

FLEAS (SIPHONAPTERA) OF PIKAS (*OCHOTONA RUFESCENS*) IN BALUCHISTAN, PAKISTAN

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Rafia Rehana Ghazi and Rajab Ali ((1992) Fleas (Siphonaptera) of pikas (*Ochotona rufescens*) in Baluchistan, Pakistan. *Bull. Inst. Zool., Academia Sinica* 31(1): 9-14. Fleas of pikas (*Ochotona rufescens*) in Quetta, the Ziarat Valley, and its suburbs are examined in this paper. Six hundred and thirty-four fleas belonging to the following genera were collected: *Xenopsylla* sp. 21.8%; *Amphipsylla* sp. 21.8%; *Frontopsylla* sp. 21.6%; and *Callopsylla* sp. 34.8% of all fleas. *Xenopsylla cheopsis* was not found. Relative abundance and diversity of fleas were not obvious except in the *Callopsylla* sp. in the Ziarat, Munna, and Hazar Ganji areas. The flea indices ranged between 1.96 and 3.54 in the Khawas and Hazar Ganji areas, respectively. The absence of *X. cheopsis* helps to explain why pikas are rarely involved in plague and murine typhus infections.

Key words: Pikas, *Ochotona rufescens*, Fleas.

This report deals with fleas (*Siphonaptera*) collected from the orchard pest *Ochotona rufescens* (commonly known as the Afghan-Pika) in the province of Baluchistan, Pakistan, where they are abundant. In parts of Baluchistan, the Afghan Pika is an agricultural pest, damaging apple trees in winter, and damaging corn, wheat, potatoes and garden vegetables in summer. Khokhar and Fulk (1976) reported that pikas damaged 20% of 2,497 apple trees examined near Ziarat in the spring of 1976. In spite of their importance, little is known about the fleas, which are generally regarded as potential carriers of important diseases such as plague (wild mammal plague) and Murine typhus.

Pikas in Baluchistan are rarely known to have involvement with plague epizo-

otics or other Zoonoses (diseases which, under natural conditions, are communicable from lower animals to man). Little evidence exists implicating these mammals as sources of human infection; this may be explained by the absence in pikas of fleas capable of transmitting important diseases. Two hundred and sixty-two pikas were trapped live and examined for fleas during two field trials in 1985 and 1986. Areas sampled were in or near a suburban-wilderness fringe where possibilities of disease occurrence exists, and where pikas coexist with a variety of wild and domestic mammals and a human population.

The frequency of parasitic fleas taken from these small mammals was about 10-15 fleas per host. Fleas from the Pulicidae, Leptopsyllidae and Anomiopsyllidae families are of interest not only

