys ordii 1: ♀ June, ♀ Sept., ♀ Oct.
Perognathus parvus 1: ♀ July, ♀ ♀ Aug.
FLEAS NATIONAL REACTOR STATION

Peromyscus maniculatus: δ 2♀ Jan., 2♂ March, 2♀ June, 6♀ July,
3♀ 4♂ Aug., 2♂ 9♀ Oct.
Spermophilus townsendii: 6♀ June

*Monopsyllus exilis (spring-summer-fall) limited distribution
Dipodomys ordii: 6 May, 6♀ June.
*Onychomys leucogaster: 6♂ 3♀ March, 2♀ April, 29♀ 55♀ June,
18♂ 1♂ July, 11♂ 14♀ Aug., 2♂ 8♀ Sept., 6♂ 12♀ Oct.

*Monopsyllus wagneri (year-round) extensive distribution
Eutamias minimus: 3♂ 4♀ March, 2♂ 2♀ June, 9♀ July, 6♀ Aug.
Lepus californicus: 9♀ June

Marmota flaviventris (6): 6♀ June
Microtus montanus: 6♀ June, 2♀ July
Mus musculus (1): 2♂ 9♀ June
Neotoma cinerea: 6♀ June, 3♀ Sept.

Spermophilus townsendii: 6♀ April, 4♂ 5♀ June
Sylvilagus idahoensis: 6♀ Feb.
Sylvilagus nuttallii: 6♀ Aug.

Odontopsyllus dentatus (spring-summer) limited distribution
*Lepus californicus: 4♀ 6♀ March, 6♀ April, 3♀ July
Lynx rufus: 6♀ Jan., 11♀ 4♀ April

*Opisocroitis labis (summer) limited distribution
Dipodomys ordii: 6♀ July
Eutamias minimus: 2♀ July, 9♀ Aug.
Onychomys leucogaster: 6♀ July
Peromyscus maniculatus: 6♀ Dec.
*Spermophilus townsendii: 3♂ April, 6♂ 5♀ June, 2♀ July

*Opisocroitis tuberculatus (spring) limited distribution
Spermophilus townsendii: 4♀ 5♀ April

*Opisodasys keenii (summer-fall) limited distribution
Peromyscus maniculatus: 4♀ 3♀ March, 7♀ May, 2♀ June, 2♀ 2♀ July, 9♀ Oct., 8♀ Nov.

*Orchopeas leucopus (summer) limited distribution
Eutamias minimus: 9♀ July

*Orchopeas serdentatus (summer-fall-winter) moderate distribution
Eutamias minimus: 6♀ Sept.
Lynx rufus: 6♀ Nov.
Peromyscus maniculatus: 6♀ Jan., 2♀ March, 5♀ June, 10♀ 15♀ Aug.

*Peromyscopsylla hesperomys (summer) limited distribution
Neotoma cinerea: 6♀ Aug.

Phalacropsylla allos (summer) limited distribution
Neotoma cinerea: 6♀ Aug.
*Onychomys leucogaster: 2♀ Sept.

Phalacropsylla paradisea (spring) limited distribution
Peromyscus maniculatus: 6♀ March
*Pulex irritans* (summer-winter) extensive distribution (because of host relationships)

*Taxidea taxus* (♂) 1: ♀ April

*Vulpes fulva* (♀) 9: 15♂ 13♀ July

*Rectofrontia fraterna* (fall) limited distribution

*Onychomys leucogaster* 15: 13♂ 17♀ Sept.

*Peromyscus maniculatus* 2: 2♂ ♀ Oct.

*Rhadinopsylla sectilis* (fall-winter-spring) moderate distribution

*Dipodomys ordii* 1: ♀ March, ♀ May

*Euchomias minimus* 2: 2♂ March

*Neotoma cinerea* 1: ♀ Dec.

*Onychomys leucogaster* 1: ♀ March, ♀ Oct.

*Peromyscus maniculatus* 3: ♀ 12♂ Jan., ♀ 3♀ Feb., 14♂ 16♀ March, ♀ April, ♀ 2♀ May, ♀ June, 3♂ 3♀ Oct., 3♂ 3♀ Nov.

