

Reports on Human Infestation with Cat Flea and Dog Flea (Siphonaptera : Pulicidae) in Okayama, Japan

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ABSTRACT. : Eighteen cases of human dermatitis by cat flea (*Ctenocephalides felis* (Bouche, 1835) Stiles and Collins, 1930) and dog flea (*Ct. canis* (Curtis, 1826) Stiles and Collins, 1930) infestation in Okayama City and its environs in 1982 and 1983 are reported. Age distribution of the patients ranged from 8 to 57 year-old, and the highest incidence of infestation was found between the age of 13 to 28. The most cases were found in summer (June to September), and patients were mostly limited in females.

Skin examination revealed the presence of itching eruptions on the upper and lower limbs, trunk, as well as face and neck. The patients were known to have contact with cats and dogs at home, and characteristic fleas were found in body hair of cats and dogs, and in and out of the house. Fifteen patients were diagnosed as the dermatitis by cat flea infestation, and 3 were by dog flea infestation.

All of the patients were treated with double application of Eurax ointment and Cerestamin, and the skin lesions completely cured within one to two weeks.

Key words : Cat and dog flea infestation — *Ctenocephalides felis* —
Ctenocephalides canis — Siphonaptera — Pulicidae

The human flea (*Pulex irritans* Linnaeus, 1758) once a tremendous vogue throughout Japan around World War II almost disappeared within several years of the postwar period. The human cases of cat and dog flea infestation have rapidly and increasingly been replaced by human flea infestation among animal pet breeders. This problem now becomes momentous both from parasitic zoonosis and public health point of view.

We have experienced 18 cases of dermatitis caused by cat and dog flea infestation in Okayama City and its environs during past two years. We thus report the increasing human infestation with the animal fleas in order to encourage clinicians to pay more attention to the incidence.

CASE NOTES

The detailed data on 18 patients infested with cat or dog fleas were summarized in Table 1. The females were predominant and the highest incidences were found in the teens and twenties. The most were found in summer (June

TABLE 1 Animal flea infestation in Okayama Prefecture

Cases No.	Patients		Dates of first examined	Distribution of lesions				Presence of hosts	Familial infestation	
	age	sex		residence	face and neck	trunk	upper limb			lower limb
1	57	F	Omote, Okayama	Jun. 1982	-	+	-	+	-	+
2	52	F	"	" "	-	-	-	+	-	+
3	22	F	Hayashima, Tsukubo	Jul. "	-	-	-	+	cat	+
4	18	M	Shimizu, Okayama	Aug. "	+	+	+	+	cat	+
5	35	F	Toyohama, Okayama	" "	-	-	-	+	-	
6	17	F	Matsuhama, Okayama	" "	-	+	+	+	cat	
7	27	F	Shimizu, Okayama	Sept. "	+	-	-	+	cat	+
8	22	F	Hachihama, Tamano	" "	-	-	-	+	cat	+
9	8	F	Urainbe, Bizen	" "	+	-	+	+	cat	+
10	21	F	Masagi, Okayama	Oct. "	-	+	+	+	cat	-
11	27	F	Seto, Akaiwa	" "	-	-	-	+	cat	+
12*	18	F	Kubo, Okayama	Dec. "	-	-	+	-	dog	-
13	13	F	Shinbo, Okayama	Apr. 1983	+	+	+	+	cat	-
14	20	F	Akasaka, Akasaka	Jun. "	-	+	+	+	-	+
15	56	F	Tsushima, Okayama	Jul. "	-	-	-	+	cat	
16*	16	F	Mite, Okayama	" "	-	-	+	+	dog	
17	18	F	Munage, Tamano	" "	-	-	-	+	-	+
18*	28	F	Wake, Wake	Aug. "	-	-	-	+	dog	

* The lesions seem to be produced by dog flea infestation.

to September). The patients 1 and 2 were sisters living together in the same house. The patients 1 and 14 showed the most typical symptoms of cat flea infestation in all of the patients.

