Ecology of Vector Mosquitoes of Japanese Encephalitis, Especially of *Culex tritaeniorhynchus*

1. Results obtained in 1965.

Yoshito Wada, Senji Kawai, Sumiyo Ito, Tsutomu Oda, Jojiro Nishigaki and **Nanzaburo Omori**

Department of Medical Zoology, Nagasaki University School of Medicine, Japan,

and

Department of Medical Zoology, Research Institute of Endemics, Nagasaki University, Japan

(Director : Prof. Nanzaburo Omori)

Kaoru Hayashi, Kumato Mifune and **Akehisa Shichijo**

Department of Pathology, Research Institute of Endemics, Nagasaki University, Japan

(Director : Prof. Hideo Fukumi)

(Received for Publication February14, 1967)

Abstract

The ecology of vector mosquitoes of Japanese Encephalitis is essential to obtain a satisfactory understanding of the epidemiology of the disease. In this connection, the relative abundance, host preference, and seasonal history of the mosquitoes in Nagasaki area were investigated in 1965. *Culex tritaeniorhynchus* is a most abundant species in farm villages, and is strongly zoophilic. The overwintered females begin to appear in late March or early April; adults of both sexes originated from them appear in middle or late May; the population density thereafter is nearly unchanged until the maximum period in density from middle July to late August; the number of mosquitoes decreases abruptly in early September and thereafter a very small number of them are only collected till early October. The day length seems to be a controlling factor in determining the gonoactivity of the females of *C. tritaeniorhynchus* rather than the temperature under certain conditions. The seasonal prevalence of this mosquito is compared also with those of the other four dominant species, *Culex vishnui*, *Aedes vexans nipponii*, *Armigeres subalbatus* and *Anopheles sinensis*.

Introduction

To obtain a satisfactory understanding of the epidemiology of Japanese Encephalitis, the basic knowledge on the role of the vector mosquitoes in the transmission of the

Contribution No. 504 from the Research Institute of Endemics, Nagasaki University and No. 162 from the Deparment of Medical Zoology, Nagasaki University School of Medicine.

disease shall de essential. Although we have about ten mosquito species which have been found suscebtiple to Japanese Encephalities Virus (JEV) in laboratory or in nature, more detailed examinations are needed for the relative susceptibility of different mosquitoes to the JEV and especially for tne ecology of them. Herewith reported is a part of the results obtained in 1965 on the relative abundance, host preference, and seasonal prevalence of mosquitoes, especially of *Culex tritaeniorhynchus*. Regarding the results of the collection of hibernated mosquitoes of *C. tritaeniorhynchus*, a paper was published by us (Omori et al,. 1965a), and the results of the isolation test of JEV from the mosquitoes we had collected was also published by us (Hayashi et al., 1966).

Places and methods

The 19 villages, at which mosquitoes were collected in 1965, were located within a range of 45 km from Nagasaki City (their names are given in Table 1). In all villages, paddy-fields were being developed in greater or lesser extent, excepting Minamiyamate,

Table 1. Period and number of mosquito catches by various methods at different villages, 1965. Catches were made for a collector in an animal-shed or a house for twenty minutes from one hour after sunset and by a dry ice trap for one hour from about sunset, excepting in the case of all night catches.

Village	Collection period	Number of catches						
		Dry ice trap	Cow-shed	Pig-shed	Goat-shed	Hen-house	Human-baited trap	Dwelling house
Nunomaki	Nov. 11	1	2	1				
Tomachi	Mar. 19 - Dec. 20	49[2)]	114[2)]	42[2)]		40[2)]	1[2)]	1
Minamiyamate	Aug. 21 - Oct. 4	7		25		7		9
Urakami	Jun. 8 - Aug. 4	5	1	2		1		
Kawabira	Mar. 12 - Oct. 20	17	50	25		14		
Hotachime	Apr. 16 - Oct. 7	9	7					
Kobasaki	Apr. 22 - Aug. 31	4		7				
Nagayo	Jul. 20 - Nov. 10	2	1					
Tategami	Aug. 30 - Oct. 11	6		6				9
Fukuda	Apr. 15 - Nov. 14	6			1	2		
Hongochi	Aug. 26 - Oct. 12	7	14			6		11
Mogi	Mar. 16 - Nov. 30	43	35	137				
Tanakamyo	Jun. 9	1						
Kaizu	Jun. 19 - Nov. 23	11[3)]	11[3)]	11[3)]				2[3)]
Kaizu 1)	Apr. 24 - Oct. 6	4	108	46				
Aino	Jun. 1 - Oct. 1	6	6	3		2		
Aino 1)	Mar. 18 - Apr. 20	3	42	7				
Yamahata	Jul. 27	1						
Onokoba	Aug. 9	1	1	1				
Kuromaru 1)	Apr. 16 - Oct. 26	8	18	9				
Kuroki	Apr. 29 - Jun. 23	3	3	1				
	Total	194	413	323	1	72	1	32

