the average heterozygosity H is described as a function of the effective population size N_e and the mutation rate u. To prove this theoretical concept the allozyme polymorphism of both species, D. subobscura and D. subsilvestris, was studied by means of horizontal starch gel electrophoresis. Fourteen loci were investigated: Adh, Ao, Aph-3, αGpdh-3, Hk-1, Hk-3, Idh, Mdh-2, Me, Odh, 6Pgdh, Pgm, Phi and Tpi. In D. subobscura 78.6% of the loci turned out to be polymorphic; the corresponding percentage in D. subsilvestris was 28.6%. The average heterozygosity was determined with 13.1% for D. subobscura and 1.5% for D. subsilvestris. Thus allozyme variation is actually much higher in the common species than in the rare species which is in accordance with the prediction of Kimura and Crow mentioned above. Using the experimental data for H and assuming a constant mutation rate of 10^{-6} for both species, the effective population size can be calculated. The result is a number of 37,687 individuals for D. subobscura and 3,801 for D. subsilvestris. These fictitious population sizes are quite dubious because of the inaccuracy of the parameter u. The proportion between the two values, however, does not depend on u. Hence the result that the population of D. subobscura is 9.9 times larger than the population of D. subsilvestris seems reliable.

In this study information about the proportion between the population sizes of D. subobscura and D. subsilvestris has been obtained from two completely different sources: from the number of flies trapped in malt baits and from the analysis of allozyme variation. Both methods yield surprisingly similar results of 12.1:1 and 9.9:1 respectively. A χ^2 test reveals that the deviation is not statistically significant ($\chi^2=2.3$; df=1). This conformity of the data leads to the conclusion that the average heterozygosity represents a suitable basis for the estimation of population sizes.

Pinsker, W. University of Tübingen, Germany. Sterility in D. subobscura males homozygous in a rare allele at the αGpdh-locus.

The allozyme variant $\alpha Gpdh^{90}$ was detected in a sample of wild flies collected in Tübingen. $\alpha Gpdh^{90}$ has an extremely slow electrophoretic mobility in starch gels of pH 7.1 compared to the common variant $\alpha Gpdh^{100}$ and was not found again in samples from natural populations, although about 2500 D. subobscura flies from several geographic regions had been screened. Since rare alleles were needed for other experiments, single pair crosses were set up in order to obtain a strain homozygous for $\alpha Gpdh^{90}$. This trial, however, failed completely. It turned out that a considerable proportion of the single pair cultures did not yield offspring. Among the fertile pairs, only some females were homozygous for $\alpha Gpdh^{90}$ but no males of this genotype could be detected.

To investigate this phenomenon in detail, two different experiments were carried out. In both of them homozygous 90/90-females were crossed with heterozygous 90/100-males. From the F_1 offspring, where the parental genotypes are expected to be present in the ratio of 1:1, single couples were set up in small culture vials. After three weeks the cultures which still contained both partners alive were separated into fertile and sterile pairs and the genotypes of the flies were determined electrophoretically. In the first experiment flies with the original chromosomes were used. For the second experiment the genetic background of the $\alpha Gpdh^{90}$-allele was recombined and substituted to a large extent by means of a marker strain. The results are given in Tables 1 and 2.

Table 1. Number of $\alpha Gpdh^{90/90}$ and $\alpha Gpdh^{90/100}$ genotypes in sterile and fertile cultures.

	Males		Females	
	90/90	90/100	90/90	90/100
sterile cultures	21	5	4	22
fertile cultures	--	56	14	42
	21	61	18	64
	$\chi^2=60.8$ df=1 $p<0.001$		$\chi^2=1.0$ df=1 n.s.	