*Spermophilus townsendii* 6: 6♀ May

*Stenistomera alpina* (winter) limited distribution

*Neotoma cinerea* 1: 4♀ Aug.

*Stenistornera macrodactyda* (fall-winter) limited distribution

*Neotoma cinerea* 1: ♀ Aug.

*Peromyscus maniculatus* 7: 3♀ Jan., 16♂ 7♀ Feb., ♀ Oct., 4♀ Nov.

*Thrassis bocchi* (summer) limited distribution

*Microtus montanus* 1: ♀ Aug.

*Thrassis francisi* (spring-summer) limited distribution

*Dipodomys ordii* 1: ♀ Aug.

*Peromyscus maniculatus* 4: ♀ ♀ March

*Spermophilus townsendii* 5: ♀ March, ♀ ♀ April, 28♂ 39♀ May, 5♂ 20♀ June

*Thrassis howelli* (summer) limited distribution

*Mammota flaviventris* 2: 24♂ 2♀ May, 2♂ 2♀ June

*Neotoma cinerea* 1: ♀ Aug.

*Thrassis pandorae* (summer) limited distribution

*Onychomys leucogaster* 1: ♀ June

*Spermophilus townsendii* 1: ♀ April

**Species of Questionable Placement**

*Catallagia* sp.

*Peromyscus maniculatus* 1: 3♀ Aug.

*Foxella* sp.

*Onychomys leucogaster* 2: ♀ ♀ June

*Malaraeus* sp.

*Microtus montanus* 2: 1 ♀ sex March, 3♀ July

*Neotoma cinerea* 1: 4♀ Aug., ♀ Sept.

*Peromyscus maniculatus* 2: 5♂ May, ♀ Feb., 6♀ March, 12♀ May, 4♀ June, 10♀ July, 3♀ Aug., 3♀ Nov., ♀ Dec.

*Megabothris* sp.


*Neotoma cinerea* 1: ♀ Aug.

*Peromyscus maniculatus* 1: ♀ Aug., 8♂ Dec.

*Meringis* sp.

*Dipodomys ordii* 2: ♀ March, 7♂ ♀ June, 4♀ July, 9♀ Aug.

*Lepus californicus* 1: ♀ Aug.

*Onychomys leucogaster* 1: ♀ Aug.

*Perognathus parvus* 1: ♀ Aug.

*Peromyscus maniculatus* 1: ♀ July, 7♀ Aug.

*Monosyllus* sp.

*Peromyscus maniculatus* 1: ♀ ♀ June

*Orchopeas* sp.

*Perognathus parvus* 1: ♀ July
June 29, 1968  FLEAS NATIONAL REACTOR STATION  79

Pulex sp.
Peromyscus maniculatus 1: 2♀ Aug.
Vulpes fulva 12: 23♀ July

Thrassis sp.
Marmota flaviventris 1: 2 June, 2♀ Aug.
Onychomys leucogaster 1: 2 Oct.
Peromyscus maniculatus 1: 2♀ Aug.
Spermophilus townsendii 2: 4 April, 3♀ May, 2♂ July

Summary of Host-Flea Associations
(* preceding flea indicates new host record)

Canis latrans
Cediopsylla inaequalis
Pulex irritans

Dipodomys ordii
*Catallagia decipiens
Epitedia wenmanni
Fozella ignota
Meringis hubbardi
Meringis parkeri
Meringis telchinum

Eutanius minimus
Catallagia decipiens
*Meringis hubbardi
*Meringis parkeri
Monopsyllus eumolpi
Monopsyllus wagneri

Lepus californicus
Cediopsylla inaequalis
*Meringis parkeri

Lynx rufus
Cediopsylla inaequalis
Odontopsyllus dentatus

Marmota flaviventris
Monopsyllus wagneri
Thrassis howelli

Microtus montanus
*Amphipsylla siberica
*Malaraceae euphorbi
Malaraceae telchinum
Megabothris sp.

