WILD POPULATION STUDIES; *DROSOPHILA FUNEBRIS* NEAR MANCHESTER

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(With Plate 5 and One Text-figure)

The highly significant work of Dobzhansky has shown that wild populations of many species of *Drosophila* contain individuals which differ in respect of the structure of their chromosomes. Dubinin & Tiniakov (1947) have recently shown that the proportion of individuals with inversions alters during the seasons of the year as the result of natural selection. The homozygotes and heterozygotes for the inversion exhibit preferential increase during the summer, but in winter the normal type has a much greater survival rate. Dobzhansky (1947) has shown that some populations of *D. pseudo-obscura* show a progressive change in gene arrangements over a period of years, and that more than half the wild individuals are inversion heterozygotes. In these cases it is usual to find both inversion heterozygotes and homozygotes in one population. The population to be reported upon here has consisted entirely of inversion heterozygotes during more than one year.

Individuals of this population 7 miles from Manchester were caught in baited traps during September 1946, April 1947, and at several dates in the summer of 1947 until September 1947. The immediate larvae and second generation larvae were examined cytologically. After dissection, the salivary glands were mounted in acetic orcein under a cover glass which had been previously smeared with albumen. After gentle pressure and warming the slide was inverted in 10% acetic acid until the cover-slip with the attached gland fell off. It was then quickly taken through 95% alcohol and mounted in euparal. After about a week the preparation became well stained. These mounts have remained in perfect condition for over 8 months.

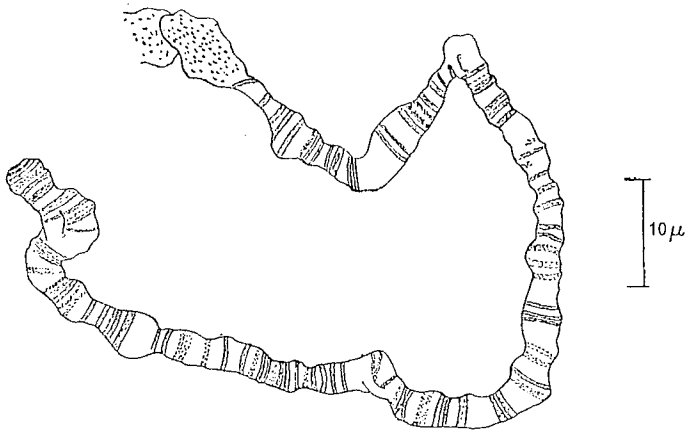
It was found that every larva from the forty wild individuals was heterozygous for three simple small inversions (see Pl. 1, figs. 1, 2). The positions of the inversions are approximately 83E–84A, 89D–F and 95D–F respectively (cf. Slzyinska & Slzyinski, 1939), on chromosome 5. As will be seen they are placed in such a way that the chromosome is divided into almost equal parts. In addition, a small inversion was sometimes seen between the first two inversions. It was, however, difficult to determine whether this last inversion was always present since it involves not more than one major band. Both photographic and visual evidence was obtained that all these structural changes were inversions.

On further breeding it was found that no homozygotes were obtained for chromosome 5. The particular interest of this wild population lies firstly in the fact that it must be rather large, since over forty individuals were caught in the two traps, set out for 24 hr. at a time; secondly, in the absence of homozygotes; and thirdly, in the constancy of the inversion heterozygotes over a period of a year, suggesting that stability has been reached.

The wild population has all the appearance of the presence of a balanced lethal system accompanied by blocked crossing-over throughout chromosome 5. The equal spacing of

the inversions would inhibit crossing-over, while the absence of homozygotes suggests that lethals are carried on the homologous chromosomes. There is as yet no means of learning whether the lethals are situated at the inversions or between them or whether the lethals arose at the time of the inversions or later.

Structural hybrids involving reciprocal translocations are well known in plants. Their importance and significance in evolution and speciation are fully realized. Philip, Rendel, Spurway & Haldane (1944) report the frequent occurrence of inversions in wild populations of *D. subobscura*, and show that the homozygotes are usually less viable than the hetero-



Text-fig. 1. Drawing of chromosome 5 showing the positions of the three major inversions and one minor inversion.

zygotes. Their extensive data also show the rarity of translocations. These authors point out that heterozygosity for inversions resembles in results the reciprocal translocations in *Oenothera*.

SUMMARY

A constant breeding population of inversion heterozygotes of *Drosophila funebris* has been discovered in the wild.

We desire to thank Dr R. Oldfield of the Natural History Museum for naming the species and Dr B. M. Slzyinski for providing us with his excellent salivary gland chromosome maps of this species.

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EXPLANATION OF PLATE 5

Figs. 1, 2. Chromosomes of two individuals showing three inversions in chromosome 5.
Fig. 3. Chromosome 5 showing the nature of the second inversion.

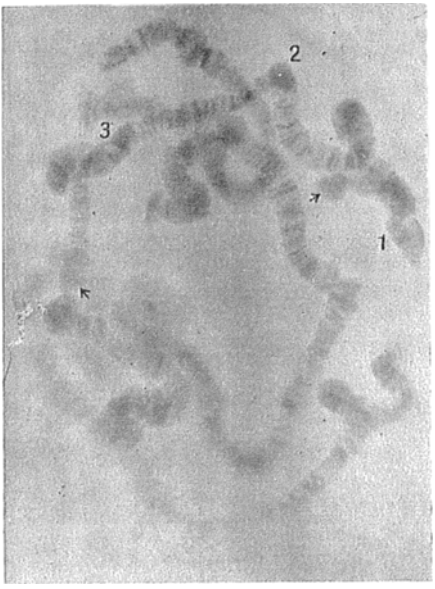

Fig. 1.

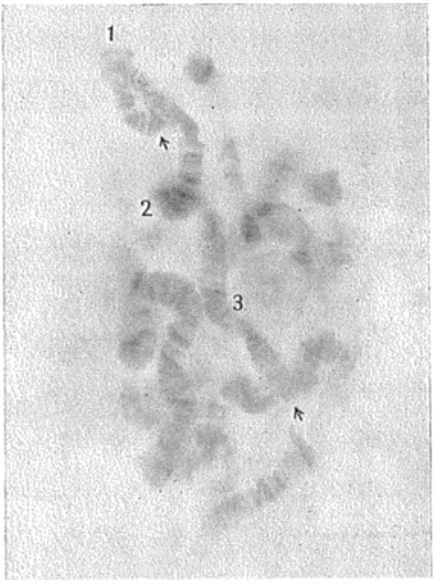

Fig. 2.

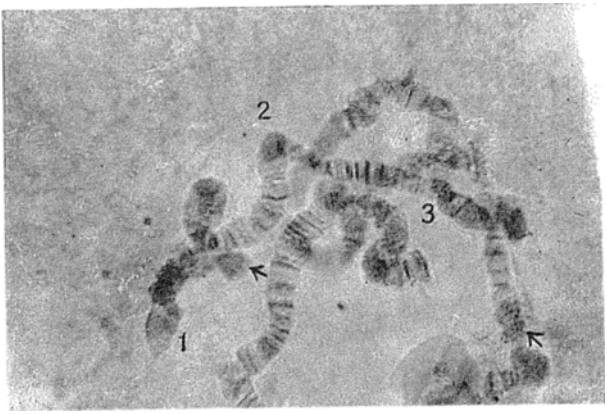

Fig. 3.