Remarks : 1) Catches of only culicine mosquitoes were made for about two hours.
2) and 3) in which one and two all night catches are respectively included.

Urakami, and Tategami, which were residential quarters of Nagasaki City. Natural features were various with villages: the three villages mentioned above were on the slope of hills; Kobasaki and Fukuda at the foot of hills near seaside; Nagayo, Kaizu, Aino, and Kuromaru in the level land with especially developed paddy-fields; and the other villages on the valley between small hills.

Mosquitoes were collected in cow-sheds, pig-sheds, goat-sheds, hen-houses, and dwelling houses, and also by using dry ice traps and human-baited traps at a regular or irreguler interval in the villages. Twenty minute catch st animal-sheds or houses from one hour after sunset and one hour catch by dry ice traps after about sunset were usually made each by one person, excepting all night collection, in which mosquitoes were collected hourly from sunset to sunrise by a person.

Period and number of mosquito collections at the 19 different villages in 1965 are shown in Table 1. The whole period was from mid-March to late December, which covered completely the breeding season of the mosquitoes. The total number of collections were 1036, and the number for each method was shown in Table 1. The rearing methods ef mosquitoes collected will be mentioned later.

Results obtained

Relative abundance of mosquitoes

Total numbers of mosquitoes collected by various methods at the 19 different villages in 1965 are given by species in Table 2, which shows that 149,100 mosquitoes belonging to 18 species were collected in total. The most abundant mosquito was *C. tritaeniorhynchus*, which made 72.85% of all. Other dominant species were *C. vishnui*, *Anopheles sinensis*, *Aedes vexans nipponii*, *Armigeres subalbatus*, and *C. pipiens pallens* in the order of adundance. The numbers of the remaining 12 species were very small.

The percentage composition of mosquitoes would change by how frequently mosquitoes were collected by each of the methods shown in Table 1, since host preference differs markedly, as will be shown in Table 3. *C. pipiens pallens* was abundant in dwelling houses and hen-houses, where the number of collections was small (see Table 1), therefore the percentage for this species was very low. The percentage for *Ar. subalbatus* seems to show roughly the real situation in the farm villages. Rather large

Table 2. Number and percentage of mosquitoes collected at 19 villages by various methods in different times, 1965.

Species	No.	%
An. lindesayi japonicus	14	0.01
An. sinensis	7790	5.22
An. sineroides	84	0.06
M. uniformis	10	0.01
Ae. japonicus	8	0.01
Ae. togoi	9	0.01
Ae. albopictus	46	0.03
Ae. vexans nipponii	7425	4.98
Ar. subalbatus	5125	3.44
C. hayashii	2	0.00
C. infantulus	1	0.00
C. bitaeniorhynchus	192	0.13
C. mimeticus	3	0.00
C. pipiens pallens	1441	0.97
C. sinensis	24	0.02
C. tritaeniorhynchus	108624	72.85
C. vishnui	17909	12.01
C. whitmorei	393	0.26
Total	149100	100.00

Table 3. Percentage composition of mosquitoes for each collecting method at 7 villages*, 1965.