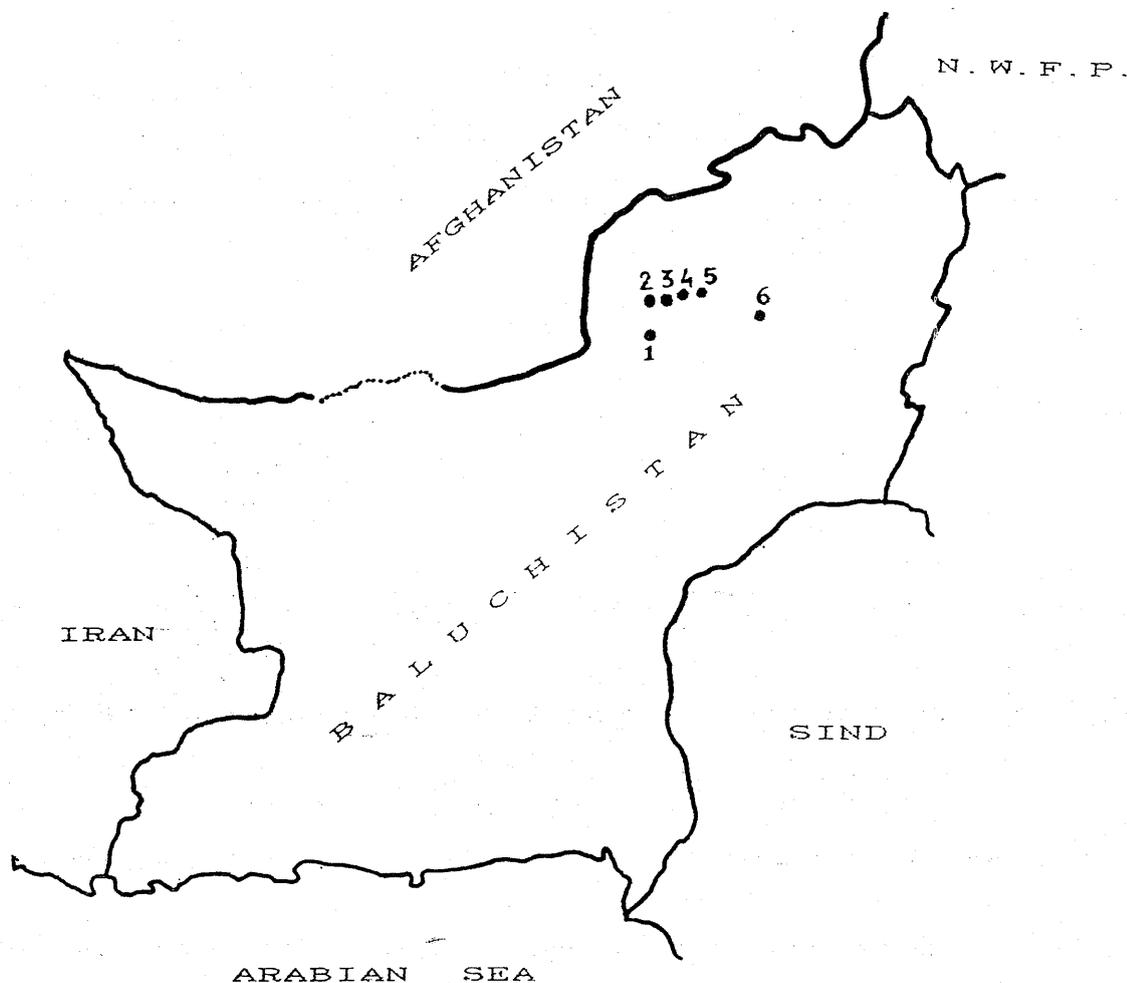


Fig. 1. Pika flea collecting locations: 1. Hazar Gangi 2. Khawas 3. Munna 4. SM Tangi 5. Ziarat Valley 6. Chotair

from the viewpoint of public health because of their association with rodents and lagomorphs, but also due to their frequent exhibitions of structural modifications that are worthy of note in studies on evolution, comparative morphology, and systematics.

Regarding plague in the upper valley of Quetta, Ziarat, and nearby suburbs (Fig. 1), the public health status of pikas crucially rests on the presence or absence of fleas on these hosts. Thorough investigations regarding the flea-host association had never been previously undertaken in this area of Pakistan,

therefore, a study concerning fleas of pikas in Baluchistan was long overdue.

MATERIALS AND METHODS

The field study included two short-term (fortnight) trips to Quetta, in the Ziarat Valley; the area included five other suburbs, namely Chotair, Sandiman Tangi, Munna, Khawas, and Hazargangi. The Ziarat Valley is at $30^{\circ} 20'N$, $67^{\circ} 45'E$, has an altitude of 2,450 meters; the valley is located in the northwestern sector of Baluchistan Province, 125 kilometers from the Pakistan-Afghanistan

border. Snow often covers the ground from December through mid-March. Weather data from nearby Quetta (altitude 1,700 meters) indicates that most precipitation occurs in winter, with brief or variable summer monsoons. The soil is extremely rocky, and farmers living on the valley floor use rocks taken from the fields to make fences and terraces; these provide nesting sites for pikas (Fulk and Khokhar, 1980).

