

Thesis Title Population Genetics of the Malaria Vector *Anopheles*
sundaicus in Thailand and Indonesia

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ABSTRACT

Cytogenetic and electrophoretic studies of the malaria vector *Anopheles sunndaicus* have been carried out from wild specimens collected from 9 geographical areas in Thailand and Indonesia. The standard photomap of ovarian nurse cell polytene chromosomes of *An. sunndaicus* is presented. In the present study, *An. sunndaicus s.l.* shows a typical anopheline karyotype with a diploid chromosome number of six, a pair of sex chromosomes and two pairs of autosomes.

Cytogenetic analyses of polytene chromosome banding patterns and differences in constitutive heterochromatin combined with electrophoretic data have led to the recognition of 3 sibling species within the *An. sunndaicus* complex provisionally designated forms A, B and C. Form A is the standard form having chromosomal variants of Xa, 2Ra and autosome 3 and mitotic chromosome Y₁. Forms A and B are different from each other in the polytene

X chromosome and mitotic Y chromosome. Polytene sex chromosome Xa and mitotic chromosome Y_1 are present in form A while form B is fixed for chromosomal variant Xb and has mitotic chromosome Y_2 . Form C differs from form A in having the variants of Xb, 2Rb, and differs from B in having the variants 2Rb and Y_1 .

Analysis of twelve enzyme systems comprising of 15 loci has shown the genetic variation and ecological and phylogenetic relationships between 9 populations of the *An. sundaicus* complex. Phylogenetic dendrograms produced by analysis using the Biosys-1 program based on UPGMA methods showed all populations of form A in one cluster which is closely related to form C cluster, while form B populations belongs to a distinct cluster from forms A and C.

These 3 cytological forms or possibly sibling species appear to have different geographical distributions and ecological habitats. Form A is widely distributed in Thailand and Indonesia, as a brackish water breeder, while form B has been found in sympatric association with form A in Purworejo, Central Java, South Tapanuli and Asahan, North Sumatra, and breeds in fresh water. However, form C has been found only in sympatric association with forms A and B at Asahan, North sumatra, and breeds in brackish water.

The present study indicates that the 3 cytological forms of the *An. sundaicus* complex prefer to feed on human as well as on animal blood (anthropozophilic) in the areas studied. Therefore, the zoophylaxis control method would most likely be effective in reducing mosquito to contact with man and consequently control malaria transmission. From ELISA tests, there is a clear indication that forms A and B are potential malaria vectors in the studied areas.