Wargent, J.M. University of Sheffield, Sheffield, England. Position-effect variegation in wings of D. melanogaster.

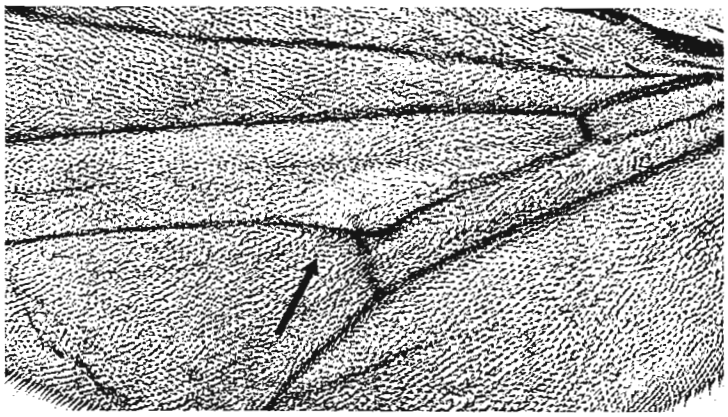
The wings of the mutant miniature of Krivshenko[1] (m^K) at normal temperatures (25°C) are sometimes crumpled and may vary in size from fully wild type to fully 'miniature'. The 'miniature' wings show the distinctive morphology of the miniature (m) mutant.

Reciprocal crosses, m^K/m^K x m/Y and m/m x m^K/Y were set up, and the F_1 bred at 14°C. Microscopic examination of the wings of the female heterozygote, m^K/m, showed that they contain patches in which the hairs appeared closer together than in surrounding areas. Measurements were made of the distances between hairs in patches (p) and also in surrounding areas (s). For comparative purposes measurements were also made of the inter-hair distances in the Amherst wild type and in a homozygous m strain, both bred at 14°C. The results are shown in the table below.

Strain	Number of Measurements	Mean inter-hair distances ± standard error
m^K/m (p)	50	62.19 ± 0.93
m^K/m (s)	50	88.55 ± 0.98
+/+	50	92.08 ± 1.51
m/m	50	53.40 ± 0.90

Statistical comparison of the difference between means shows that the wild type and the m mutant are significantly different at the 1% level. The difference between m^K/m (s) and +/+ is not significant and although a significant difference was obtained between m^K/m (p) and m/m the inter-hair distances of the former resemble those of the m strain rather than those of the wild type. The difference between the means for m^K/m (s) and m^K/m (p) is significant at the 1% level. These results indicate that the wings contain both wild type and m-like cells.

There is considerable variation in the size of the patches observed; some wings contain predominantly wild type cells while others consist mainly of m-like cells. The photograph shows a predominantly 'miniature' wing with an area of wild type cells. It is assumed that the crumpled phenotype is caused by the presence of patches, and that the number and size of the patches determine the size of the wing.



The strain contains an inversion with breakpoints in section 10E4-5 and section 20B of the salivary X chromosome. The m locus, in section 10E1-2, is relocated next to broken heterochromatin in the rearranged chromosome. The presence of mutant cells in the wing is therefore probably due to a variegation-type position effect[2] at the m locus; this conclusion is supported by the observation that the mottling is enhanced by low temperature.

References: 1. Krivshenko, J., 1956, DIS 30: 75; 2. Lewis, E.B., 1950, Advances in Genetics 3: 73-115. This work was supported by Grant No. 68/1317 from the Science Research Council of Great Britain.

Novitski, E., E. Ehrlich and H. Becker*. University of Oregon, Eugene, Oregon and University of Munich, Germany*. A terminal attachment region on 2L.

