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Relative Feeding Preferences of Mosquitoes for Man and Dogs

Osamu SUENAGA
Reference Center, Institute for Tropical Medicine, Nagasaki University

Tatsuya ITOH
Department of Medical Zoology, Nagasaki University School of Medicine, and Nagasaki City Health Center

ABSTRACT: Mosquitoes were collected by a human-bait-trap and a dog-bait-trap at two areas, suburban and rural, of Nagasaki City in 1968 and 1969 to compare the feeding preferences of mosquitoes for man and dogs. Species composition of mosquitoes collected by the two different traps was very similar to each other at both areas, and *Armigeres subalbatus*, *Aedes albopictus* and *Culex pipiens pallens* were predominant. It was considered that the latter two species may be important in transmitting the canine heartworm to man.

Although the canine heartworm, *Dirofilaria immitis*, is known as a common parasite of dogs in Japan, it is becoming a new problem also as a parasite causing zoonosis, because several human cases have recently been reported (Nishimura *et al.*, 1954; Yoshimura and Yokogawa, 1970; Ishii and Fuse, 1974; Otsuru and Shiraki 1974). In our previous papers, it was reported that Nagasaki City and Omura City are heavily endemic areas of the parasite (Suenaga *et al.*, 1971, 1974), and that its main vectors are *Culex pipiens pallens* and *Aedes albopictus* (Suenaga and Itoh, 1973; Suenaga, 1975). The present paper deals with relative feeding preferences of mosquitoes for man and dogs in relation to the possibility of human infections with the canine heartworm.

PLACES AND METHODS

Mosquitoes were collected by a human-bait-trap and a dog-bait-trap at two areas, suburban and rural, in Nagasaki City. In the suburban area, where microfilaria positive rate among house dogs was 43.9%, the mosquito collections were made in the precincts of a shrine contiguous to a side street of a downtown. In a bamboo thicket just behined the precincts aedine mosquitoes were found breeding, and in the drainage along the side

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street *Culex pipiens pallens* were found, sometimes in a very large number, during the survey periods. Paddyfields were found within about 500 m distance from the mosquito collection site.

In the rural area, where microfilaria positive rate was 38.9%, mosquitoes were collected within a bamboo thicket near a farmhouse with several dogs including an infected one. Although many aedine mosquitoes were breeding usually in some stumps of bamboos, no breeding places of *C. p. pallens* were found in and around the thicket. The nearest paddyfield was found about 200 m from the mosquito collection site.

In both areas the mosquito catches were conducted once a week as a rule from 4 to 9 p. m. from July to October in 1968 and from June to November in 1969. A common white mosquito net, 2 m x 2.5 m x 1.5 m in size, was used for the trap in the experiments, after one side of the net was cut lengthwise for an entrance of mosquitoes. Two traps with different baits were set 3 meters apart, the entrance of which faced the leeward side in each area. All of the female mosquitoes collected were carried to the laboratory, and identified.

Results and Discussion

Numbers and percentages of female mosquitoes collected by two kinds of bait traps in 1968 and 1969 were shown in Table 1 for a suburban area and Table 2 for a rural area. In these tables, correlation coefficient between the numbers of mosquitoes collected by two different traps was also presented for each year and area. The sixty percent confidence intervals for percentage of mosquitoes were also illustrated in Fig. 1. As clearly seen in the two tables and one figure, the correlation coefficients were very high, and

Table 1. Comparison between numbers of female mosquitoes collected by two methods, a dog-bait-trap and a human-bait-trap, at a suburban area of Nagasaki City in 1968 and 1969

Period (No. of collections)	July-October, 1968 (8)				June-November, 1969 (12)			
Method	Human-bait-trap		Dog-bait-trap		Human-bait-trap		Dog-bait-trap	
No. & % of mosquitoes	No.	%	No.	%	No.	%	No.	%
Anopheles sinensis	37	4.4	34	5.3	30	3.1	2	0.7
Culex pipiens pallens	71	8.4	115	17.9	113	11.7	39	13.2
C. tritaeniorhynchus summorosus	55	6.5	70	10.9	50	5.2	21	7.1
C. bitaeniorhynchus	0	0.0	0	0.0	0	0.0	1	0.3
C. mimeticus	0	0.0	0	0.0	0	0.0	1	0.3
C. vorax	0	0.0	1	0.2	0	0.0	0	0.0
Aedes albopictus	245	29.0	128	19.9	154	16.0	33	11.2
Ae. vexans nipponii	21	2.5	35	5.4	11	1.1	9	3.1
Armigeres subalbatus	415	49.2	260	40.4	606	62.9	189	64.1
Total	844	100.0	643	100.0	964	100.0	295	100.0
Correlation coefficient	0.949*				0.994**			

*Significant by *t*-test at 1% level. **Significant at 0.1%.

the mosquito structures by the two traps were similar to each other in all of the 4 series of experiment.

