6. Title: Bang Phra Mosquito Study

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DESCRIPTION

Studies on the natural history of arboviruses in the Bang Phra area continued during the 1968–69 season in collaboration with the departments of Epidemiology and Virology. In the past, emphasis has been upon the ecology of Japanese encephalitis (JE) virus in the vicinity of the Horse Farm operated by the Queen Saovapha Institute at Bang Phra in Chon Buri province, southeastern Thailand. In recent years the isolation of other arboviruses, including Batai, Sindbis, Tembusu and Wesselsbron viruses, from mosquitoes at Bang Phra has directed attention towards the ecology of these other agents. During this report period collections of adult mosquitoes were made at weekly or more frequent intervals 1) with New Jersey light traps modified to capture live specimens, 2) while biting horses and humans, and 3) in bait traps containing a variety of small vertebrates and/or CO_2 (dry ice).

RESULTS

Light trap collections were made principally to measure the seasonal abundance of Aedes mosquitoes, such as A. lineatopennis and A. mediolineatus which yielded isolations of Wesselsbron virus, and A. vexans from which Batai virus was isolated, during the 1968–69 season (Table 13). Results of biting collections made from horses and humans, inside and outside stables, are summarized in Tables 14–17 for this period. Except for C. quinquefasciatus, which was not collected from horses, the species attacking both of these hosts are almost identical. The culicine mosquitoes collected with greatest frequency in bait traps during parts of 1968 and 1969 are listed in Tables 18 and 19. The composition of the fauna from these bait traps differs markedly from that attracted to horses in that certain species, such as Culex annulus, C. pseudovishnui and C. quinquefasciatus are obviously more attracted to birds than to large mammals. On the other hand, Culex gelidus and C. tritaeniorhynchus, which prefer large mammals, were found in small numbers in these bait traps. Culex sitiens, which was collected from both horses and humans in small numbers, was attracted to both the bird and rodent–baited traps in large numbers. No mosquitoes were collected from traps baited with the lizard, Calotes versicolor, although with CO_2 added as an additional attractant, mosquitoes entered the traps (Table 19). Further evidence for the host predilections of some of the mosquitoes as Bang Phra was obtained from agar–gel diffusion tests on the gut contents of engorged females collected by a variety of methods (Table 20). Some species, such as C. quinquefasciatus, are obviously not attracted to large mammals, but do feed on humans and birds, while others, such as C. gelidus, C. tritaeniorhynchus and A. vexans, feed predominantly on large animals. Confirmation that some engorged mosquitoes collected in baittraps actually fed on the bait animals is presented in Table 21.

A total of 86, 672 mosquitoes collected during 1968–69 season by the above methods were tested for presence of viral agents by the Department of Virology. Two strains of Tembusu virus were isolated from mosquitoes from bait traps–one from Culex annulus from a trap containing chickens and CO_2

and the second from a pool of C. sitiens from a trap baited with sparrows (Passer flaveolus) and CO_2. One isolation of Sindbis virus was obtained from a pool of Culex pseudovishnui collected from a trap baited with Passer flaveolus and CO_2. Further details on these isolates are given in the SEATO Study on Arboviruses elsewhere in this report.

Table 13. Female Aedes mosquitoes collected per night (1800—0600) by light trap at Bang Phra. 1968—69.

Mosquito species	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Aedes lineatopennis	1	2	1	4	<1	0	1	<1
Aedes mediolineatus	55	40	39	111	9	<1	1	0
Aedes vexans	41	93	32	79	2	0	6	3
Aedes vigilax	1	1	<1	4	0	0	5	1

Table 14. Culicine mosquitoes collected per hour biting horses inside stables at Bang Phra 1968—69.

Species	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Aedes mediolineatus	3	1	2	2	<1	0	<1	<1
Aedes vexans	7	9	6	3	<1	<1	1	3
Culex fuscocephalus	1	1	1	1	2	<1	3	1
Culex gelidus	68	72	36	23	39	24	24	24
Culex sitiens	1	1	<1	1	<1	<1	5	4
Culex tritaeniorhynchus	8	3	3	2	1	0	1	1
Mansonia uniformis	15	17	8	6	9	1	14	10

Table 15. Culicine mosquitoes collected per hour biting horses outside stables at Bang Phra, 1968–69

Species	Apr	Nov	Dec	Jan	Feb
Aedes vexans	10	0	<1	3	1
Armigeres subalbatus	3	0	<1	<1	0
Culex gelidus	36	7	13	8	28
Culex sitiens	5	<1	<1	4	2
Culex tritaeniorhynchus	2	<1	<1	1	<1
Mansonia uniformis	17	1	<1	8	7

Table 16. Culicine mosquitoes collected per hour biting man inside stables at Bang Phra, 1968–69.