Mus musculus
Monopsyllus wagneri

Mustela frenata
Fozella ignota
*Meringis hubbardi
*Meringis parkeri

Neotoma cinerea
Anomiopsyllus amphibolus
Epitedia wenmanni
Malaraceae bitterrootensis
Malaraceae telchinum
Megabothris sp.
Megarthroglossus divisus
*Meringis parkeri
Monopsyllus wagneri
Thrassis ucanantis

Onychomys leucogaster
Fozella ignota

*Monopsyllus eumolpi
*Monopsyllus exilis
Monopsyllus wagneri
*Opisocrostis labis
*Rhadinopsylla sectilis
*Thrassis francisi

Opisocrostis labis
*Orchopeas leucopus
Orchopeas sexdentatus
*Rhadinopsylla sectilis

Monopsyllus wagneri
Odontopsyllus dentatus

*Orchopeas sexdentatus

*Meringis parkeri
Monopsyllus wagneri
*Thrassis bacchi

Orchopeas sexdentatus
Peromyscopsylla hesperomys
Phalacropsylla alsos
*Rhadinopsylla sectilis
Stenistomera alpina
*Stenistomera macrodactyla
Thrassis howelli

Opisocrostis labis
**Malaraeus telchinum**  
*Meringis hubbardii*  
*Meringis parkeri*  
*Monopsyllus exilis*  
*Monopsyllus wagneri*

**Perognathus parvus**  
*Malaraeus telchinum*  
*Meringis hubbardii*  
*Meringis parkeri*

**Peromyscus maniculatus**  
*Amphipsylla siberica*  
*Callistopsyllus irinus*  
*Callitlagia decipiens*  
*Cediopsylla inaequalis*  
*Epitedia stanfordi*  
*Epitedia wenmanni*  
*Floxella ignota*  
*Hystrichopsylla occidentalis*  
*Malarueus telchinum*  
*Mrgabothris sp.*  
*Meringis hubbardii*  
*Meringis parkeri*

**Reithrodontomys megalotis**  
*Meringis hubbardii*  
*Meringis parkeri*  
*Monopsyllus wagneri*

**Sorex merriami**  
*Meringis hubbardii*  
*Meringis parkeri*  
*Monopsyllus wagneri*

**Spermophilus townsendii**  
*Meringis parkeri*  
*Monopsyllus eumolpi*  
*Monopsyllus wagneri*  
*Opisocrostis labis*

**Sylvilagus idahoensis**  
*Cediopsylla inaequalis*  
*Monopsyllus wagneri*

**Sylvilagus nuttalii**  
*Cediopsylla inaequalis*  
*Monopsyllus wagneri*

**Taxidea taxus**  
*Pulex irritans*  
*Thomomys talpoides*  
*Foxella ignota*  
*Vulpes fulva*  
*Pulex irritans*  
*Junco oreganus*  
*Cattallagia decipiens*

---

**Phalacropsylla allos**  
*Rectofrontia fraterna*  
*Rhadinopsylla sectilis*  
*Thrassis pandorae*

*Monopsyllus eumolpi*  
*Monopsyllus wagneri*  
*Orchopeas sp.*

*Monopsyllus eumolpi*  
*Monopsyllus exilis*  
*Monopsyllus wagneri*  
*Opisocrostis labis*  
*Orchopeas sectentatus*  
*Peromyscopsylla hesperomys*  
*Phalacropsylla paradisea*  
*Pulex sp.*  
*Rectofrontia fraterna*  
*Rhadinopsylla sectilis*  
*Stenistomera macroductyla*  
*Thrassis francisi*

---

**Degree of Host Infestation**

Fleas of several species varied greatly in their occurrence on their preferred host between different study areas (Table 1). Greatest to lesser extremes were demonstrated by *Monopsyllus wagneri*, *Meringis parkeri*, *Monopsyllus eumolpi*, *Thrassis francisi*, and *Meringis hubbardii*, respectively. In three areas where the lowest degree of host infestation occurred, the flea-host index was higher than in most
Table 1. Extremes of host infestation and flea-host index of fleas of eleven species in selected areas.*