The patient 1 was a 57-year-old housewife living in Omote-Cho, Okayama City. The patient first noticed itching eruptions on the lower leg skin in late May, 1982. Then she visited the Department of Dermatology, Kawasaki Hospital Division, in June 5th, 1982 because the eruptions spread gradually to the trunk. Skin examination revealed itching eruptions around both joints of ankle (Figs. 1 and 2), upper legs and over the trunk. The eruptions consisted of recurrently grouped or disseminated papules which commenced as wheals, erythematous papules, rised vesicles and depressed crusts of millet to fingernail in size. The cutaneous findings of the lesions appeared as insect bite wounds characteristic to animal flea infestation. The followings become clear after

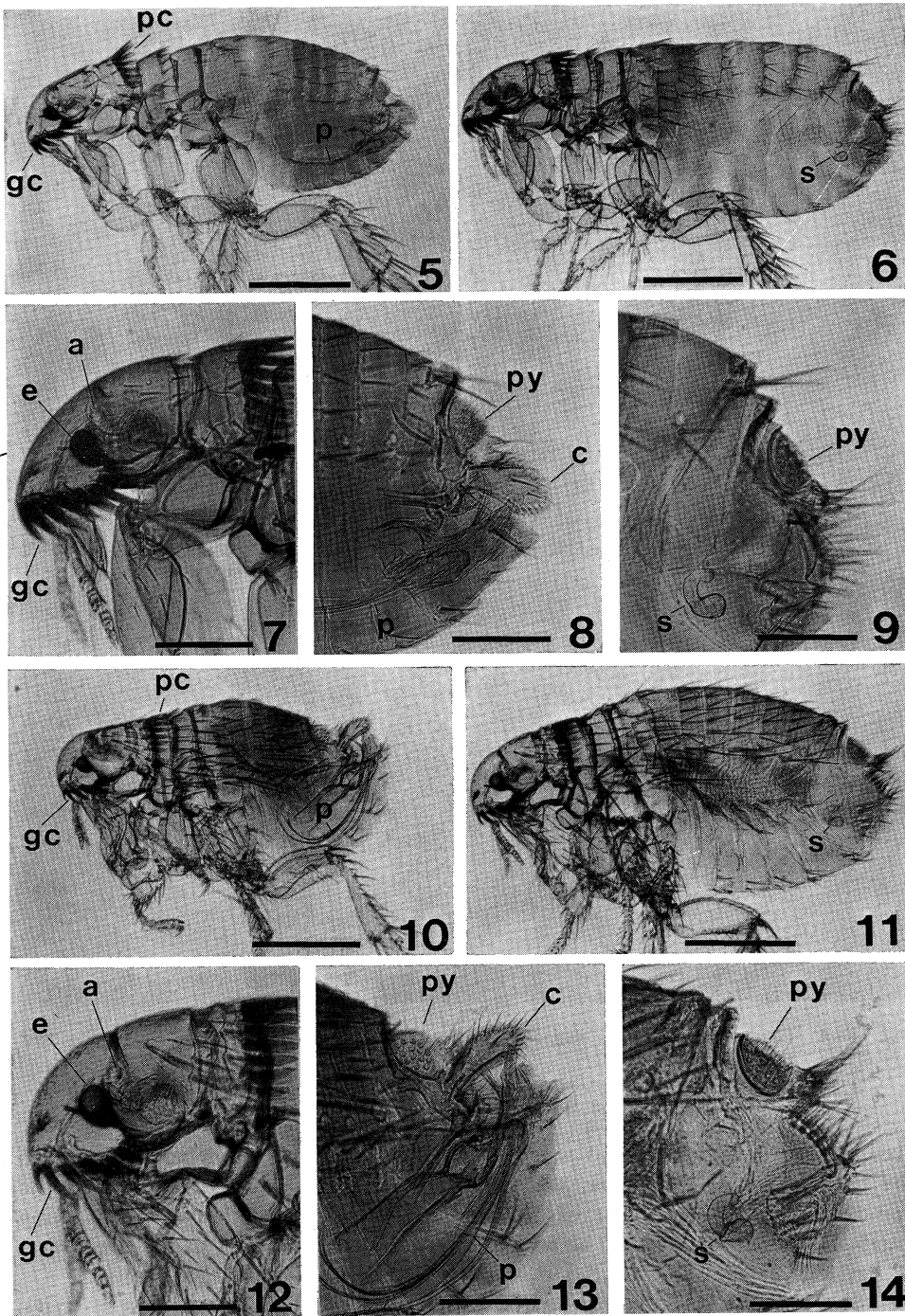


Figs. 1—4. Clinical photographs showing cutaneous lesions produced by cat and dog flea bites.

