

Ecology of Japanese Encephalitis Virus Infections in Chiangmai
Valley: Vector Studies

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OBJECTIVE: To investigate the ecology of vectors of Japanese encephalitis virus (JEV) in the Chiangmai Valley, Northern Thailand, with particular emphasis on their dispersal, host preferences and population dynamics.

DESCRIPTION: In studies described in previous Annual Reports, JEV was isolated from 3 *Culex* species—*C. fuscocephala*, *C. gelidus* and *C. tritaeniorhynchus*—in the Chiangmai Valley, and all 3 species are believed to be acting as JEV vectors in that area. During 1972 studies were undertaken in a village in Saraphi district to determine the pattern of dispersal of vector mosquitoes following the taking of a blood meal. The village selected for these studies was surrounded by rice fields and separated from neighbouring villages by distances of 1–2 Km. On 3 successive nights in July and again in August freshly engorged mosquitoes were collected, counted, marked with a fluorescent dust and released from a central point. Beginning on the second night after release CDC light traps were operated for 7 consecutive nights within the study village and across rice fields in neighbouring villages. All mosquitoes collected in these traps were examined under a longwave ultraviolet lamp for marked specimens.

To determine if the density of vector mosquitoes varies according to the distance from blood meal sources, CDC light traps were operated at intervals across an open rice field from a village in Mae Rim district. Five collection sites were selected; the first trap was located within the village near livestock and the other four at increasingly greater distances from the village across 1700 meter wide rice fields. The last collection site was more than half the distance across the rice fields to another village. Studies were also made to determine if the JEV vector species demonstrate seasonal differences in host preferences. Three Magoon traps were baited on successive nights each week with a buffalo, cow or pig. These animals were rotated from trap to trap to eliminate differences due to trap location.

PROGRESS: In July 1972 an estimated 12,723 *C. fuscocephala*, 444 *C. gelidus* and 21,380 *C. tritaeniorhynchus* were marked and released in Saraphi district. In CDC trap collections made following their release 27 *C. fuscocephala* (0.21%) and 40 *C. tritaeniorhynchus* (0.18%) were recaptured. Both species apparently dispersed in a random fashion and marked specimens were recaptured at distances up to 1400 meters from the release point (Figure 1). For unknown reasons the majority of marked mosquitoes were recaptured at one site 1100 meters west of the release point. In August an estimated 6,078 *C. fuscocephala*, 481 *C. gelidus* and 10,718 *C. tritaeniorhynchus* were marked and released from the same village site. Light traps were operated for the same period and at the same sites as in the first experiment. A total of 15 *C. fuscocephala* (0.24%), 1 *C. gelidus* (0.20%) and 2 *C. tritaeniorhynchus* (0.02%) were recaptured in this experiment. The dispersal pattern was similar to that observed in the first experiment (Figure 2). However, 1 *C. tritaeniorhynchus* was recaptured at a point 1800 meters from the release point, which was the maximum distance at which light traps were located from the release point. No correlation between the pattern of dispersal of vector mosquitoes with either wind direction or velocity was observed during these experiments. The flight ranges of these mosquitoes would allow for rapid dissemination of JEV from village to village in the Chiangmai Valley.

The results of CDC trap collections made at varying distances across rice fields from a village in Mae Rim district are summarized in the Table 1. Statistically significant differences were observed between numbers of mosquitoes collected in the village and in the rice fields. These differences appear to be directly correlated with the distance of trap locations from the nearest village.

From September 1972 to February 1973 larger numbers of *Culex fuscocephala*, *C. gelidus* and *C. tritaeniorhynchus* were collected from Magoon traps baited with a buffalo than from the traps baited with either a cow or pig. Lowest numbers were collected in December and January with populations beginning to increase in February. The numbers of mosquitoes in cow-baited traps fluctuated in the same general pattern as those in the buffalo-baited traps. Consistently fewer mosquitoes were collected in pig-baited traps than when either a buffalo or cow was used, however, some specimens of each of the 3 species were collected each month in the traps baited with the pig.

Table 1. Summary of mosquito collections in CDC traps set in a rice field at various distances between two villages—Chiangmai, Thailand, 1972–73.