<table>
<thead>
<tr>
<th>Flea</th>
<th>% hosts infested by area</th>
<th>Highest</th>
<th>Lowest</th>
<th>Highest flea-host index by area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catallagia decipiens</td>
<td></td>
<td>15.6 (36)</td>
<td>2.6 (16)</td>
<td>2 (17)</td>
</tr>
<tr>
<td>Epidemia uenmanni</td>
<td></td>
<td>18.2 (35)</td>
<td>.8 (3)</td>
<td>2.5 (3)</td>
</tr>
<tr>
<td>Malarasus euphorbi</td>
<td></td>
<td>25.0 (28)</td>
<td>.4 (3)</td>
<td>4.5 (36)</td>
</tr>
<tr>
<td>Malarasus telchinum</td>
<td></td>
<td>31.8 (36)</td>
<td>.8 (8)</td>
<td>2.2 (13)</td>
</tr>
<tr>
<td>Meringis hubardi</td>
<td></td>
<td>51.5 (1)</td>
<td>0 (17)</td>
<td>2.9 (2)</td>
</tr>
<tr>
<td>Meringis parkeri</td>
<td></td>
<td>84.6 (14)</td>
<td>0 (29)</td>
<td>6.4 (10)</td>
</tr>
<tr>
<td>Monopsyllus cunicolpi</td>
<td></td>
<td>83.3 (23)</td>
<td>11.1 (7)</td>
<td>5.3 (2)</td>
</tr>
<tr>
<td>Monopsyllus wagneri</td>
<td></td>
<td>100 (38)</td>
<td>0 (29)</td>
<td>7 (9)</td>
</tr>
<tr>
<td>Opisodasys keymi</td>
<td></td>
<td>4.9 (36)</td>
<td>.4 (3)</td>
<td>2.2 (36)</td>
</tr>
<tr>
<td>Rhabdopsylla sectilis</td>
<td></td>
<td>13.9 (36)</td>
<td>.8 (3)</td>
<td>6.8 (3)</td>
</tr>
<tr>
<td>Thrasis francisi</td>
<td></td>
<td>90.9 (3)</td>
<td>20.0 (9)</td>
<td>4 (9)</td>
</tr>
</tbody>
</table>

*Area in parentheses.

other areas. The flea-host index was high in only two areas where the degree of host infestation was also high. In three other areas where the flea-host index was high, the degree of host infestation was only moderate.

**Host Abundance and Species Variety**

In some cases the number of different fleas found on a particular host was directly proportional to the number of hosts examined (Table 2). This may be expressed as the more common the host, the greater the variety of fleas it possesses. This was demonstrated by

Table 2. Number of mammals examined and number of species of fleas found on each kind.

<table>
<thead>
<tr>
<th>Host</th>
<th>No. examined</th>
<th>Species of fleas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peromyscus maniculatus</td>
<td>1866</td>
<td>27</td>
</tr>
<tr>
<td>Dipodomys ordii</td>
<td>808</td>
<td>12</td>
</tr>
<tr>
<td>Perognathus parvus</td>
<td>474</td>
<td>6</td>
</tr>
<tr>
<td>Eutamias minimus</td>
<td>398</td>
<td>9</td>
</tr>
<tr>
<td>Lepus californicus</td>
<td>125</td>
<td>5</td>
</tr>
<tr>
<td>Plecostus townsendii</td>
<td>78</td>
<td>0</td>
</tr>
<tr>
<td>Otisomys leucogaster</td>
<td>63</td>
<td>11</td>
</tr>
<tr>
<td>Spermophilus townsendii</td>
<td>60</td>
<td>8</td>
</tr>
<tr>
<td>Reithrodontomys megalotis</td>
<td>39</td>
<td>3</td>
</tr>
<tr>
<td>Sylvilagus nuttallii</td>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>Microtus montanus</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>Neotoma cinerea</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Sylvilagus idahoensis</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Sorex merriani</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Lynx rufus</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Thylomys talpoides</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Marmota flaviventris</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Canis latrans</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Taxidea taxus</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Mustela frenata</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Vulpes fulva</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Mus musculus</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Peromyscus maniculatus, Dipodomys ordii, Eutamias minimus, Onychomys leucogaster, and Spermophilus townsendii. Conversely, some hosts taken in abundance had relatively few species of fleas on them, such as Perognathus parvus, Lepus californicus, Plecotus townsendii, Reithrodontomys megalotis, and Sylvilagus nuttallii. Still other animals, although relatively unabundant, possessed a greater variety of fleas than would normally be expected. These were Neotoma cinerea, Microtus montanus, and Lynx rufus.

