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Siphonaptera: Host Records from Crater Lake National Park, Oregon

Abstract

Small mammals were routinely trapped and their ectoparasites collected over a twenty year period at Crater Lake National Park, Oregon. Over 600 mammals representing 18 taxa were examined yielding 23 taxa of fleas. Flea-host records and sex ratios are presented. Male *Eutamias amoenus* were found to be infested significantly more often than females.

Introduction

Since 1960 the Oregon State Health Division Biology Section has trapped and collected ectoparasites from small mammals at Crater Lake National Park, Klamath Co., Oregon, as part of a statewide surveillance program for vector-borne disease. Noteworthy flea-host records gathered between 1960-1979 are presented herein.

Study Area Description

Elevation of the park above mean sea level is about 1340-2720 m. Several floristic zones are present; at lower elevations Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), and ponderosa pine (*Pinus ponderosa*) predominate. Lodgepole pine (*Pinus contorta*) and western white pine (*Pinus monticola*) are common at middle elevations. Above this zone, mountain hemlock (*Tsuga mertensiana*), Shasta red fir (*Abies magnifica* var. *shastensis*), and noble fir (*Abies procera*) are characteristic. Whitebark pine (*Pinus albicaulis*) is common on the rocky crests encircling the caldera in which Crater Lake lies.

Methods and Materials

Small mammals were periodically collected throughout the park between July and September inclusive for the years 1960-1963, 1965, 1967, 1969, 1971, 1973, and 1977-1979. Most trap stations were between 1830 and 2130 m in elevation. Both Sherman live-traps (7.62 x 8.89 x 22.86 cm) and Museum Special traps were used. Each captured animal was individually anesthetized with diethyl ether, bled (1973, 1977-1979), and thoroughly combed for fleas which were stored in a 2 percent saline solu-

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tion. Fleas were subsequently identified by personnel at the Center for Disease Control, Vector-borne Disease Division, Plague Branch, Fort Collins, Colorado.

Results and Discussion

A total of 616 mammals representing 18 taxa were collected and yielded 23 taxa of fleas. Several mammals recorded in low numbers yielded no fleas. These are: *Sorex vagrans* (5 individuals), *Sorex palustris* (1), *Sorex* sp. (1), *Tamiasciurus douglasi* (1), *Phenacomys intermedius* (1), and *Microtus montanus* (2). The occurrence of flea species and associated mammalian hosts is shown in Table 1.

The sex ratios of the four host species captured in the largest numbers are: *Eutamias amoenus* (sex recorded in 110 individuals), 1 male: 1.1 females; *Eutamias townsendii* (28), 1:0.6; *Spermophilus lateralis* (236), 1:1.2; *Peromyscus maniculatus* (125), 1:0.8. Chi-square was used to test for differences in the rate of infestation associated with host sex (Table 2). No significant correlation was found except that in *E. amoenus* ($p < 0.001$, $df = 1$), 66.7 percent of all males were infested compared to 26.8 percent of the females.

Information regarding flea sex ratios is incomplete because the sex of individual fleas was not recorded during 1965 and 1969-1973. However, data from the remaining years regarding the two predominant species indicate a sex ratio of about 1:1.4 for both *Oropsylla idahoensis* (56 males, 81 females) and *Monopsyllus eumolpi* (57, 79).

Accidental infestations were recorded from several hosts. The following references to preferred hosts were drawn from Hubbard (1947). *Orchopeas sexdentatus*, commonly found on *Neotoma* spp., was recovered from one *Clethrionomys occidentalis*. Eight *Oropsylla idahoensis* were removed from *Eutamias* spp., *Peromyscus maniculatus*, and *C. occidentalis*. The preferred hosts of *O. idahoensis* are *Spermophilus* spp.; at Crater Lake they clearly exhibited a host preference for *S. lateralis*, readily parasitizing both sexes. *Foxella ignota*, a flea of *Thomomys* spp., was recorded from *Neotoma cinerea*. *Eutamias amoenus*, *Spermophilus lateralis*, and *Microtus* sp. were host to *Monopsyllus wagneri*, commonly found on *P. maniculatus*. A true *Scapanus* flea, *Nearctopsylla jordani* was taken from *P. maniculatus*. *Monopsyllus ciliatus*, a flea of *Eutamias* spp., was recovered from *S. lateralis*, *P. maniculatus*, and *Martes americana*, a chipmunk predator.