The main species collected at the suburban area were *Armigeres subalbatus*, *Aedes albopictus*, *Culex pipiens pallens* and *Culex tritaeniorhynchus summorosus* in both 1968 and 1969. At the rural area, the main species were *Ar. subalbatus*, *Ae. albopictus* and *C. t. summorosus* in 1968, and *Ar. subalbatus* and *Ae. albopictus* in 1969. The dominant species were common in the two areas, though *C. p. pallens* was not many at the rural area. Thus it was considered that *Ar. subalbatus*, *Ae. albopictus* and *C. p. pallens* are frequent feeders on both man and dogs.

Although there were many papers on feeding preferences of mosquitoes in Japan, comparisons between man and dogs were made only in a very few papers. Sasa and Asanuma (1948) reported, in their guide book on Japanese mosquitoes, the feeding preferences of mosquitoes on several kinds of animals including man and dogs in Okayama City, and Kato (1955) analyzed their data statistically in his book on the ecology of mosquitoes. Their conclusions agree with our results in that the species compositions of mosquitoes attracted to man and dogs are similar.

It was suggested from the above that mosquitoes harboring the infective larvae of the canine heartworm would bite man not rarely in the endemic area, because *C. p. pallens* and *Ae. albopictus* are the main vectors of this parasite and both feed actively on man as well as dogs.

Table 2. Comparison between numbers of female mosquitoes collected by two methods, a human-bait-trap and a dog-bait-trap, at a rural area of Nagasaki City in 1968 and 1969

Period (No. of collections)	July–October, 1968 (14)				June–November, 1969 (14)			
Method	Human-bait-trap		Dog-bait-trap		Human-bait-trap		Dog-bait-trap	
No. & % of mosquitoes	No.	%	No.	%	No.	%	No.	%
Anopheles sinensis	3	0.4	5	1.5	5	1.4	4	1.8
Culex pipiens pallens	13	1.7	9	2.6	7	2.0	3	1.3
C. tritaeniorhynchus summorosus	78	10.2	58	17.0	12	3.4	14	6.2
C. pseudovishnui	45	5.9	7	2.1	1	0.3	0	0.0
C. bitaeniorhynchus	5	0.6	2	0.6	0	0.0	0	0.0
C. vorax	0	0.0	1	0.3	0	0.0	0	0.0
Aedes albopictus	242	31.7	68	19.9	154	43.7	65	28.6
Ae. nipponicus	1	0.1	0	0.0	0	0.0	0	0.0
Ae. vexans nipponii	28	3.7	60	17.6	1	0.3	1	0.4
Armigeres subalbatus	346	45.3	127	37.2	171	48.6	140	61.7
Uranotaenia bimaculata	3	0.4	2	0.6	0	0.0	0	0.0
Tripteroides bambusa	0	0.0	2	0.6	1	0.3	0	0.0
Total	764	100.0	341	100.0	352	100.0	227	100.0
Correlation coefficient	0.903*				0.938*			

*Significant by t-test at 0.1% level.