Species \ Method	Dry ice trap	Cow-shed	Pig-shed	Henhouse	Dwelling house
An. sinensis	4.63	10.68	12.66	2.96	3.08
Ae. vexans nipponii	8.37	3.18	1.05	0.49	0.00
Ar. subalbatus	4.35	5.29	3.33	1.58	24.62
C. pipiens pallens	0.21	0.38	1.88	15.08	61.54
C. tritaeniorhynchus	67.15	68.32	59.77	48.13	4.62
C. vishnui	14.73	12.06	21.02	31.34	1.54
Others	0.56	0.08	0.29	0.42	4.62
No. (%) mosqs. of all species	64947 (100.00)	22173 (100.00)	13946 (100.00)	3038 (100.00)	65 (100.00)

* Tomachi, Minamiyamate, Kawabira, Tategami, Hongochi, Mogi, and Kaizu.

number of *Ae. vexans nipponii* were collected, as a considerably large number of collections were made by using dry ice which was extremely attractive to this mosquitoes. *C. vishnui* and *An. sinensis* were abundant, since they were attracted very well by cows, pigs, and CO_2 and mosquito collections were much frequently made in cow-sheds and pig-sheds and by dry ice traps. It can be said that *C. tritaeniorhynchus* is an extremely abundant species, even under the consideration of the method and number of mosquito collections.

Host preference of mosquitoes

With each of six dominant mosquito species, the percentage composition to the total number of mosquitoes obtained by each collection method is given in Table 3, showing the difference in host preference among different species. It is seen from the table that *C. tritaeniorhynchus* is strongly zoophilic, strongly attracted to CO_2 gas, fairly ornithophilic, while much less androphilic; *C. vishnui* appears strongly ornithophilic and fairly zoophilic and attracted to CO_2; *Ae. vexans nipponii* is strongly attracted to CO_2 and somewhat zoophilic; *An. sinensis* is rather zoophilic; *Ar. subalbatus* seems roughly equal in the preference (the high percentage for dwelling houses is due to the fact that collections were made at houses having large breeding places of this species).

Seasonal histories of mosquitoes

Here, emphasis is put on the seasonal history of *C. tritaeniorhynchus*, since it is the main vector of Japanese Encephalitis. Data shown are obtained mostly at the three villages of Mogi, Tomachi, and Kawabira, where mosquito collections were made at a regular interval of one week from mid-March to late December in 1965.

Table 4 gives the earliest dates on which overwintered females and newly emerged males of *C. tritaeniorhynchus* were collected

Table 4. Earliest dates on which overwintered females and newly emerged males of *Culex tritaeniorhynchus* were collected, 1965.

Village	Mogi	Tomachi	Kawabira
FEMALES			
by dry ice traps	Mar. 31	Apr. 2	Apr. 7
at cow-sheds	Apr. 12	Apr. 9	Apr. 14
at pig-sheds	Apr. 12	Apr. 9	Apr. 28
MALES			
by light traps	May 18	May 15	May 21
in swarms	May 24	May 15	May 21

at three villages by various methods. The earliest dates for the females were March 31 by dry ice traps and April 9 at animal-sheds, and for the males May 15.

Just engorged females of *C. tritaeniorhynchus*, which were firstly collected at animal-sheds in 1965 (see Table 4), were reared at room temperatures in our laboratory. The earliest case of producing new adults from them is given in Table 5, which shows

Table 5. Earliest case of producing new adults from just engorged females of *Culex tritaeniorhynchus*, which were firstly collected at animal-sheds in 1965 (cf. Table 4). Rearing was made at room temperatures in our laboratory.

Engorged females collected	April 9
Oviposited	April 18
Hatched	April 20
Pupated	April 30
Emerged	May 3

that the first adults of the new generation emerged on May 3. It can be presumed that new adults did not appear in 1965 before May 3 in the field, because the room temperatuers, under which rearing was made, were higher by approximately 5°c than those in the outsids.

For referenc e,the earliest dates of males of *C. tritaeniorhynchus* having been collected by light traps in 1960 and 1961 at four places near Nagasaki City are given in Table 6, which shows the emergence of males of a new generation was from early or middle May.

Table 6. Earliest dates of males of *Cul x tritaeniorhynchus* having been collected by light traps in 1960 and 1961 at four places near Nagasaki City.

Ward	Year	Date
Mikawa	1960 1961	May 19 May 13
Takao	1960 1961	May 5 May 13
Sakamoto	1960 1961	May 26 May 13
Kozen	1960	July 21

From the results shown in Tables 4, 5, and 6 it would be concluded that over-wintered females of *C. tritaeniorhynchus* begin to appear about in late March or early April and new adults originated from them begin to emerge about in early or middle May, though the dates may change to some extent by year according to the temperatures on those days.