**Degree of Infestation by Sex**

Where sufficient numbers were taken to be indicative of rates of infestation, most fleas showed little if any difference relative to sex relationships. Significant differences were present, however, for fleas of seven species on hosts of eight species (Table 3). On hosts of three species, male fleas were much more abundant on the male hosts than on the female. The reverse situation occurred with hosts of two species where the male fleas were much more abundant on the female hosts than on the male. Female fleas were more abundant on the male hosts than on the female of four species, whereas on hosts of another species the female fleas were more abundant on the female hosts than on the male.

**Seasonal Occurrence**

Fleas were taken every month of the year, but the greatest number of species (23) was taken in August, and the least number (11) in February. The seasonal occurrence and number of species taken

<table>
<thead>
<tr>
<th>Flea and host</th>
<th>Male fleas on hosts</th>
<th>Female fleas on hosts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cediopsyllus inaequalis</td>
<td>1.3</td>
<td>2.1</td>
</tr>
<tr>
<td>Lepus californicus</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Sylvilagus nuttallii</td>
<td>3.0</td>
<td>4.1</td>
</tr>
<tr>
<td>Foxella ignota</td>
<td>6.0</td>
<td>8.5</td>
</tr>
<tr>
<td>Onychomys leucogaster</td>
<td>3.6</td>
<td>3.4</td>
</tr>
<tr>
<td>Meringis hubbardi</td>
<td>1.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Peromyscus maniculatus</td>
<td>1.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Meringis parkeri</td>
<td>2.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Perognathus parvus</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Monopsyllus eumolpi</td>
<td>1.8</td>
<td>2.1</td>
</tr>
<tr>
<td>Eutamias minimus</td>
<td>2.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Orchopeas xerodontus</td>
<td>7.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Neotoma cinerea</td>
<td>5.5</td>
<td>7.8</td>
</tr>
<tr>
<td>Thrassis francisi</td>
<td>2.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Spermophilus townsendii</td>
<td>2.3</td>
<td>2.8</td>
</tr>
</tbody>
</table>

*Total number of fleas divided by total number of infested hosts.*
was winter 2, spring 2, summer 13, fall 3, winter-spring 1, spring-summer 1, summer-fall 3, fall-winter 2, fall-winter-spring 1, spring-summer-fall 1, year round 12.

**Species Interaction**

Whether competition between fleas on the same host actually exists is not known, but host specificity and relative numbers on the same host as observed in these studies are suggestive that the phenomenon does exist. Should species interaction occur, it is expected that the ratio of times a species occurs as the only one on the host would be great. Conversely, where little interaction is demonstrated, the greater the ratio of times a species may be expected to occur in association with others. Data for five species were indicative of considerable interaction, and for eight, a lesser degree (Table 4). *Cediopsylla inaequalis* and *Monopsyllus eumolpi* demonstrated greatest reaction, and *Monopsyllus exilis* and *Malaraeus euphorbi* the least.

<table>
<thead>
<tr>
<th>Flea</th>
<th>Ratio of times found</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alone</td>
</tr>
<tr>
<td><em>Cediopsylla inaequalis</em></td>
<td>4</td>
</tr>
<tr>
<td><em>Monopsyllus eumolpi</em></td>
<td>4</td>
</tr>
<tr>
<td><em>Meringis parkeri</em></td>
<td>3</td>
</tr>
<tr>
<td><em>Monopsyllus wagneri</em></td>
<td>3</td>
</tr>
<tr>
<td><em>Thrassis francisi</em></td>
<td>2</td>
</tr>
<tr>
<td><em>Meringis hubbardi</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Orchopeas sexdentatus</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Foxella ignota</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Catallagia decipiens</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Malaraeus telchinum</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Rhadinopsylla sectilis</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Epitedia wenmanni</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Malaraeus euphorbi</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Monopsyllus exilis</em></td>
<td>1</td>
</tr>
</tbody>
</table>

**Study Area Relationships of Fleas**

No apparent correlation between the number of species of fleas found and a predominant plant type was evident. However, there was some variance in the number of species found in different study areas (Table 5). It is expected that the number of species of fleas found should be directly proportional to the number and kinds of hosts examined in a given area. In areas 4, 6, 9, 21 and 39 the numbers of species of fleas found were less than expected, whereas in areas 14, 23, 24, 28, 32, 33, 35, 37, 38 and 40 the numbers were greater. This may be indicative that the former areas are not as favorable for the survival and reproduction of fleas as are the latter ones.
Table 5. Numbers of species of fleas in proportion to numbers and kinds of hosts examined in selected study areas.

