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1. **The ws_3 lg_1 gl_2 region.**

For a number of years, Ws_3 Lg_1 Gl_2 / ws_3 lg_1 gl_2 x ws_3 lg_1 gl_2 has been used to demonstrate linkage and crossing over to students in cytogenetics. This testcross has several advantages for instruction. Ample seedling populations are obtained in two weeks or less following planting in greenhouse benches. The phenotypes are of interest to the students and permit quite rapid and accurate classification. A light spraying with water aids scoring of Gl_2 gl_2 and gl_2 gl_2, since drop-lets adhere to the homozygous recessive seedlings and not to the heter-ozygotes. The other categories are obvious to the students.

Each student shells his own kernels directly from an ear and is not informed of the genes concerned until actual classification. Approximately 1200 seedlings are scored each year. Each classification by a student is verified by another; the few questionable seedlings are brought to the attention of the instructor. This procedure thus assures confidence in the pooled data. The distribution of the eight phenotypic classes discloses to the students that linkage and crossing over rather than independent assortment occurred. The order of the genes and recom-bination percentages are then calculated. Reference to McClintock's (1931) positioning of lg_1 within the terminal four chromomeres of the short arm of chromosome 2 and the study of the linkage map (Neuffer et al., 1968) complete the exercise.

Accuracy of scoring is evident from the consistency of data from year to year. Accordingly, extensive good data have been accumulated for this region and are presented in Table 1.

The map in Neuffer et al. (1968) shows $\dfrac{ws_3 \quad al \quad lg_1 \quad gl_2}{0 \quad 4 \quad 11 \quad 30}$ with the position of al uncertain. Recombination was less than indicated by the map. Coincidence was calculated from the data in Table 1, according to the method in Serra (1965), and a value of $0.28 \pm .04$ was obtained disclosing considerable interference.

Table 1

Results from testcrosses of $\underline{ws}_3$ $\underline{Lg}_1$ $\underline{Gl}_2$ / $\underline{ws}_3$ $\underline{lg}_1$ $\underline{gl}_2$ × $\underline{ws}_3$ $\underline{lg}_1$ $\underline{gl}_2$

	Non-cross-overs	Single cross-overs region 1 ($\underline{ws}_3$-$\underline{lg}_1$)	Single cross-overs region 2 ($\underline{lg}_1$-$\underline{gl}_2$)	Double cross-overs	Total
No.	12,534	1,341	2,788	68	16,731
%		8.0	16.7	0.4	

The occurrence of double crossovers among the progeny from different ears was highly variable. We have recently found that the occurrence of doubles is not fortuitous but is dependent upon the frequency of single crossing over and the degree of interference for different female parents (Bard and Morgan, 1973).

References:
Bard, Susan R. and D. T. Morgan, Jr. 1973. Recombination in paired and individual kernels of Zea mays L. Genetica 44: 16-24.

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