Hubbard indicates that *Onychomys leucogaster* is probably the true host of *Monopsyllus exilis* and that the flea would be found wherever *O. leucogaster* occurs. Two *M. exilis* were taken from *P. maniculatus* at Crater Lake, outside the range of *O. leucogaster*.

Catallagia sculleni is primarily a *P. maniculatus* flea. In this study it was recovered from *Eutamias* spp., microtines, and *Zapus trinotatus*. In the Pacific Northwest, Hubbard recovered only *Megabothris abantis* and *M. quirni* on *Z. trinotatus*.

Hubbard reports that *Opisodasys keeni* is the second most common flea on *P. maniculatus* and is found west of the eastern base of the Cascade Range; only one was recovered at Crater Lake. Perhaps the scarcity of *O. keeni* is due to the proximity of the study site to the eastern terminus of the species' range.

TABLE 1. Occurrence of flea species on mammals from Crater Lake National Park, Oregon, 1960-1979.

Species	Number collected	Number infested	Oreopeas sexdentatus Baker	Opisodasys keeni (Baker)	Thrassiss sp.	Oropsylla idahoensis (Baker)	Foxella ignota (Baker)	Malariaeus telchinum (Rothschild)	Malariaeus bitterooleensis (Dunn)	Malariaeus sp.	Megabothris abantis (Rothschild)	Monopsyllus wagneri (Baker)	Monopsyllus ciliatus (Baker)	Monopsyllus eumolpi (Rothschild)	Monopsyllus exilis (Jordan)	Monopsyllus sp.	Ayphloceras sp.	Catallagia sculleni Hubbard	Catallagia chamberlini Hubbard	Catallagia sp.	Peromyscopsylla hesperomys (Baker)	Peromyscopsylla selensis (Rothschild)	Peromyscopsylla sp.	Hystriocopsylla occidentalis Holland	Nearctopsylla jordani Hubbard	
<i>Ochotona princeps</i>	2	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Eutamias amoenus</i>	110	51	—	—	1	4	—	—	—	—	—	1	32	73	—	—	—	—	—	—	—	—	—	—	—	—
<i>Eutamias townsendii</i>	31	11	—	—	—	1	—	—	—	—	—	—	16	5	—	2	—	—	—	—	—	—	—	—	—	—
<i>Eutamias sp.</i>	51	21	—	—	—	1	—	—	—	—	—	—	1	78	—	—	—	—	—	—	—	—	—	—	—	—
<i>Spermophilus lateralis</i>	236	158	—	—	—	329	—	—	—	—	—	—	2	3	3	—	—	—	—	—	—	—	—	—	—	—
<i>Peromyscus maniculatus</i>	126	64	—	2	—	1	—	1	—	—	—	—	1	57	2	—	—	—	—	—	—	—	—	—	—	—
<i>Neotoma cinerea</i>	2	1	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Clethrionomys occidentalis</i>	23	10	1	—	—	1	—	4	—	2	—	—	—	—	—	—	—	2	1	1	—	—	—	—	—	—
<i>Microtus richardsoni</i>	4	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Microtus sp.</i>	13	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Zapus trinotatus</i>	6	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Martes americana</i>	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	616*	324	2	2	1	337	1	6	1	2	19	61	55	159	2	2	1	10	1	17	12	3	14	1	1	

*Included are the 11 individuals (five species) described in the text from which no fleas were recovered.

TABLE 2. Distribution by host sex of fleas on four common mammals at Crater Lake National Park.

Species	Absent		Present	
	Male	Female	Male	Female
<i>Eutamias amoenus</i>	18	41	36	15
<i>Eutamias townsendii</i>	11	6	6	5
<i>Spermophilus lateralis</i>	38	40	70	38
<i>Peromyscus maniculatus</i>	34	28	36	27

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