<table>
<thead>
<tr>
<th>Area</th>
<th>Expected*</th>
<th>No. species of fleas</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>7-8</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>10-11</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>8-9</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>3-4</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>21</td>
<td>12</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>3-4</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>32</td>
<td>3</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>33</td>
<td>1-2</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>37</td>
<td>1-2</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>38</td>
<td>2-3</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>39</td>
<td>8</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>40</td>
<td>3-4</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

*Approximation based on the relative numbers and kinds of hosts examined in relationship to fleas found in all other study areas.

Radiation Influence

Comparative rates of host infestation and flea-host indices showed some differences between a radioactive waste burial ground and an ecologically similar control area (Table 6). Although there was little difference in the flea-host index of the two areas, in four of five cases approximately twice as many mammals were infested with fleas in the control area than in the irradiated area. This lower infestation rate is not necessarily due to the effects of radiation, but more likely is due to the effect of sorptive dusts resulting from physical disturbance of the area (excavation, grading, and plant removal).

Table 6. Variations in degree of infestation between an irradiated area and a non-irradiated control plot.

<table>
<thead>
<tr>
<th>Flea</th>
<th>Irradiated area 13</th>
<th>Non-irradiated area 38</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flea-host index</td>
<td>% hosts infested</td>
</tr>
<tr>
<td><em>F. ignota</em></td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td><em>M. telchinum</em></td>
<td>2.2</td>
<td>7.5</td>
</tr>
<tr>
<td><em>M. parkeri</em></td>
<td>2.5</td>
<td>21.1</td>
</tr>
<tr>
<td><em>M. eumolpi</em></td>
<td>3.3</td>
<td>55</td>
</tr>
<tr>
<td><em>M. wagneri</em></td>
<td>6.9</td>
<td>51.4</td>
</tr>
</tbody>
</table>

Geographic Distribution

The geographic distribution of a species of flea usually is related to the geographic range and variety of its hosts. In this study this generally was the case, and those fleas which were found on the
greatest variety of hosts demonstrated the most widespread geographic distribution (Table 7). Some exceptions were noted, however, wherein this correlate did not hold true. *Foxella ignota*, *Malaraeus telchinum*, *Monopsyllus eumolpi*, and *Orchopeas sexdentatus* were widely distributed, yet were not found on as many hosts as some other species. Conversely, *Catallagia decipiens* and *Opisocrostis labis* were not widely distributed, yet occurred on a greater variety of hosts than some other species.

**Species Variation**

*Amphipsylla siberica*. These specimens are similar to the subspecies *pollionis* from Alaska.

*Cediopsylla inaequalis*. Beck identified males of series 3169 and 3170 from *Lynx rufus* as subspecies *interrupta*. These were in company with subspecies *inaequalis* which predominates on lagomorphs and some of its predators, *Lynx rufus* and *Canis latrans*. Jellison examined both males and females of a series and designated the males as *inaequalis*.

*Malaraeus bitterrootensis*. A male of series 2647 has features of both this species and *M. euphorbi*. Differences are the basal hook on the 8th sternite of *bitterrootensis*, and the distal part of the sternite which on this specimen has only one long seta, whereas typical *bitterrootensis* has several.

*Malaraeus euphorbi*. Jellison tentatively assigned two females of series 5855 to the *euphorbi* group because of their similarity to species figured by Stark (1958). Another two females of series 5827

Table 7. Species of greatest abundance (arranged in diminishing order of geographic distribution) and number of species of hosts on which found.