In both experiments 90/90-males were only found in the sterile cultures and never among the fertile pairs, whereas the females were randomly distributed. The changing of the genetic background had no influence on the sterility of the males. In this connection it should be noticed that in the first experiment 90/90-homozygotes occurred significantly less frequently in the offspring of 90/90-females and 90/100-males than expected ($\chi^2=45.1$; df=1; $p<0.001$),

Table 2. Number of $\alpha Gpdh^{90/90}$ and $\alpha Gpdh^{90/100}$ genotypes in sterile an fertile cultures after substitution of genetic background.

	Males		Females	
	90/90	90/100	90/90	90/100
sterile cultures	41	6	25	22
fertile cultures	--	62	32	30
	41	68	57	52
	X^2=86.7 df=1 p<0.001		X^2=0.03 df=1 n.s.	

Table 3. Single pair mating: number of females inseminated by $\alpha Gpdh^{90/90}$ and $\alpha Gpdh^{90/100}$ males after 72 hours.

αGpdh genotype of male	Females	
	inseminated	not inseminated
90/90	--	21
90/100	18	3
	X^2=31.5 df=1	p<0.001

independent of the sex. This lower viability of about 30% compared to the heterozygotes could be due to detrimental alleles of other genes on the same chromosome. In the second experiment viability of the 90/90-homozygotes was reduced only in males (X^2=6.7; df=1; p<0.01) but not as much as in the first experiment (60% compared to the heterozygotes). Thus the substitution of the genetic background uncoupled the $\alpha Gpdh^{90}$ allele for the most part from the viability-reducing genes but not from the gene (or genes) responsible for sterility. This means that sterility is caused either by a closely linked locus or by the $\alpha Gpdh^{90}$ allele itself. The latter explanation gave rise to the speculation that the sterile males are not able to copulate. The enzyme αGpdh is found in high concentration, especially in the flight muscles, and flies mutationally deficient for αGpdh are known to be restricted in their ability to fly. Since males use their wings during courtship, an effect of the αGpdh mutant on this behavior seemed at least possible. Direct observation, however, revealed that 90/90-males are not handicapped in copulation. To prove whether these copulations result in insemination, the females were dissected and the receptacula and spermatheca investigated for the presence of sperm. The result of an experiment where single pairs had been set up in small vials for 72 hours is shown in Table 3. It can be seen that none of those females paired with 90/90-males contained sperm. The testes of 90/90-males were therefore also examined. Since sperm were present, it can be concluded that the sterility factor prevents the transfer of sperm to the storage organs of the females. It remains an open question whether this inhibition of insemination is caused by the disturbed action of the mutated αGpdh. Assuming that the αGpdh locus is directly involved, it seems possible that the mobility of the spermatozoa might be affected in homozygotes for the $\alpha Gpdh^{90}$ allele.

Prakash, H.S. and Sreerama Reddy, G. University of Mysore, India. Distribution of different species of Drosophila in Agumbe (Western Ghats), South India.

The Indian subcontinent with its variable geographic features offers a rich abode for the colonization of Drosophila species. However, sustained efforts are essential to survey and take census of various species and their densities to get an insight into the taxonomy and distributional pattern of the genus Drosophila. Western Ghats, a mountainous terrain extending along the western border of penninsular India, is one such unexplored territory. The climatic and physiographic features and its luxuriant flora provide a large number of breeding sites for Drosophila species. Agumbe, a part of Western Ghats, is one such natural environment situated at an altitude of 826 m, with an average annual rainfall of 8275.7 mm. It is called "Chirapunji" of South India due to its highest annual rainfall. A characteristic feature of rainfall at Agumbe is that all of it is received from a southwest monsoon from July to October. The northwest monsoon has no effect on it. The heavy rainfall has contributed to the growth of thick timber forest with bushy vegetation underneath, and thus provides congenial habitat for Drosophila species.

Drosophila collections made by conventional fermenting banana bait technique at five sites in this locality during July 1977 yielded a total of 1170 specimens comprising 12 species representing three subgenera (Table 1). Eight of these - D. eugracilis, D. malerkotliana, D.