Table 7 gives the rearing record of 21 just engorged females of *C. tritaeniorhynchus* collected in a cow-shed at Hotachime on April 16 in 1965, which is 7 days after the earliest date of overwintered females having been collected in animal-sheds (see Table 4). Each female was separately reared in a small cage with 1% sugar solution at room temperatures in our laboratory. The first oviposition was observed on April 24 and the last one on May 17; the number of ovipositions ranged from zero to 4, its mean being about 1.5; the females with the longest life span died on May 22. These facts indicate that some overwintered females could feed and oviposit three or more times, ane could survive beyond the time of the emergence of new adults in the field.

Table 8 gives the record of hatching of the egg-masses deposited by the hibernated females of *C. tritaeniorhynchus* shown in Table 7. The number of eggs in an egg-mass ranged from 47 to 193, and seemed to decrease with repeated ovipositions in the same female. The percentage of hatching ranged from 38.3 to 100.0 and no egg-masses were found entirely infertile, indicating that the females of this species had been fertilized before entering into hibernation.

The seasonal prevalences of female *C. tritaeniorhynchus* collected by dry ice traps, in cow-sheds, pig-sheds, and henhouses in 1965 at each of the three farm villages of Tomachi, Mogi, and Kawabira are given in the below. Collections by dry ice traps were made each for one hour after about sunset by one person at the site near paddy-fields. The number of traps used each day at each village was usually one, though at times two to four. Since a trap was set not always at the same site even in the same village, the sampling error due to the difference in the setting site was sometimes imported as mentioned later, because catches by dry ice traps varied greatly with their setting sites. On the other hand, in the cases of catches in the animal-sheds, collections were usually repeated in the same sheds each by one person for twenty minutes from one hour after sunset. Domestic animals in the villages were commonly cows, pigs, and hens, but pigs at Mogi and hens at Tomachi and Kawabira were more numerous respectively than at the other villages.

Then natural features of the villages were different with each other: Tomachi was located on a small basin with many small valleys providing presumably suitable places for the overwintering of female *C. tritaeniorhynchus*; Kawabira was along a long and rather steep valley; while Mogi was intermediate in the situation.

At Kawabira village, because of the scanty of paddy-fields and accordingly of the breeding number of the mosquito species, the population density was much lower than at the other two villages throughout the year as will be seen in Figs. 1 to 4. Accordingly the discussion on the seasonal prevalence was made only with the results obtained at Tomachi and Mogi villages.

The seasonal prevalences of *C. tritaeniorhynchus* by dry ice traps are shown in Fig. 1. Lower population densities at Tomachi from mid-June to Mid-July and at Mogi from late June to early July, and much higher ones in late July at Mogi were due to the temporal changes in the setting sites of traps, and these should be considered to be sampling errors as mentioned earlier. Under this consideration, the seasonal prevalences by dry ice traps were compared among the villages. At Tomachi, a much greater number of overwintered females were collected in late March through the end of April than at Mogi, but thereafter the prevalences were rather similar in the two villages. The general trend of the prevalence is summarized as follows: The overwintered females begin to appear in late March or early April, making very high peak in some place in late April;

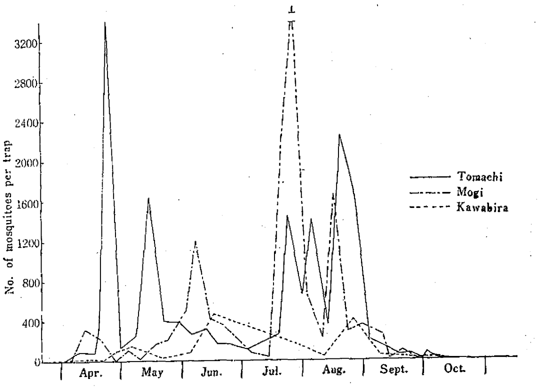

Fig. 1. Seasonal prevalence of female *Culex tritaeniorhynchus* collected in cow-sheds at three villages, 1965.

Table 7. Rearing record of 21 just engorged females of *Culex tritaeniorhynchus* collected in a cow-shed at Hotachime on April 16, 1965. Each female was separately reared in a small cage with 1 % sugar solution at room temperatures in our laboratory.

