

Ecology of Japanese Encephalitis Virus at Chiengmai

Principal Investigator : Joe T. Marshall, Ph.D.

Associate Investigators : Robert Edelman, LTC, MC
James E. Williams, CPT, MSC
Pairatana Gunakasem, M.D.
Douglas J. Gould, Ph.D.
Suchinda Udomsakdi, M.D.

Assistant Investigators : Vandee Nongnoork
Somchai Imlarp, B.S.
Roypim Tiptanatoranin, B.S.
Panor Srisongkram, B.S.
Aree Boriharnvanakett, B.S.
Somsak Imlarp
Nonglak Khananurak, B.S.
Chalam Chantrasri, B.S.

The purpose of this search for the natural cycle of JEV at Chiengmai is to find what animals constitute an interepidemic reservoir of the virus, whence it can erupt into the human population. Elsewhere in the world, many encephalogenic arboviruses are maintained by means of a natural cycle in mosquitoes and birds. Accordingly, the Ecology Section collected 1667 sera of small vertebrates, mostly the tree sparrow, in the Chiengmai study villages during this report year. The tree sparrow, Passer montanus, is the most abundant bird living in and about the houses, and it is the most prolific. Its long breeding season and consequently large proportion of immature individuals in the population should provide a suitable reservoir of individuals susceptible to JEV infection. Of the total of 1150 tree sparrow sera obtained, all with age ascertained, most were from birds that were banded and released. Paired and multiple bleedings (total 163) were obtained from 75 individuals that were recaptured over periods of as long as 9 months. Blood clots, livers and spleens were preserved for virus isolation in 295 specimens. Other vertebrate sera were obtained from bats (55), rodents (48), frogs (5) domestic nocturnal geckos, Hemidactylus frenatus (58), diurnal lizards, Calotes mystaceus (138), and other birds (213). Mosquito traps baited with live tree sparrows were placed in various habitats in order to attract vector mosquitoes.

This collection of blood and tissue specimens is now being tested, the sera by microplaque reduction neutralization test and tissues by the suckling mouse system for virus isolation. Results are incomplete. Some preliminary tests gave the following results: 69 sera of Passer, Calotes, Rattus and Bandicota lacked high HI titers for JEV; of 70 Passer sera tested with macro-PRNT at dilutions of 1:9 to 1:19, 4 gave more than 50% plaque reduction; of 855 Passer sera, none yielded viral isolates in suckling mice (sera was stored at -20°C with repeated thawings due to mechanical failure of the storage freezer, which prevents an unequivocally negative isolation report).

Results of the mosquito bait trap studies using the tree sparrow as bait indicate that the recognized JEV vectors do not come to the birds, even in places where mosquitoes are obtained in great numbers by sweep-vacuum and light-trap methods. No mosquitoes come to the birds placed high in trees; enormous numbers of Culex pipiens quinquefasciatus enter and engorge themselves when the traps are placed about buildings in the city of Chiengmai, but not at the study villages; engorged Culex tritaeniorhynchus are found in traps placed over standing water of rice paddies and marshes.

The three vectors of JEV in Chiengmai, Culex tritaeniorhynchus, C. gelidus, and C. fuscocephala, prefer the buffalo, pig, and cow for their blood meals. Human infection is presumably made possible by an enormous increase of the vector populations, thereby favoring the possibility of a "chance" bite of man. This same phenomenon may hold for a possible bird-mosquito-buffalo cycle, providing of course, that serologic tests now in progress indicate there indeed exists bird infections by JEV at Chiengmai.

Summary of Preserved Specimens Obtained from Small Vertebrates in Chiengmai.

	<u>Passer montanus</u>	Other birds	Bats	Rodents	Lizards	Frogs
1970 ¹						
April	24	0	5	23	109	5
May	18	28	49	25	22	
June	183	37	1		38	
July	75	36			27	
August	133	31				
September	123	27				
October	111	34				
November	188	9				
1971 ²						
January	135	5				
February	82	6				
March	78					
Totals	1150	213	55	48	196	5

1 Sera from each animal stored at -20°C.

2 Sera, blood clot, liver and spleen from each animal stored at -73°C.