Location	TN=147		TN=70		TN=70		TN=70		TN=70	
	In first village near animals		175 m from first village		477 m from first village		741 m from first village		663 m from second village*	
Species \ Sex	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
<i>C. fuscocephala</i>	698	55550	8	115	52	36	0	3	0	14
<i>C. gelidus</i>	32	3100	3	19	1	3	0	2	0	0
<i>C. tritaeniorhynchus</i>	493	86897	4	245	18	68	0	9	1	26
Vector Species/ Trap Night	8.3	990.1	0.2	5.2	1.0	1.5	0.0	0.2	0.01	0.6

* = 1037 meters from 1st village.

TN = Number of Trap Nights

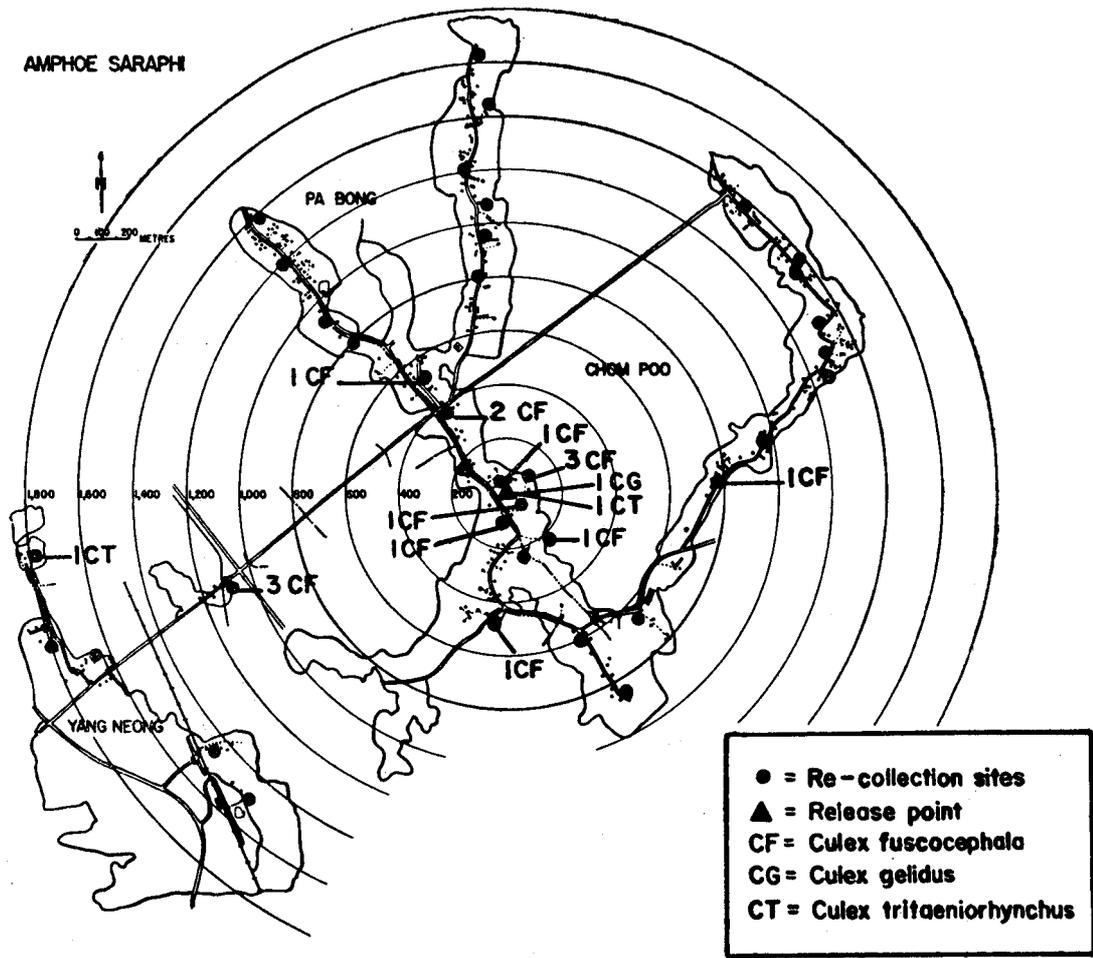


Figure 2 Map showing location of sites at which marked *C. fuscocephala*, *C. gelidus* and *C. tritaeniorhynchus* were recaptured—August 1972.