

ANNUAL PROGRESS REPORT

SEATO Medic Study No. 8 Ecology of Arboviruses in Thailand.
Arbovirus Infection Rates in Residents of
Thailand.

Project No. 3A 025601 A 811 Military Medical Research Program
S.E. Asia

Task 01: Military Medical Research Program
S.E. Asia

Subtask 01: Military Medical Research Program
SEASIA (Thailand)

Reporting Installation: US Army-SEATO Medical Research Laboratory
APO 146, San Francisco, California
Division of Medical Research Laboratories
Department of Virology

Period Covered by Report: 1 April 1963 to 31 March 1964

Principal Investigator: Major Scott B. Halstead, MC

Associate Investigator: Dr. Suchinda Udomsakdi

Assistant Investigator: Miss Prabhasri Umpaivit

Reports Control Symbol: MEDDH-288

Security Classification: UNCLASSIFIED

ABSTRACT

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The objective of this study is to determine what arthropod borne viruses infect man, when and where. Specific infection rates are correlated with mosquito collection, climatologic and ecologic data and also correlated with specific disease attack rates. This study is planned to observe the rate and temporal distribution of specific arthropod borne viral infections in humans. During 1962 sera were collected at intervals from residents of 19 study areas in Bangkok. From 5 of these areas arthropods were also collected. In 1963, serum specimens were obtained every 3 months from school children living in Bangkok, Bang Pa-In (Central Plain), Pak Chong (western fringe of the Korat Plateau) and Bangphra-Sriracha (Southeast Thailand). Mosquito

collections were made throughout the year at each of these sites. Preliminary serological study of the 1962 Bangkok material has shown that the city is inhomogeneous with respect to dissemination of dengue and chikungunya viruses. Upper class living areas, characterized by sparse housing and screened houses were found to have very low virus transmission. Serologic study of 1963 specimens is awaiting isolation and characterization of viruses from collected arthropods.

BODY OF REPORT

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Objectives: To determine what arthropod borne viruses infect man, when and where. Specific infection rates are correlated with mosquito collection, climatologic and ecologic data and also correlated with specific disease attack rates.

Description: As time has permitted, this project has expanded to meet its objective as a study of arthropod-borne viruses infecting man. Initiated with an intensive area study of hemorrhagic fever in Bangkok, subsequently (1963) studies were enlarged to a town on the Central Plain and towns in Northeast and Southeast Thailand. In each instance the study format is similar. Residents are bled repeatedly as many times as will be permitted,

records are kept of illnesses in the studied group and in hospitals in studied communities and mosquitoes are captured and processed for virus.

Progress:

Bangkok Area Study

To study the dynamics of epidemic hemorrhagic fever, 19 Bangkok study sites were established for study of acquisition of antibody and case observation. Areas were randomly selected, each containing nearly 400 households (approximately 2000 persons), and representing most of the variation in urban habitat found in the city. Each house was numbered, a census of inhabitants taken and visits made every 4-6 weeks to obtain history of hemorrhagic fever among the inhabitants. Random selections of between 10-30% of households were bled before the HF outbreak and 35% of these persons were rebled at the end of the outbreak (over 2000 persons). Whenever possible a single convalescent blood specimen was obtained from patients with recent hemorrhagic fever. Hemorrhagic fever cases were traced to the source of diagnosis for confirmation, symptoms and physical findings.

Results based upon this study have been presented in part in SMRL 1. Currently, sera collected before and after the 1962 epidemic are being retested by HI and CF so that dengue and chikungunya virus infection rates as presented in this report must be regarded as preliminary.

During 1963 HF cases finding was continued in the 19 study areas. Of interest, it was observed that areas in Amphur Dusit with few cases in the widespread outbreak of 1962 had many more cases in the smaller outbreak of 1963. Areas in other parts of the city with large numbers of HF cases in 1962 had lower attack rates in preceding years suggests a "brush fire" epidemiology for hemorrhagic fever with disease moving to susceptible "patches".

