zygotes 0, 1, 2, 3, 4, 5, etc. in accordance with the level of biochemical heterozygosity, the numerals referring to the numbers of loci in the heterozygous condition in each individual. Since individuals heterozygous for 5 or more loci were not encountered in our sample, we confined ourselves to 4 blood-group loci. The frequency of heterozygotes for these 4 loci were higher than for the remaining 3 enzymatic loci.

Individuals were divided by morphological characters into 3 categories, namely, modal category M (= average ± 0.67 S.D.) extreme category 1 (E_1‹M) and extreme category 2 (E_2›M). The frequencies of E_1, M and E_2 individuals were calculated in each heterozygous group. The main statistical parameters (mean, coefficient of variation and kurtosis) of morphological trait distributions in each heterozygous group were also calculated. Coefficient of variation and kurtosis were also calculated for the frequency distribution of E_1, M and E_2 individuals in each heterozygous group. Of the studied 48 morphological characters, 17 showed trend differences in various heterozygous groups. In the present paper we concentrate on the 5 traits Stature(S), Bi-Trochanteric diameter (T), Mesosternal Chest Circumference (M), Digit length of 2 (D) and Palm length (P) which were separated by principal component alalysis as independent variables.

The frequencies of E_1, M and E_2 individuals in 5 heterozygous groups for morphometric traits are given in figure 1. It is evident that for all the evaluated traits, maximal frequency of M individuals was in tetraheterozygotes and minimal – in completely homozygous group. Differences between the 5 heterozygous groups, however, were not significant (table 1). As for the 2 extreme groups 0 and 4 there was a significant difference only for P, but combined probability of significance[16] for the 5 independent t-tests was ‹0.01. Moreover, coefficients of correlation between the level of heterozygosity and the frequency of modal individuals in the group were extremely high and in 3 cases also statistically significant (table 1). As can be seen from table 2 the range of the character values in the tetraheterozygous group (4) tend to be narrow, the CV values lower and the kurtosis higher than in the homozygous group (0). These differences are very evident when we compare the frequency distributions of the E_1, M and E_2 individuals (table 2). Here the kurtosis for each trait in the homozygous group has a negative value, indicating a paucity of M individuals, whereas in the heterozygous group the kurtosis is positive, indicating an excess of M individuals.

In summary, our data show that in human populations the variability of some morphological traits is related to the biochemical heterozygosity level and that an increase in heterozygosity may clearly lead to a decrease in morphological variability-'developmental homeostasis' and will also favor the average phenotype.

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Supernumerary (B) chromosome in *Anopheles indefinitus* (Diptera, Culicidae)[1]

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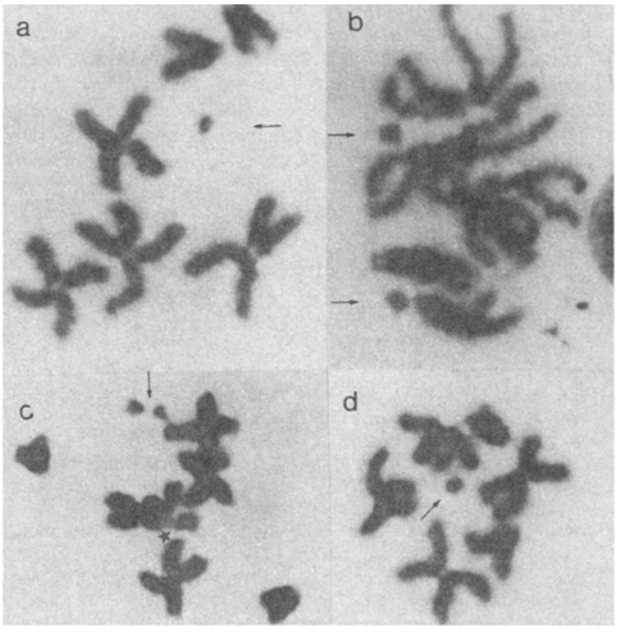
Summary. Larval brain mitotic karyotype of *An. indefinitus* from Kanchanaburi exhibits a supernumerary (B) chromosome which is apparently common in that population. 1 or 2 B-chromosomes have been observed in the samples from 5 isofemale lines examined.

The karyotype of eukaryotes is essentially invariable with respect to chromosome number. Yet, the genome of many species of plants and animals comprises extra heterochromatic elements called supernumerary or B-chromosomes. These may be of various sizes, shapes and number[2,3]. The B-chromosome, however, does not follow strictly the law of Mendelian segregation. Although B-chromosomes are widespread among insects in general, they are apparently rare in the order Diptera, particularly in anophelines. There are only 2 reported cases of *Anopheles* species (i.e. *An. maculipennis* and *An. messae*) showing B-chromosomes[4]. We report here the occurrence of a B-chromosome in *An. indefinitus* collected in Thailand. It was discovered during the course of metaphase karyotype analysis of anopheline mosquitoes in Southeast Asia.

