Singh, B.N. Banaras Hindu University, Varanasi, India. Heterosis owing to basal inversion in D. ananassae.

Several inversions in the natural populations of Drosophila ananassae, a cosmopolitan and domestic species, have been reported from various parts of the world. Most of the inversions have a very restricted distribution while the three paracentric inversions originally described by Kaufmann (1936) from Alabama, U.S.A. and termed by him as subterminal (IIL), terminal (IIIL) and basal (IIIR) seem to be coextensive with the species (see the geographic distribution of inversions arranged by Shirai and Moriwaki, 1952; Singh, 1970). These three widely distributed and frequently reported inversions have been called 'cosmopolitan' by Futch (1966).

It has been found in many species of Drosophila that heterotic buffering is associated with chromosomal polymorphism. In D. ananassae heterosis has been found to be associated with subterminal and terminal inversions when heterozygous (Moriwaki et al, 1956; Moriwaki and Tobari, 1963; Tobari, 1964; Singh, 1972, 1973; Singh and Ray-Chaudhuri, 1972). The literature, however, lacks information regarding basal inversion. In the present investigation, a wild laboratory stock of D. ananassae containing this inversion in IIIR and the standard gene sequence in the other chromosomes, has been utilized. This stock was raised from a female captured in Lowari, Chakia forest area, Varanasi, in November 1968. In order to determine the frequencies of different genotypes (karyotypes), the larvae were squashed with the usual acetocarmine method.

All the three karyotypes for the basal inversion were distinguished. Their frequencies are shown below:

| | Standard Homozygote | Heterozygote | Inversion Homozygote |
|---|---|---|---|
| Observed | 54 | 119 | 38 |
| Expected | 61.53 | 104.82 | 44.65 |

$\chi^2 = 3.82$
$P > 0.05$

In a random sample of 211 larvae, 119 (56.4%) are heterozygous for the inversion. Thus the frequency of heterozygotes is more than 50 per cent. This suggests that the inversion heterozygote is adaptively superior to the corresponding homozygotes. The expected values of the three genotypes have been calculated on the basis of Hardy-Weinberg frequencies. The $\chi^2$ test shows that the differences are statistically insignificant ($P > 0.05$).

Thus it can be suggested that heterotic buffering is associated with basal inversion as is the case with subterminal and terminal inversions. Now it is known that all the three inversions in D. ananassae which are coextensive with the species, exhibit heterosis in heterozygous condition. So it is proposed that this may be one of the factors which enabled these inversions to spread almost throughout the distribution range of the species.

References: Futch, D.G. 1966, U.T.P. 6615:79-120; Kaufmann, B.P. 1936, PNAS 22:591-594; Moriwaki, D., M. Ohnishi, and Y. Nakajima 1956, Proc. Int. Genet. Symp. pp.370-379; Moriwaki, D. and Y.N. Tobari 1963, Genetics 48:171-176; Shirai, M. and D. Moriwaki 1952, DIS 26:120-121; Singh, B.N. 1970, Ind. Biol. 2:78-81; Singh, B.N. 1972, Genetica 43:582-588; Singh, B.N. 1973 (submitted); Singh, B.N. and S.P. Ray-Chaudhuri 1972, Ind. J. Exp. Biol. 10:301-303; Tobari, Y.N. 1964, Evolution 18:343-348.

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The results showed the inability of the two oral contraceptives to induce any mutations in Drosophila melanogaster.

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