△ : oviposited; ○ : fed on a human hand; × : did not feed; ■ : died.

♀ No.	April														May																						No. of ovipositions
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1										△○									△○					△×	○			■									3
2														△○							△×	×	×	×	○					△○				■			3
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21										△×	×	×	×	×	×	×	×	×	×	×	×	×		×	×	×	■										1
No. of ovipositions	0	0	0	0	0	0	0	3	3	3	0	1	1	3	0	0	1	1	3	1	1	0	0	1	2	2	0	1	0	1	2	0	0	0	0	0	30

Table 8. Record of hatching of the egg-masses deposited by overwintered *Culex tritaeniorhynchus* shown in Table 7.

Egg-mass No.	Female No. *	Date of oviposition	No. eggs in an egg-mass	Date of Hatching	No. larvae hatched	% hatching
1	5	Apr. 24	102	Apr. 26	87	85.3
2	17	〃	113	〃	110	97.3
3	19	〃	113	〃	66	58.4
4	7	Apr. 25	85	Apr. 27	35	41.2
5	13	〃	122	〃	90	73.8
6	15	〃	122	〃	118	96.7
7	1	Apr. 26	185	Apr. 28	182	98.4
8	18	〃	179	〃	154	86.0
9	21	〃	99	Apr. 27	96	96.9
10	4	Apr. 28	105	Apr. 30	73	69.5
11	19	Apr. 29	128	May 1	122	95.3
12	2	Apr. 30	143	May 2	131	91.6
13	5	〃	80	〃	72	90.0
14	6	〃	60	〃	36	60.0
15	18	May 3	121	May 6	120	99.2
16	19	May 4	128	May 7	125	97.7
17	1	May 5	193	〃	191	99.0
18	5	〃	91	〃	91	100.0
19	15	〃	126	〃	122	96.8
20	20	May 6	70	May 8	68	97.1
21	2	May 7	105	May 9	102	97.1
22	1	May 10	145	May 12	145	100.0
23	19	May 11	82	May 13	82	100.0
24	20	〃	76	〃	75	98.8
25	4	May 12	58	May 14	52	89.7
26	15	〃	109	〃	108	99.1
27	12	May 14	107	May 17	72	67.3
28	2	May 16	89	May 18	79	88.8
29	14	May 17	47	May 19	18	38.3
30	15	〃	65	〃	62	95.4
Total			3248		2884	88.8

* See Table 7.

the adults originated from them make a rather low peak in from mid-May to early June; The number of adults thereafter decreases slightly until the maximum period from late July to late August; while the number abruptly decreases in early September and only a very small number of them are collected till early October.

Fig. 2 shows the seasonal prevalences in cow-sheds. The general features of the prevalences at Tomachi and Mogi were similar to those by dry ice traps, excepting relatively higher population densities in May and June than by the dry ice traps. The seasonal prevalences in pig-sheds are given in Fig. 3, which were again rather similar in the trend to those by dry ice

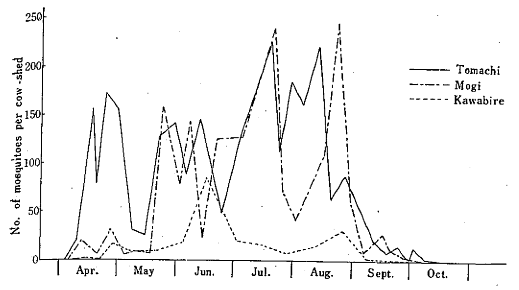

Fig. 2. Seasonal prevalence of female *Culex tritaeniorhynchus* collected in cow-sheds at three villages, 1965.

traps, showing, however, relatively rather higher activity in July and August.

The seasonal prevalence in henhouses was, however, very much different from those obtained by other collection methods as shown in Fig. 4. At Tomachi the maximum number of mosquitoes collected was observed in late April, while, thereafter the number decreased, fluctuating roughly periodically and disappearing in early October, without forming any marked rises during a period covering July and August.

