the others described here: convalescence ensues more quickly and the case-fatality rate does not exceed 0.5-3%.

OHF is distributed throughout the forest steppe zone to the north of Omsk. Patients have usually been bitten by ticks. The ticks have a wide range of warm-blooded hosts that take part in dissemination of the virus.

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Vertebrate Hosts of Chikungunya Virus *

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Chikungunya may be an arthropod-borne virus with both a zoonotic and an urban cycle. *Aedes aegypti*, *Aedes africanus* and *Aades albopictus* have been established as biological vectors by repeated isolations from nature (by Singharaj et al.[1] and Weinbren et al.[2]) or by laboratory transmission studies (by Shah et al.[3]). Each of these species is predominantly anthropophilic and probably they account for transmission from man to man in urban and rural areas of South-East Asia and Africa. Neutralizing antibodies to chikungunya virus have been found in human sera examined in this laboratory from all areas of Thailand and from Rangoon (Burma), Saigon and the Mekong River delta (South Viet-Nam) and Vientiane (Laos). Chikungunya virus was not isolated during extensive prospective virological studies undertaken in Malaysia (Elisberg—personal communication). Tribal groups living 2000 feet (600 m) or more above sea level in Thailand, Laos, and South Viet-Nam have little evidence of chikungunya infection.

Evidence that chikungunya has a transmission cycle other than man-to-mosquito-to-man was first presented by Weinbren et al.,[2] who demonstrated viraemia in monkeys, and Osterrieth & Blones-Redaura,[4] who found antibodies in chimpanzee sera. Subsequently, McIntosh et al.[5] demonstrated the susceptibility of several other primate species, while wild birds (5 species), chickens, cattle, sheep, goats and horses did not become viraemic when inoculated subcutaneously. In Thailand, chikungunya may behave somewhat differently. Haemagglutination-inhibiting (HI) and neutralizing antibodies to chikungunya have been demonstrated in adult cattle, water buffalo, horses, pigs, dogs, monkeys, rabbits and bats. No antibodies were found in cats or four urban rodent species. The animals surveyed were from Bangkok or the surrounding alluvial plain of the Chao Phrya River. The species with the highest percentage of HI and neutralizing antibody were horse (37.5%), pig (34.8%) and water buffalo (22.5%). At present no other group A arboviruses have been demonstrated from areas of South-East Asia where chikungunya is known is known to be endemic.

One strain of chikungunya virus was recovered from a pool of 200 *Culex tritaeniorhynchus* captured in November 1962 at the Red Cross Horse Farm, Bangphra. This farm, 60 miles (100 km) south-east of Bangkok, stables approximately 120 horses and is located on moderately hilly terrain surrounded by tapioca plantations.

Whether and under what circumstances vertebrates in South-East Asia can function as hosts for transmission of chikungunya virus to mosquitos is not known.

* From the Virology Department, US Army–SEATO Medical Research Laboratory, and the Department of Microbiology, Faculty of Public Health, University of Medical Sciences, Bangkok, Thailand. Originally issued as document IR/Haem.Fever/Sem.1/WP/23.

[1] See page 67.

[2] Weinbren, M. P., Haddow, A. J. & Williams, M. C. (1958) *Trans. roy. Soc. trop. Med. Hyg.*, **52**, 253-258.

[3] Shah, K. V., Gilotra, S. K., Gibbs, C. J., Jr & Roseboom, L. E. (1964) *Indian J. med. Res.*, **52**, 703-709.

[4] Osterrieth, P. & Blones-Redaura, G. (1960) *Ann. Soc. belge Méd. trop.*, **40**, 199-203.

[5] McIntosh, B. M., Paterson, H. E., Donaldson, J. M. & DeSousa, J. (1963) *S. Afr. J. med. Sci.*, **28**, 45-52.

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