- 1—3. Pruritic dermatitis on legs of case 1 (1-2) and 14 (3) ; cat flea infestations.
 4. Pruritic dermatitis on forearm of case 12 ; dog flea infestation.

questioning the patient as to whether she had an animal pet or not. Although she had no pet at her home, she recognized a wild cat wandered around the home frequently. After the cat delivered kittens at her home small living organisms which believed to be animal fleas frequently jumped at the lower part of her legs at the entrance floor or on artificial truft of the backyard.

She brought several fleas to the hospital caught on tatami mats of living room. On microscopic observation the fleas were identified as the cat flea, *Ctenocephalides felis* (Bouche, 1835) Stiles and Collins, 1930 from morphological characteristics of head and genal ctenidia (Figs. 5-7). The patient was treated with double application of Eurax ointment and Cerestamin. At the same time



Figs. 5—14. Adult fleas of *Ctenocephalides felis* (5—9) from case 1 and *Ct. canis* (10—14) from case 12, the mounted specimens.

5—6. Whole body of male (5) and female (6). (bars = 0.5 mm)

7. Head and prothoracic segments of female. (bar = 0.2 mm)

8—9. Posterior portion of male (8) and female (9). (bars = 0.2 mm)

- 10–11. Whole body of male (10) and female (11). (bars = 0.5 mm)
12. Head and prothoracic segments of female. (bar = 0.2mm)
13–14. Posterior portion of male (13) and female (14). (bars = 0.2 mm)
a : antenna, c : clasper, e : eye, gc : genal ctenidia, p : penis, pc : pronotal ctenidia,
py : pygidium, s : spermatheca

the house was recommended to exterminate by use of insecticide. The skin lesions of the patient were recovered within a week after treatments.

The patient 14 was a 20-year-old office girl living in Akaiwa County, Okayama Prefecture. She noticed itching eruptions on the skin surface of the lower part of her legs in early June, 1983.

She thus visited our office in June 17th, 1983 when eruptions spread gradually over the body. The cutaneous findings were found on the lower legs (Fig. 3), forearms and trunk showing itching eruptions of millet to fingernail in size. The eruptions showed erythematous papules and were very similar to that of the patient 1. Then we found that she kept no pet at her home, although the papules were considered as the dermatitis by animal flea. According to the patient a wild cat had frequently been wandering around the house for past several weeks, and one of her family members complained with similar type of dermatitis.

On microscopic observations the fleas which she brought from her house were identified as the cat flea, *Ctenocephalides felis* from the external morphology. The skin lesions of the patient were completely cured within 2 weeks by the enforcements of dermatological treatment and extermination of animal fleas around the residence. Of the clinical appearance of papules in other 16 patients, courses and healing of the disease were identical to those of the patients 1 and 14. As shown in Table 1 the patients studied were mostly female, and 13 out of 18 patients kept pets. Moreover, all the animal fleas found were from cats and dogs. The patients 1, 2, 5, 14 and 17 did not keep any pet at their homes though wild cats or dogs frequently inhabited around the houses. In patients 1, 2 and 5, the fleas were found from living rooms. Though the patient 17 had no pet at her home, she had been frequently contacted with a pet cat at her relative's house. The patients 12, 16 and 18 kept dogs at their homes, and the fleas were found as dog species (Figs. 10–12). The eruptions of these 3 patients were diagnosed as the dermatitis by dog flea, *Ctenocephalides canis* (Curtis, 1826) Stiles and Collins, 1930 infestation (Fig. 4).

As shown in Table 1 skin eruptions of all the patients are found on lower and upper limbs, trunk, as well as face and neck in the order of frequency in occurrence. And among 18 patients, 10 were the familial infestation.

DISCUSSION

A large number of human dermatitis by cat and dog flea infestation have been so far reported elsewhere,¹⁻⁷⁾ but few report are known in Japan.⁸⁻¹⁰⁾ Fleas are bloodsucking insects belonging to Order Siphonaptara of 2 to 2.5 mm in length with laterally flattened abdomen. The males are smaller than females, and the external appearances of the posterior portion of male differ sharply from that of female (Figs. 8, 9, 13 and 14). There are numerous bristles on

the exoskeletal surface of whole body, and the rows of the bristles are of taxonomic importance. The morphological differences between cat flea and dog flea can readily be distinguished by the shape and an arrangement of genal ctenidia situated on the ventral margin of head, the inclination of forehead and the reproductive organs (Figs. 6, 7, 11 and 12).