The facts that the number of mosquitoes collected was relatively greater during

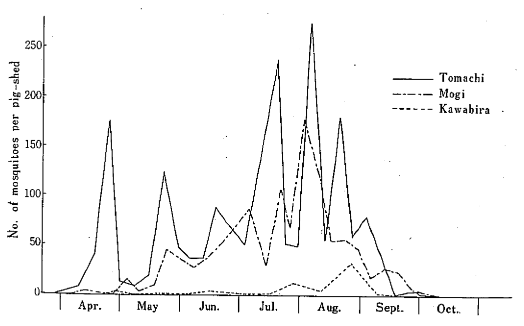

Fig. 3. Seasonal prevalence of female *Culex tritaeniorhynchus* collected in pig-sheds at three villages, 1965.

from late May to June in cow-sheds, and the number was rather so during July and August in pig-sheds, while the number was

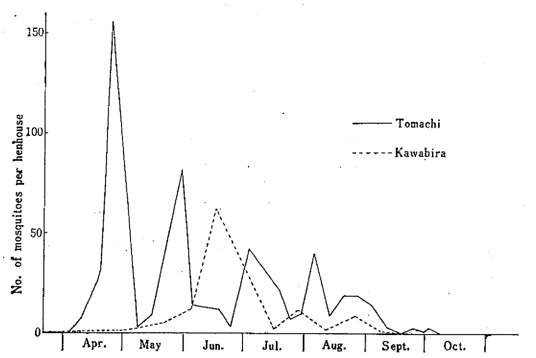

Fig. 4. Seasonal prevalence of female *Culex tritaeniorhynchus* collected in henhouses at two villages, 1965.

larger at earlier parts of the active season in henhouses seemed to suggest that the host preference of the mosquito may change by season. It is of course needed further studies to make the situation more clear, especially in relation to the time of the infection with JEV in those host animals.

The notable fact that a greater number of overwintered females were collected at Tomachi than at Mogi is not very clear at present, but may be due to the topography of the former village being more complicated, having many small valleys around the village and probably providing many places suitable and of safety for the overwintering of the females than that of the latter where it is rather simple.

The marked rise and fall in the number of the females collected by various methods throughout the collecting periods may have some relation to the succession of generations in the breeding of the mosquito, but more detailed observations are needed for drawing a conclusion, as the peaks are not always in accord with each other in the different collecting methods even in the same village.

The sudden fall in the number of female

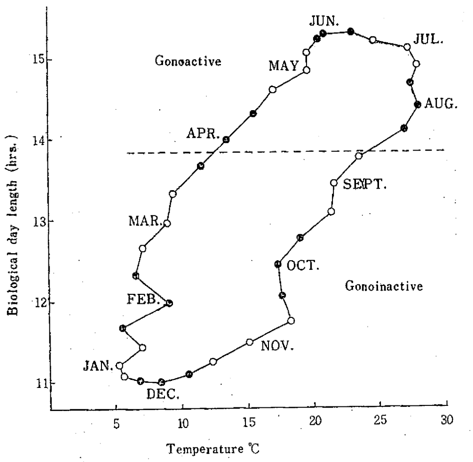

Fig. 5. Seasonal changes of mean temperature and biological day length at Nagasaki City, 1965, together with a supposed line differentiating gonoactive and gonoinactive conditions for female *Culex tritaeniorhynchus*.

C. tritaeniorhynchus in early September seemed to indicate that most females entered hibernation around this time, when the mean temperature was still as high as 24°C. On the other hand, in April, when the mean temperatures were 15°C or lower, the overwintered females became active in feeding and oviposited after taking blood meal as mentioned earlier. The females are considered gonoactive during the period from April to early September. Here, the seasonal changes of the mean temperature and the biological day length (one Lux and above in illumination) at Nagasaki City is illustrated in Fig. 5.