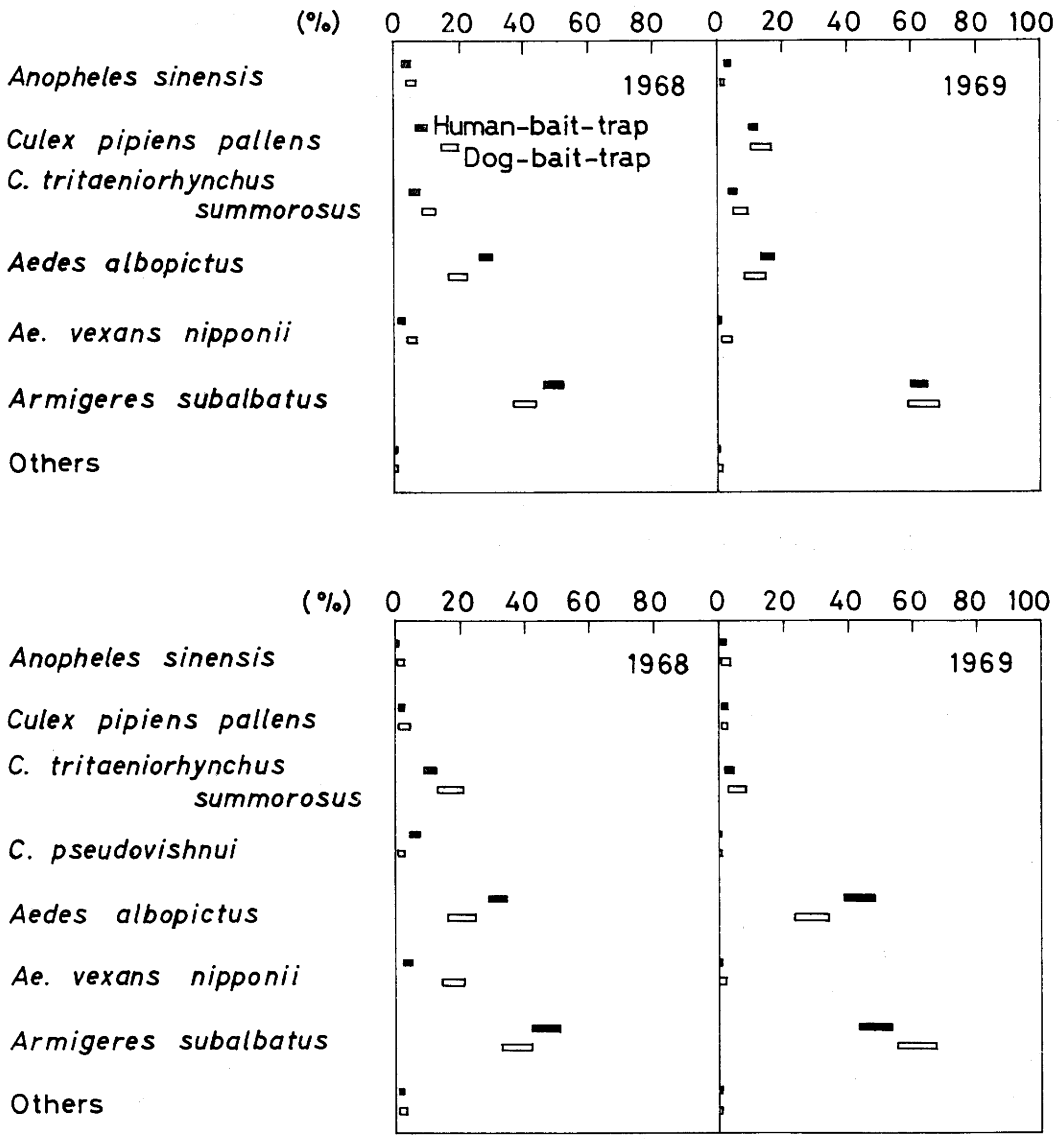

Fig. 1. Sixty percent confidence intervals for percentage of mosquitoes collected each by two method, a human-bait-trap and a dog-bait-trap, at a suburban area (upper) and a rural area (lower) of Nagasaki City in 1968 and 1969.

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人と犬に対する蚊の吸血嗜好性について

末永　敏（長崎大学熱帯医学研究所資料室），伊藤達也（長崎大学医学部医動物学教室，長崎市中央保健所試験研究係）

長崎市内の犬糸状虫濃厚浸淫地の中，市街地と農村との中間的な地区と農村地区の2地区を選び，それぞれ1カ所で人及び犬のそれぞれを誘引源としたトラップを設置して蚊を採集し，その種類構成を比較した．その結果，両地区の何れにおいても両種トラップで採集された蚊群集の種類構成は近似しており，オオクロヤブカ，ヒトスジシマカ，アカイエカの3種が特に多く採集されることがわかった．これらの中，アカイエカは犬糸状虫の主要伝搬蚊であり，ヒトスジシマカも副次的伝搬蚊であることから，その濃厚浸淫地では犬糸状虫の感染幼虫を保有した蚊が人を刺す機会がかなりしばしばあることが推察された．

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