Novitski, E., M. E. Myszewski and H. Goldin. University of Oregon, Eugene, Oregon. Dicentric chromosomes in Drosophila.

The genetics of centromere behavior in D. melanogaster has been previously studied by testing the action of centromeres against each other in dicentric chromosomes formed by crossing over. Classification of centromeres into "strong" and "weak" categories suggests that a greater diversity of centromeric strengths may exist. The range of the diversity may extend to include centromeres which are less capable than even "weak" centromeres in effecting chromosome movement by virtue of a particular array of adjacent heterochromatin. The extreme case would be the physical presence of a centromere on a chromosome incapable of any movement, i.e., the chromosome would act as an acentric.

Females heterozygous for a long inversion provide the system where dicentric chromosomes are formed with regular frequency: Irradiation of these females would introduce random damage to the centromere regions of these crossover-produced dicentrics. In the instance where one of the centromeres is altered in the manner described previously, the second centromere could act to carry the new chromosome to the pole. This would provide a class of progeny generally lost and would also provide chromosomes with particularly interesting properties. Should dicentric chromosomes such as these be recovered, their analysis may provide useful information concerning centromere strength, activity of heterochromatin and chromosome structure.

A simple experiment was designed to generate dicentric chromosomes. Females heterozygous for two $XY^S \cdot Y^L$ chromosomes, one in normal sequence, the other carrying an inversion of the entire X chromosome were used (Fig. 1)(In(1)EN, $XY^S \cdot Y^L$, car f v cv y $Y^S \cdot Y^L$ (110-8 Parker) y^2 su-w^a w^a $Y^S \cdot Y^L$ y^+). The y^+ and B^S markers, on the ends of their respective chromosomes,

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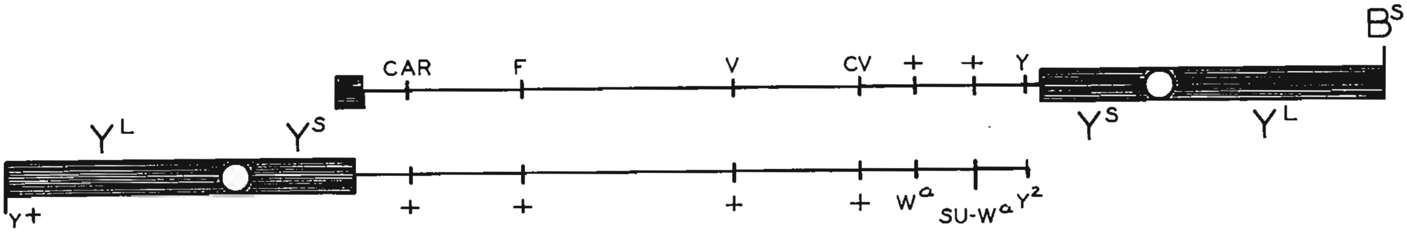

FIGURE I. $XY^S \cdot Y^L$ CHROMOSOMES UTILIZED IN CROSS DESIGNED TO PRODUCE DICENTRIC CHROMOSOMES

tive chromosomes, would be joined by a single crossover to form a $y^+Y^L \cdot Y^S$ $XY^S \cdot Y^L$ B^S chromosome. Progeny carrying both the y^+ and B^S markers would be of interest, for while the y^+ B^S offspring may represent a fortuitous juxtaposition of the markers, they may also indicate a particular type of dicentric chromosome which is not lost during cell division.

Four-day-old females were X-rayed with 2700r and mated immediately to X/Y males carrying a yellow mutant. Among 37,370 progeny from irradiated females, 324 flies carrying y^+B^S and intermediate markers indicative of single crossing over were observed. No flies of the y^+B^S phenotype appeared among 16,626 progeny from non-irradiated females. Of the original 324 exceptional y^+B^S flies, 186 (62 males, 124 females) proved to be fertile. These fertile exceptions are currently being tested to ascertain whether the y^+B^S markers are actually carried by a dicentric chromosome or if they merely represent a tantalizing rearrangement of the markers.