It is apparent from the figure that the difference is remarkable between the temperatures in April and early Septmber, but the biological day langths are nearly the same in the two seasons, being approximately 14 hours (indicated by a horizontal line in the figure). This shows that at least within a certain range of temperatures the day length is a controlliug factor in determining the gonoactivity in female *C. tritaeniorhynchus.*

Although *C. tritaeniorhynchus* is the main vector of Japanese Encephalitis, the other four dominant mosquito species in Nagasaki area, *An. sinensis*, *C. vishnui*, *Ae. vexans nipponii*, and *Ar. subalbatus*, have been known to be infected experimentally and the latter three species were proved by us to be

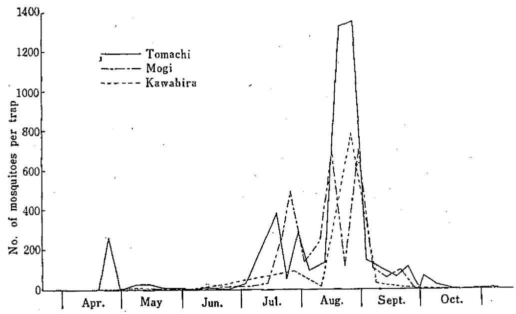

Fig. 6. Seasonal prevalence of *Culex vishnui* collected by dry ice traps at three villages, 1965.

infected naturally and therefore, the seasonal prevalences of these mosquitoes by dry ice traps will be briefly mentioned as under. As shown in Fig. 6, *C. vishnui* is a species which is apparently very later in breediug than *C. tritaeniorhynchus*: The number is extremely fewer until early July, and the maximum period is seen in middle and late August, but the number decreases abruptly in early September in the same way as in the latter species. The seasonal prevalence of *An. sinensis* is rather similar

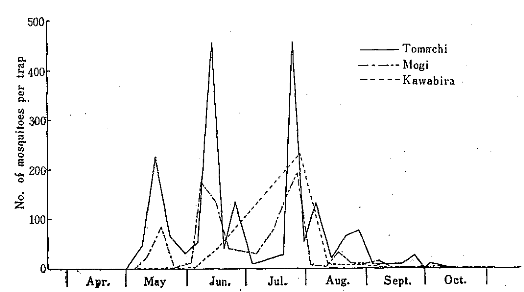

Fig. 7. Seasonal prealence of *Aedes vexans nipponii* collected by dry ice traps at three villages, 1965.

to that of *C. tritaeniorhynchus* as shown in Fig. 9 but the overwintered females appear much earlier in spring, having a peak in early or middle April. Thereafter the numbers are very small up to early July.

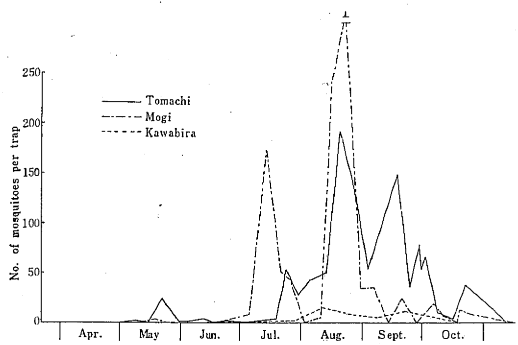

Fig. 8. Seasonal prevalence of *Armigeres subalbatus* collected by dry ice traps at three villages, 1965.

In late July the numbers suddenly increase, decreasing gradually towards as late as early November. *Ae. vexans nipponii*, the seasonal prevalence of which is given in Fig. 7, begins to appear in early May, is active during from mid-May through early August, fluctuating markedly in number, and disappears in late October. This species seems to overwinter as eggs presumably from late August. The seasonal prevalence of *Ar. subalbatus* is shown in Fig. 8. This mosquito is observed to take blood meal from May but the number is not large until July. The number is very large in August and September decreasing gradually towards early November.

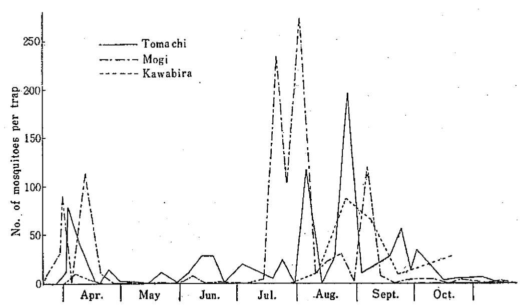

Fig. 9. Seasonal prevalence of *Anopheles sinensis* collected by dry ice traps at three villages, 1965.