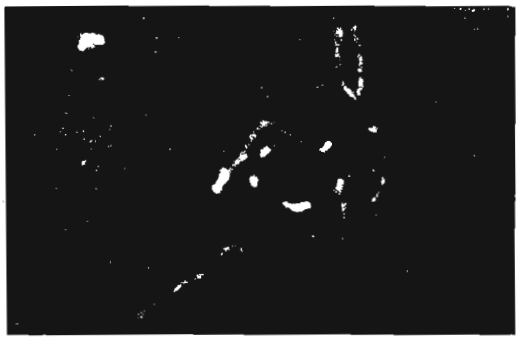
Compounds involving the X and Y chromosomes or several X-chromosomes have been put together in virtually every combination, but compounds involving the autosomes have been limited to the five cases where homologous arms of an autosome have been attached to the same centromere as reversed metacentrics. There are two reasons for this difference in versatility of the sex chromosomes as opposed to the autosomes.

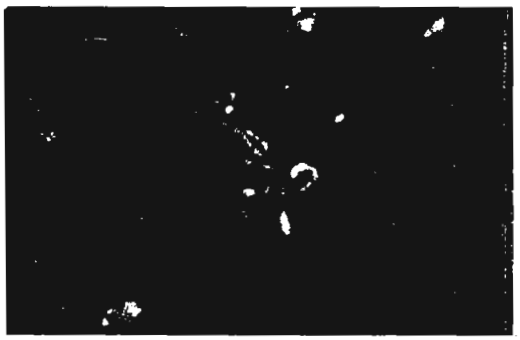
1. The sex chromosomes are much simpler to handle in single and compound forms because of the manner of their transmission and because of the prior existence of certain specialized chromosome types.

2. The occurrence of a complete X-chromosome with a terminal heterochromatic (and dispensable) section, first found in In(1)EN, made it possible to tack X-chromosomes together in serial order into compounds of all possible combinations. Since the construction of compound autosomes is limited by the absence at any of the ends of any useful terminal heterochromatic piece with an associated dispensable marker, it was decided to synthesize such chromosomes as a first step in making more useful autosomal compounds.

The hope that such an attempt might be successful stems from the suspicion that on one or more of the chromosome tips there may be small regions that are essentially heterochromatic (or a few loci which can be readily dispensed with in the heterozygote). This thought is based in part on the occurrence of the two ring chromosomes, R(1) and R(1)2, from attached X-chromosomes. The simplest and perhaps only explanation for their origin is that one of the tips of the attached X's underwent a rare "exchange" with the base of the other arm of the attached X. It seemed a good possibility that a similar situation might exist at the tips of one or more autosomes and that a search for a similar exchange that would add a larger piece of heterochromatin along with a good marker to an autosome would give positive results.

The procedure involved irradiating (3,000r) females carrying a doubly marked Y-chromosome along with an attached X, and looking for cases among the F_1 where the two markers, y^+ and Bar, have been separated, indicating that some kind of "exchange" had taken place, but where the attached X was not involved. Almost without exception, each female so treated produced one or more progeny showing such a separation and it was necessary to limit the analysis to one exceptional progeny per parental female, in order to avoid duplication. The exceptions selected were tested for segregation of the X-chromosome markers from the major autosomes. Two cases were found of attachment of Bar to the left end of the second chromosome. In both cases, results of the tests of this chromosome against a normal second showed for it to be .01 units to the left of the locus of al. Tests for the presence of Y-chromosome fertility factors at the left end of X have showed that in the first case (B3) none of the fertility factors is present and in the second case (B5) two (S1 and L5, and possibly L4) are. B3 is viable and fertile when homozygous; tests are not yet complete for B5.





Ganglion metaphases stained with quinacrine hydrochloride confirm the presence of some of the Y-chromosome at the tip of the second chromosome of B5. As can be seen on the photographs, there are two bright fourth chromosomes and XY chromosome with two bright regions at one end (undoubtedly corresponding to the short arm of the Y) and three at the other (the long arm of the Y). One of the autosomes has two bright blobs at one end, with a less well stained piece distal to them. This must represent the tip of 2L to which part of Y long, along with Bar, have been attached.

With these chromosomes, it should now be possible to make up certain additional compounds, by hooking another autosomal arm (or an X, or a Y) to the tip of 2L.

Additional runs are being made to try to synthesize chromosomes in which a marker is similarly placed on the tips of the other autosomal arms. If no other cases occur, an attempt will be made to use certain Y-autosome translocations (see the Washington-La Jolla report in this issue).