Materials and method. Samples from natural populations of *An. indefinitus* were obtained during a mosquito collection made in August 1982, in the Srinakarin Dam area, Kanchanaburi Province, some 180 km west of Bangkok, Thailand. 5 wild-caught females of *An. indefinitus* were captured and given a full bloodmeal. Each isofemale line was set up to obtain F_1 larvae under laboratory conditions. The brain ganglia of the early 4th-stage F_1 larvae were used for mitotic chromosome study after pretreatment with a 0.1% colchicine solution. A modified method of Baimai[5] was used for air-dried metaphase

chromosome preparations. The prepared slides were subsequently stained with a 2% Giemsa solution, pH 7.0. At least 10 larvae from each isofemale line were cytologically examined. Photomicrographs were taken under oil immersion (× 670) on Kodak High Technical Film with green filter.

Results and discussion. The basic metaphase karyotype of *An. indefinitus* (2n = 6) consists of 2 pairs of metacentric (V-shaped) autosomes and 1 pair of telocentric (rod-shaped) sex chromosomes. Approximately 1/3 of the proximal region of the X chromosome exhibits a major block of constitutive heterochromatin. The distal region of the X chromosome is euchromatic. The Y chromosome is, as a general rule, almost totally heterochromatic.



Photomicrographs of mitotic metaphase chromosomes of *Anopheles indefinitus* from female (a, b) and male larvae (c, d). 1 B-chromosome in a and d, 2 B-chromosomes in b and c indicated by arrows. *Note abnormal elongation of an autosome in c.

The F_1 progeny from all 5 isofemale lines exhibited polymorphism for heterochromatic B-chromosome(s) in a dot-like configuration. Even though some F_1 larvae showed the normal metaphase karyotype, a large number of them had 1 (fig., a, d) or 2 B-chromosomes (fig., b, c). Thus, the presence of B-chromosomes is inconsistent among individuals from each family. In some preparations a B-chromosome clearly manifests 2 sister chromatids (fig., b). This indicates that B-chromosome heterochromatic material under certain conditions does undergo duplication and segregation in a manner similar to normal (A) chromosomes. Some individual larvae having either 1 or 2 B-chromosomes exhibit a structural abnormality in one arm of one of the autosomes (fig., c). The nature of this structural peculiarity is obscure. Unfortunately, observations on morphological, physiological and genetic effects of the B-chromosome(s) could not be made as the extra chromosomes were detected in larvae. However, it has been suggested that B-chromosomes could play an important role in the genetic system of higher organisms at various levels (e.g. chromosomes, cells and individual or any combinations of these within populations). Further, the B-chromosome may exert an effect on restriction of chiasma formation[6]. These important aspects of B-chromosomes merit further studies in *Anopheles* species that serve as human malaria vectors in Southeast Asia.

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Asynchronous puffing in the foot pad chromosomes of *Parasarcophaga*

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Summary. The foot pad polytene chromosome IIIL of *Parasarcophaga ruficornis* and *P. misera* shows a heterozygous puff in the region 7B–C. In *P. ruficornis* the heterozygosity is manifested as a difference in the timing of puffing between the 2 homologues. The outer and inner dorsal cells of the same foot pad also reveal asynchrony in puffing at this locus.

The occurrence of genetic variability is quite a common phenomenon in cross-breeding organisms. Among dipterans the analyses of polytene chromosomes have, in many cases, provided an opportunity for the visualization of heterozygosities which reflect genetic variability. Apart from a large amount of information about the cytological variations in the form of polymorphisms for inversions in several species of dipterans, polytene chromosome analysis has also provided information about the heterozygosities that are expressed as physiological differences between homologous chromosomes, in the form of heterozygous puffs[2–11]. Such puffs are strong indicators of a genetically determined difference.

The present communication gives an account of puff heterozygosity in *Parasarcophaga* (Sarcophagidae:Diptera) where the 2 homologues show a difference in the timing of puffing. Such puffs have previously been reported only in *Sciara* and it has been suggested that they may reflect differential action of some allelic genes in heterozygotes[9].

During a study of changes in puffing of foot pad chromosomes in a small laboratory stock of *Parasarcophaga ruficornis*[12] it was noticed that, in the 2 outer cells, the 2 homologues in region 7B–C of chromosome arm IIIL sometimes undergo their puffing cycles asynchronously on day 7. Until late on day 6 the 2 homologues remain condensed in all the preparations (fig. 1), but on day 7, in the foot pads of some individuals, one of the homologues is puffed while its partner remains unpuffed (fig. 2). This condition has been referred to as puff heterozygosity. One of the corresponding homozygous conditions with both the homologues remaining condensed on day 7 has also been encountered. The other homozygote with both the homologues in puffed state has not been found. By late day 7 both the homologues are puffed in step in all the preparations