Summary

Mosquitoes were collected in cow-sheds, pig-sheds, goat-sheds, henhouses, and dwelling houses, and by using dry ice traps and human-baited traps at 19 villages in Nagasaki area at a regular or irregular interval from early spring to early winter in 1965. Some rearing experiments with collected mosquitoes were also conducted in the laboratory. The results obtained are summarized as follows:

1) 149,100 mosquitoes belonging to 18 species were collected in total. The most abundant mosquito is *Culex tritaeniorhynchus*, which forms 72.85% of all. Other dominant species are *C. vishnui*, *Anopheles sinensis*, *Aedes vexans nipponii*, *Armigeres subalbatus*, and *C. pipiens pallens* in the order of abandance. The scarcity of *C. pipiens pallens* is perhaps due to the less frequent collections in dwelling houses and henhouses.

2) Host preferences of mosquitoes were studied by comparing the percentage compositions of each species to the total number by respective collection methods. It was found that *C. tritaeniorhynchus* is strongly zoophilic and probably in a lesser extent ornithophilic, *C. vishnui* ornithophilic and also zoophilic, *An. sinensis* and *Ae. vexans nipponii* zoophilic, and *C. pipiens pallens* androphilic and also ornithophilic.

3) The overwintered females of *C. tritaeniorhynchus* begin to appear in late March or early April and are most active in late April; newly emerged females in the first

generation appear in middle or late May; the population density thereafter is nearly unchanged or decreases slightly until the maximum period in number from middle July to late August; the number decreases abruptly in early September and only a small number of mosquitoes are collected up to early October.

4) The sudden decrease in number of female *C. tritaeniorhynchus* in early September seems to indicate that most females begin to enter hibernation around this time. Day length is considered to be a controlling factor in determining the gonoactivity in the female rather than temperature at least under a certain condition.

5) *C. vishnui* is abundant in mid-July to late August, *An. sinensis* in early and middle April and in late July to mid-September, *Ae. vexans nipponii* in mid-May to early August, and *Ar. subalbatus* in July to September.

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日本脳炎伝搬蚊，特にコガタアカイエカの生態．Ⅰ.1965年の成績．和田義人，河合潜二，伊藤寿美代，小田力，西垣定治郎，大森南三郎，長崎大学医学部医動物学教室・長崎大学風土病研究所衛生動物学部（主任：大森南三郎教授），林薫，三船求真人，七条明久，長崎大学風土病研究所病理学部（主任：福見秀雄教授）

摘　　要

牛舎，豚舎，山羊舎，鶏舎，人家において，及びドライアイストラップ，二重蚊帖を用いて，長崎地方の19部落で，1965年の早春から初冬まで，定期的又は不定期的に蚊の採集を行なった．また，蚊の飼育実験をも研究室で実施した．得られた結果は次の通りである．

1）合計して，18種149,100個体の蚊が採集された．最も多い種はコガタアカイエカであり，全体の72.85%を占めている．次いで，シロハシイエカ，シナハマダラカ，オオクロヤブカ，アカイエカがこの順に多く，他の種類は極めて少ない．ここで，アカイエカが余り多くないのは，人家や鶏舎での採集回数が少なかったことによると思われる．

2）各々の種類の全採集蚊数に対する百分率組成を，採集方法別に算出，比較して，吸血嗜好性を吟味した．その結果，コガタアカイエカは大動物及び鳥類を，シロハシイエカは鳥類及び大動物を，シナハマダラカとキンイロヤブカは大動物を，アカイエカは人類及び鳥類を好むことがわかった．

3）コガタアカイエカの越冬雌成虫は，3月下旬又は4月上旬に出現し始め，4月下旬にその活動の山がある．新生第一世代の成虫は5月中，下旬に出現する．その後個体数は殆んど変らないか幾分減少して，7月下旬乃至8月下旬の最盛期を迎える．9月上旬になると個体数は激減して，その後10月上旬まで極く少数の雌成虫が採集されるのみとなる．

4）コガタアカイエカ雌成虫の個体数が9月上旬に激減することから，大多数の雌成虫がこの頃から越年に入るものと思われる．本種雌成虫の生殖活動性を決定する要因としては，温度よりもむしろ日長時間が少なく共ある条件下では重要と考えられる．

5）シロハシイエカは7月中旬～9月上旬に，シナハマダラカは4月上・中旬及び7月下旬～9月中旬に，キンイロヤブカは5月中旬～8月上旬に，オオクロヤブカは7月～9月に，盛に活動する．