Species	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Aedes vexans	2	<1	1	1	<1	0	<1	2
Culex fuscocephalus	2	1	<1	<1	<1	0	1	1
Culex gelidus	20	12	6	3	12	12	16	17
Culex quinquefasciatus	10	1	1	1	<1	<1	1	<1
Culex sitiens	1	<1	1	1	<1	1	3	9
Culex tritaeniorhynchus	1	1	1	1	1	<1	2	1
Mansonia uniformis	4	2	3	2	1	<1	5	2

Table 17. Culicine mosquitoes collected per hour biting man outside stables at Bang Phra, 1968 – 69.

Species	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Culex gelidus	<1	<1	<1	<1	1	2	2	4
Culex quinquefasciatus	10	1	1	0	<1	<1	1	<1
Culex sitiens	1	1	1	1	<1	<1	4	9
Mansonia crassipes	0	<1	<1	<1	<1	0	<1	2
Mansonia uniformis	1	1	1	1	<1	<1	1	2

Table 18. Female culicine mosquitoes collected per trap—night (1800—0600) by bait traps at Bang Phra, Aug 68 – Feb 69.

Species	Rattus rattus	R. rattus+CO_2	Rattus exulans	R. exulans+CO_2	Rattus norvegicus	R. norvegicus+CO_2	Bandicota indica	B. indica+CO_2	Chicken	Chicken+CO_2	CO_2 alone
Culex annulus	0	1	<1	1	0	2	<1	2	<1	5	<1
Celex gelidus	<1	3	<1	2	<1	5	<1	3	<1	13	3
Culex pseudovishnui	<1	4	<1	3	<1	5	<1	7	<1	18	1
Culex quinquefasciatus	1	3	<1	2	1	2	2	5	10	58	2
Culex sitiens	1	18	<1	13	2	20	5	47	17	138	7
Culex tritaeniorhynchus	0	1	0	1	0	2	<1	1	<1	2	1
Mansonia crassipes	1	4	<1	3	1	4	2	7	4	20	2
Mansonia uniformis	0	1	>1	>1	<1	2	0	1	<1	4	<1

Table 19. Female culicine mosquitoes collected per trap–night (1800–0600) by bait traps at Bang Phra, Apr – May 68.

Species	Passer flaveolus	Passer flaveolus +CO_2	Pycnonotus goiavier	P. goiavier +CO_2	Calotes versicolor	C. versicolor +CO_2	Calotes mystaceus	C. mystaceus +CO_2	CO_2 alone
Armigeres subalbatus	0	2	0	<1	0	<1	0	<1	<1
Culex annulus	0	3	0	<1	0	1	0	1	1
Culex gelidus	0	8	0	2	0	1	0	1	1
Culex pseudovishnui	<1	38	0	2	0	10	0	3	7
Culex quinquefasciatus	19	169	1	33	0	79	<1	27	6
Culex sitiens	6	127	0	10	0	36	<1	23	9
Mansonia crassipes	1	4	<1	1	0	1	<1	1	<1

Table 20. Source of blood meals of mosquitoes collected at Bang Phra during 1968–69 as determined by agar–gel diffusion techniques.

Species	Positive reaction with antisera				
	Human+ Monkey	Cow+ Buffalo	Horse	Rat	Chicken
Aedes mediolineatus			30		
Aedes vexans		1	17		
Aedes vigilax	3		5		
Culex gelidus	11	5	244	1	
Culex pseudovishnui				2	
Culex quinquefasciatus	6				61
Culex sitiens	5	6	11	61	142
Culex tritaeniorhynchus			11		
Mansonia crassipes				8	14
Mansonia uniformis			78	2	

Table 21. Total number of confirmed feedings by mosquitoes captured in bait traps at Bang Phra during 1968 – 69 determined by agar - gel diffusion techniques.

Species	Bait				
	Bandicota indica+CO_2	Rattus rattus+CO_2	Rattus norvegicus +CO_2	Rattus exulans+CO_2	Chicken +CO_2
Aedeomyia catasticta	0	0	0	0	1
Culex gelidus	0	0	1	0	0
Culex pseudovishnui	1	1	0	0	0
Culex quinquefasciatus	0	0	0	0	61
Culex sitiens	37	11	11	2	142
Mansonia crassipes	4	3	1	0	14
Mansonia uniformis	1	1	0	0	0