Table 41 shows results of preliminary HI tests in several areas. HI antibody for dengue is measured at an initial dilution of 1:20 against dengue 1. Dengue infection rates are calculated from individuals who had no detectable HI antibody in the pre-season serum but detectable antibody in the post-season serum. It is recognized that these criteria do not distinguish primary antibody responses from antibody responses to secondary antigenic stimuli. However, the number of persons with rise in HI antibody must be proportional to total viral infections (dissemination of dengue virus) and this figure can be used as a base for comparing hemorrhagic fever cases observed. Note that low infection rates without cases of HF were observed in the upper class residential district (Area 18). Compound housing predominates in this area, most houses have screening and running water. The rate of past accumulation of antibody in this area is significantly lower than in other areas.

Table 42 shows a similar data for chikungunya HI antibody. Note that the age-antibody accumulation rate for chikungunya parallels dengue but is somewhat slower.

Bangkok, Bang-Pa-In, Pakchong and Sriracha Study

In collaboration with the Entomology Department (SMRL 42) and Dr. Skon Rohitayodhin (SMRL 41) of the Bangphra Red Cross Horse Farm regular collections of mosquitoes have been made in 4 location in Thailand: (1) Bangkok (2) Bang-Pa-In, located on the Central Plain approximately 30 kilometers north of Bangkok (3) Pakchong, located in the Petchabun Hills, 60 kilometers north - northeast of Bangkok. This area of monsoon forest is located on the border of Northeast Thailand, 40 kilometers west of Korat, and (4) Sriracha, a town located 60 kilometers Southeast of Bangkok on the coast of the Gulf of Siam. The surrounding terrain is hilly. Primary forest has recently been cut over and land planted in tapioca and peanuts. These 4 rather different habitats are being surveyed for arboviruses as a preliminary to future studies in Thailand. Serum samples were obtained from 400-500 school children in each area in April, August and December 1963. Specimens will be tested against viruses isolated, if any, and against other arboviruses recovered in previous work.

Summary and Conclusions: Preliminary serologic workup of pre- and post-hemorrhagic fever season bleeding from 2000 residents of Bangkok has shown that rates of accumulation of group B antibody and chikungunya antibody vary. Chikungunya infection occurs less frequently than combined group B experience. Over all group B seasonal infection rates in 1962 were as high as 33% in low class areas. An upper class residential district showed evidence of lower group B virus exposure in years previous to 1962 as well as low group B infection rate during the epidemic of 1962. Serologic studies are continuing. No further conclusions can be achieved until work is complete.

Table 41. Accumulation of dengue HI antibody with age; seasonal dengue virus infection rate and observed HF cases, in 6 selected study areas of Bangkok, 1962.

Area	Predominating ethnic and economic group	% Antibody in Jan. - Feb. 1962					Virus infection rate	No. HF cases
		0-4	5-9	10-14	15-19	20+		
3	Thai, middle class	22	59	78	92	90+	33%	7
5	Thai, lower class	39	61	70	85	95+	30%	11
7	Thai, lower class	41	61	69	86	94+	35%	17
18	Chinese-Thai, upper class	16	14	44	87	90+	10%	0
19	Chinese, lower class	35	50	-	-	-	20%	6
20	Thai, low-middle	23	62	86	86	90+	25%	2

Table 42. Accumulation of chikungunya HI antibody with age in 6 selected study areas of Bangkok, 1962.

Area	Predominating ethnic and economic group	% Antibody in Jan.-Feb. 1962 by age group				
		0-4	5-9	10-14	15-19	20+
3	Thai, middle class	14	31	46	67	75
5	Thai, lower class	14	32	54	61	74
7	Thai, lower class	16	46	61	75	81
18	Chinese-Thai, upper class	0	8	11	50	58
19	Chinese, lower class	5	20	-	-	-
20	Thai, low-middle class	16	40	68	80	86