The flea develops into the adult by complete metamorphosis passing through 3 developmental stages as egg, larva and pupa. The female adult of cat and dog fleas lays eggs on body hair or in habitats of the host, and in most cases the eggs may be found on beds and mats of the host animals. The eggs are about 0.5 mm longitudinally, ovoid in form and white or cream in color. The larvae are very mobile, slender in form, about 4.0 mm in length with 15 segments and yellowish-white in color. The larval fleas are not parasitic and live on any nutrient fragments, particularly fine dust in the den and feces of adult fleas. The pupal stage of fleas is influenced by temperature and varied from 7 days to a year. According to Harwood and James¹¹⁾ the life cycle (egg to adult) of cat fleas is approximately 20 to 24 days (larval stage 11 to 12 days) at 24°C.

It is well known that not only female but also male of the adult fleas feed on host blood. Although the type-specific host for cat and dog fleas are usually cats, dogs or avians, the fleas are known to attack more often on human beings to suckblood.

All of the present patients were more or less contacted with cat or dog at the home, and the host's characteristic fleas were found in these animals and in and-out of the houses. Judging from this, it is safe to say that dermatitis of the patients was evidently infested by animal fleas. The relations between the human dermatitis and the cat flea bite have been studied by Iwashige,⁸⁾ Joseph³⁾ and Iwashige and Kitamura.⁹⁾ Iwashige⁸⁾ demonstrated that there were two kinds of eruption such as vesicle and papule types in the cutaneous lesions produced by the cat flea infestation, and these eruptions are frequently appeared on the skin surface of the lower part of legs. He also noticed that the eruptions of vesicle type were limited in number, soybean to cherry in size, and the eruptions of this type were in no way visible on the surface of trunk. The eruptions of papule type, on the other hand, are somewhat increased in number and they were found on the skin surface of forearms and trunk including the lower part of legs. It is considered that the human dermatitis produced by animal flea bite is a sort of allergic reaction.¹²⁾ Joseph³⁾ recognized the existence of two types of reactions, immediate and delayed reaction, in biting experiments of the cat flea against the human skin of 4 volunteers. The immediate reaction accompanied by an acute pruritic sensation, erythema and slight oedema appeared 10 to 15 min following the bite persisting for 48 to 56 hrs and disappeared in 72 hrs. The delayed reaction accompanied by erythema and formation of papules and pustules appeared in 12 hrs following the bite, which persisted for 4 to 5 days and subsided thereafter.

It is thus obvious that cat and dog fleas can give rise to dermatitis for the skin of human beings. However, the reports of human infestation with cat or dog fleas are comparatively few in Japan as mentioned above. For this reason, Iwashige and Kitamura⁹⁾ have reported that it is universally believed

that the humans have never infested with animal fleas, and these fleas are not the remotest chance of capture in the heat of bloodsucking. Hewitt *et al.*²⁾ have suggested that the incidence of cutaneous lesions in man produced by animal ectoparasites is deceptively low, with two reasons ; 1) a large number of cases were not referred to dermatological clinics ; 2) in the earlier stage of this investigation, many cases were ignored.

According to Iwashige⁸⁾ and Maeda and Anekohji¹⁰⁾ most of the patients infested with animal fleas in Japan were limited to the female and found mainly in summer period. In the present investigation, 17 patients except one were female, and dermatitis was found more often in summer period (June to September).

Some species of animal fleas communicate endemic diseases to man, such as myxomatosis, plague and endemic or murine typhus by viruses, bacteria and rickettsia. Moreover, most of the cat and dog fleas parasitic to cats and dogs play a role of the intermediate host for several cestodes, namely, *Hymenolepis nana*, *H. diminuta* and *Dipylidium caninum*, and these cestodes are transmitted from fleas to man. The authors are therefore desirous that the pet breeders are needed to be advised to pay special attention to the health and sanitation of the animals.

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