Pikas, along with some other rodents, were captured with Snap traps and live-traps baited with vegetables or bread coated with peanut butter. The animals were placed in white cotton bags to prevent the escape of ecto-parasites (fleas). The mammals were brought to the field laboratory, and the ecto-parasites were brushed on to white enamel trays; the fleas were collected using fine brushes, and preserved in a 70% ethanol solution for morphological study. Each animal was recorded by sex, weight, and total head, body, and tail length.

RESULTS

During the two field trips, 262 pikas were captured alive and examined for fleas. Forty-eight individuals of other species were also caught. These included 19 *Meriones persicus* (Persian Jird), 16 *Cricetulus* (Migratory Hamster) and 13 *Calomyscus* (Long-tailed Hamster).

The small mammals did not show considerable relative abundance in numbers, except in the case of *M. persicus* in the Ziarat and Chotair areas (Table 1). No mammals were trapped in the Hazar Ganji area. All species trapped are nocturnal.

In all, 634 fleas representing four species were collected (Table 2). *Callopsylla* sp. (34.8% of total) was the most abundant species. The other three — *Xenopsylla* sp, *Amphipsylla* sp, and *Frontopsylla* sp. — comprised 21.8%, 21.8%, and 21.6% of the total fleas collected, respectively. *Xenopsylla cheopis*, the most important plague bacilli carrier, was not

Table 1
Mammals captured per 262 pikas (*Ochotona rufescens*) at six localities in Baluchistan during 1985-1986

Species	Study area					
	Ziarat Valley	Chotair	Sandiman Tangi	Munna	Khawas	Hazar Ganji
<i>Meriones persicus</i>	3.82	2.29	0	0.76	0.38	0
<i>Calomyscus</i> sp.	1.53	0.76	0.38	0	2.29	0
<i>Cricetulus</i> sp.	1.91	1.14	0.76	2.29	0	0

Table 2
Fleas collected from pikas at six sites in Baluchistan during 1985-1986

Species	Study sites						Male ♂	Female ♀	Species Total	Total Percentage
	Ziarat Valley	Cho-tair	Sandiman Tangi	Munna	Khawas	Hazar Ganji				
<i>Xenopsylla</i> sp.	28	30	19	20	13	28	60	78	138	21.8%
<i>Amphipsylla</i> sp.	25	15	30	29	12	27	40	98	138	21.8%
<i>Frontopsylla</i> sp.	30	18	26	25	23	15	42	95	137	21.6%
<i>Callopsylla</i> sp.	45	25	30	52	15	54	78	143	221	34.8%
Totals	128	88	105	126	63	124	220	414	634	100%

Table 3
Flea infestations on male and female pikas at six sites
in Baluchistan during 1985-1986

Area	Male pikas infested				Female pikas infested			
	n/N*	% infestation	No. fleas	Mean density**	n/N*	% infestation	No. fleas	Mean density**
Ziarat Valley	14/45	31.1	96	2.13	5/14	35.71	32	2.28
Chotair	12/28	42.86	52	1.85	4/12	33.33	36	3.0
Sandiman Tangi	15/31	48.38	73	2.35	8/22	36.36	32	1.45
Munna	10/25	40.00	79	3.16	7/18	38.89	47	2.61
Khawas	5/19	26.31	23	1.2	2/13	15.38	40	3.07
Hazar Ganji	17/20	85.00	88	4.4	3/15	20.00	36	2.4
Total	63/168	37.50	411	2.45	29/94	30.85	223	2.37

* Number of pikas infested (n)/total pikas examined (N).

