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1. Selecting mutants of mitotic nondisjunction with TB-9b.

Nondisjunction of the B chromosome is under genetic control (Roman, 1949) and the isolation of mutants of nondisjunction should, therefore, be possible. Mutants lacking the ability to undergo nondisjunction should be the easiest class of mutants to detect, but there are problems in identifying such mutants. Rates of spontaneous mutation are extremely low, requiring large population sizes. In addition, classification of the mutants requires testcrossing each individual to determine its rate of nondisjunction. A partial answer to these problems has been found. Selection for chromosomal mutation, rather than point mutation, greatly reduces the number of individuals that need be screened. Chromosomal mutations occur at a fairly high frequency for the B chromosome, and they have the advantage over point mutations of visibility. Classification problems can be simplified by selecting mutants from the progeny of TB-9b plants that show a very high rate of nondisjunction (95% or more). Only kernels resulting from normal disjunction of the B^9 need be tested for mutation, and these are few in number. To test these ideas, an inbred TB-9b line with a high rate of nondisjunction was selected and crossed to a bz tester.

$$\underline{sh}\ \underline{bz}\ \underline{wx}\ \underline{B}\ \underline{Pl} \quad X \quad 9^{B^{Wx}}\ 9^{B^{Wx}}\ B^{9^{Sh\ Bz}}$$

The Bz seeds from the progeny were grown and Bz plants selected for testing. Of 2,161 progeny, only 57 were Bz in both endosperm and sporophyte. A further reduction in effort was made by analyzing nondisjunction from self pollinations, rather than testcrosses. From the 57 self pollinations, four apparent mutations were found. Two of these were found to be new isolations of the B^9 isochromosome. The other two have not shown any easily identifiable abnormality in mitosis, and pachytene analysis will be needed. Selection of the isochromosome here depended on two factors: 1) The isochromosome generally has a low rate of nondisjunction. 2) Self pollination does not discriminate between transmission of

the chromosome through the male vs. the female parent. Because of pollen competition, the isochromosome is transmitted mainly through the female parent and cannot undergo nondisjunction. The finding of the isochromosome suggests that selection of chromosome abnormalities is possible. In addition, the highly effective mutagen, ethyl methane sulfonate, might allow screening of point mutations. While a 9^{B} 9^{B} B^{9} male was used in the present experiment to encourage chromosome abnormalities, a 9^{B} 9^{B} B^{9} B^{9} parent would be suitable with EMS.

Reference:

Roman, H., 1949. (Abstract). Records of the Genetics Society of America, no. 18, p. 112.

Wayne Carlson

2. An unselected "mutant" affecting nondisjunction.

This summer, a series of crosses were made between an inbred TB-9b stock and the F_2 of two inbred c sh wx testers. The F_2 plants were segregating for many different traits, but were homozygous for c sh wx. Plants selected from the TB-9b line were hyperploid ($9^{c\ sh\ wx}$ $9^{B^{Wx}}$ $B^{9^{C\ Sh}}$ $B^{9^{C\ Sh}}$). Of several hundred ears produced in the cross (c sh wx ♀ X TB-9b ♂) all were typical except one. The abnormal ear contained an extremely high rate of C-c multiple sectored kernels. Classification of the ear was as follows:

C Wx =	78
C/c Wx =	35
C wx =	27
C/c wx =	15
c Wx =	103
c wx =	5

of the total colored seeds, 50/155 are variegated. The ear with this high proportion of sectored kernels was produced in a cross (1818 X 1819J) in which one pollen shedding from a TB-9b plant was crossed onto 10-15 ears of the F_2 c sh wx. Since only one ear was abnormal, the "mutation" must be attributed to the female parent. This "mutation" is interesting because it affects B^{9} stability, but is not located on the B-9b translocation. If the "mutation" acts by inducing nondisjunction of the B^{9}, it is acting at the wrong time (during endosperm