<table>
<thead>
<tr>
<th>Species</th>
<th>No. of areas in which found</th>
<th>No. of hosts on which found</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Monopsyllus wagneri</em></td>
<td>34</td>
<td>14</td>
</tr>
<tr>
<td><em>Meringis parkeri</em></td>
<td>28</td>
<td>12</td>
</tr>
<tr>
<td><em>Monopsyllus eumolpi</em></td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td><em>Meringis hubbardi</em></td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td><em>Foxella ignota</em></td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td><em>Rhadinopsylla sectilis</em></td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td><em>Malaraeus telchinum</em></td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td><em>Orchopeas sexdentatus</em></td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td><em>Cediopsylla inaequalis</em></td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td><em>Epitedia wenmanni</em></td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td><em>Malaraeus euphorbi</em></td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td><em>Monopsyllus exilis</em></td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td><em>Opisocrostis labis</em></td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td><em>Thrassis francisi</em></td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td><em>Catallagia decipiens</em></td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td><em>Opisodasys keeni</em></td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td><em>Stenistomera macradactyla</em></td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td><em>Rectofrontia fraterna</em></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><em>Thrassis howelli</em></td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
were designated as distinct from those of 5855, and probably are not *M. telchinum*.

*Megabothris obscurus*. A male of series 3098 was designated by Beck as having some variations from the original description of this species. Jellison designated a number of females from a variety of hosts, series 5164, 5435, 5566, 5800 and 5827, as probably this species.

*Meringis hubbardi*. Beck had some question on several specimens which were very similar to *M. parkeri*, but called them *hubbardi* on the basis of Stark’s (1958) drawing. Jellison designated a group of males from series 76, 1437, 1438, 1689, 2010, 2032 and 2072 as not typical *hubbardi* or *parkeri*, and suggested that these may be abnormal males as figured by Hopkins and Rothschild (1953-1962). Some females of series 1437, 1934, 2032, 2072, 2098, 5638, 5700, 5719, 5723, 5756 and 5757 Jellison designated only as of the *parkeri-hubbardi* group.

*Orchopeas sexdentatus*. Jellison observed a great variation in sternite 7 of the females in series 5826.

*Rectofrontia fratera*. Beck indicated that in the Idaho specimens the 9th sternite of the male is not as figured by Holland (1949).

*Thrassis bacchi*. Jellison designated these as subspecies *gladiolis*. Two females of series 4893 have numerous apical spinelets on the metanotum similar to those on *T. aridis*.

*Thrassis francisi*. Beck indicated that some of these specimens are very similar to *T. howelli*, although the finger of some males is broader than shown in illustrations.

*Thrassis howelli*. Jellison designated these as belonging to the subspecies *utaheensis*. However, on many fleas of the series 3896 the posterior dorsal edge of tergite VIII of the males is nude, whereas in most published illustrations there are several long setae present. The distal posterior edge of sternite VIII is likewise not as hirsute as in the illustrations.

**Summary**

Fleas of 38 species were collected from mammals of 21 species and one species of bird between June, 1966 and September, 1967 at the National Reactor Testing Station in Idaho. Almost two-thirds of the species collected represent new records for Idaho, and over 40 collections represent new host records. Twenty-one of the species are of medical importance in plague transmission as demonstrated by findings in nature or experiments in the laboratory (Stark, 1958). Fourteen of these important species have a limited geographic distribution at the station. five are moderately distributed, and two demonstrate a wide-spread distribution. The greatest number of species was taken in August. Most species showed little if any difference relative to sex relationships and degree of host infestation. The num-
ber of species of fleas infesting a particular host was not directly proportional to the numbers of hosts examined in all cases. Frequencies of simultaneous occurrence of fleas of two different species on the same host were indicative that species competition may occur in some instances. There was no apparent correlation between the number of species of fleas and a predominant plant type in any area, although variations in numbers did occur between different study areas. The geographic distribution of fleas at the station was related to the geographic range and variety of their hosts. Species of fleas infesting the greatest variety of hosts were Monopsyllus wagneri, Meringis parkeri, and Meringis hubbardi. Mammals infested by the greatest variety of fleas were Peromyscus maniculatus, Neotoma cinerea, Dipodomys ordii, Onychomys leucogaster, Eutamias minimus, Spermophilus townsendii, and Microtus montanus. Comparative rates of infestation between an irradiated area and a non-irradiated control area showed that twice as many animals were infested in the control area as in the irradiated plot.

References