** Mean density: number of fleas/pika.

Table 4
Percentage of pika *Ochotona rufescens* infested by fleas, flea index
on all hosts, and flea index on infested hosts only,
for six areas in Baluchistan during 1985-1986

Site	n/N*	% Pikas infested	No. of fleas	Mean fleas/pika based on	
				Total pikas examined	No. of pikas infested
Ziarat Valley	19/59	32.20	128	2.16	6.73
Chotair	16/40	40.00	88	2.20	5.50
Sandiman Tangi	23/53	43.39	105	1.98	4.56
Munna	17/43	39.54	126	2.93	7.41
Khawas	7/32	21.87	63	1.96	9.00
Hazar Ganji	20/35	57.14	124	3.54	6.20
Total	102/262	40.47	634	2.42	6.21

* Number of pikas infested (n)/total pikas examined (N).

collected at any site. In addition, a few specimens of Lealptid mites (*Echinolealap* sp.) and Ixodid ticks (*Heamaphysalis* sp.) were also found. No considerable abundance or diversity of fleas were noted, with the exception of *Callopsylla* spp. which was moderately abundant in all areas studied.

The six areas cannot be separated into any significant groupings regarding the percentage of infested pikas, since each area had almost equal percentages; the only exception was the Hazar Ganji area, where the percentage of infested male pikas was 85.00. Male and female

pikas in the Khawas area were found to be least infested, at 26.3% and 15.3%, respectively. Significantly more male pikas than female pikas were captured during the two visits (Male=168, Female=94) (Table 3). Because small mammal males are often more infested with fleas than, females (Schwan, 1985), a greater abundance of males might make them a greater health threat to humans than female pikas.

DISCUSSION

In the six areas studied, pikas were

found to be infested with fleas; however, the infestation was somewhat uniform, with considerable numbers of fleas found on each pika. The flea populations in all areas were found to be quite similar; this might be due to the similar ecological conditions. *Callopsylla* was the most widespread and abundant flea species, however, it plays no important role in the transmission of plague, either between pikas or from pikas to humans. *Xenopsylla* sp. —the most important vector for Urban plague (Pollitzer, 1954) —and Murine typhus (Traub *et al.*, 1978) were found in all areas studied; however, species involved in the transmission of such diseases, *i.e.*, *X. cheopis*, were not present on any pika. However, the presence of *X. cheopis* in the area had not been reported earlier, significantly reducing the public health hazard of pikas to humans regarding plague and murine typhus.

The genus *Xenopsylla* was reported for the first time. *Amphipsylla* sp. and *Xenopsylla* sp. were the second most abundant species of fleas collected at all the study sites. Although *Amphipsylla* sp. is reported to be of public health significance (Pollitzer, 1954), it appears an unlikely candidate to initiate epizootics or maintain infections in pika populations for any length of time, unless attempts at serological or other relevant micro-examinations are not taken.

Frontopsylla sp. is a common flea which infests pikas living at high alti-

tudes. This flea has not been implicated in the transmission of disease organisms.

From our results, we believe that no appreciable flea fauna variation is evident between the six areas; this demonstrates that pikas (*Ochotona* sp.) in these areas have some significance, as they harbour fleas that transmit disease.

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巴基斯坦，貝魯其斯坦省之鼠兔身上的跳蚤調查

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本實驗調查了分佈於奎塔 (Quetta)，吉亞拉 (Ziarat) 等地的山谷及郊區的鼠兔 (*Ochotona rufescens*) 身上跳蚤的種類及數量。總共發現了 634 隻跳蚤分別屬於鼠蚤 *Xenopsylla* sp. 佔 21.8%，*Amphipsylla* sp. 佔 21.8%，*Frontopsylla* sp. 佔 21.6% 及 *Callopsylla* sp. 佔 34.8%。其中除了 *Callopsylla* sp. 在吉拉拉，木納 (Munna) 及哈沙甘吉 Hazardganji) 等地區呈相當多量的發生外，其他種類皆不明顯。*Callopsylla* sp. 在各地區的鼠蚤指數則在 1.96 至 3.54 之間。此次調查並未發現印度鼠蚤 *Xenopsylla cheopis*，這也說明了為什麼鼠兔很少涉及鼠疫及地方性斑疹傷寒感染的原因。