gl_2 actually synapsed at pachytene and therefore available for crossing over (if this occurs at pachytene) based on 115 measurements of pachytene trivalent configurations is 14 units. The amount of recombination found proximal to gl_2 in this experiment did not differ significantly at the 5 percent level from standard expectation based on these maximal estimates (chi square - 3.47 for 20 chromosome progeny, d.f. 1). Since all the estimates were intentionally maximized, the results are inconclusive, and it may be that crossover frequency was in fact increased somewhat in the region synapsed proximal to gl_2. In any event there does not seem to have been enough increase in crossover frequency in this region to compensate for the crossover suppression in the region at snyaptic failure. Further tests are planned in which markers on both sides of the point of interchange may be utilized with progenies sufficiently large for studies of interference.

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2. Recombination inhibition and enhancement in disomic plants heterozygous for a substitution from Tripsacum.

In disomic plants which are heterozygous for a segment derived from a Tripsacum chromosome substituted for approximately the distal 60 percent of the short arm of chromosome 2, pachytene synapsis is usually normal throughout the complement. The Tripsacum segment has been shown to carry normal dominants for the chromosome 2S markers ws_3 lg_1 gl_2, but in test crosses crossing over rarely occurs between the Tripsacum and corn segments, a region estimated to contain 54 map units. Preliminary tests have indicated, however, that crossing over may be greatly increased elsewhere in chromosome 2 in plants of this constitution. Forty-four percent recombination (215/484) was found in the gl_2-v_4 region although it is probable that only about 29 crossover units were available for crossing over in this region, 5 of these on the long arm side of the centromere. Tests are planned using additional marker loci to determine the degree and distribution of possible crossover frequency increases outside the region of crossover suppression. The extent of this region of crossover suppression may be varied by the use of rare recombinants between the Tripsacum and corn segments.

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3. Behavior of Tripsacum chromosomes added to the normal corn complement.

Studies are continuing on the genetic and snyaptic homologies of Tripsacum chromosomes in the corn complement. A number of new stocks are currently available for tests. In one of these an extra chromosome from Tripsacum, having physical properties similar to chromosome 9 or 10

of corn, does not synapse with any of the corn chromosomes. Twenty-one chromosome plants are indistinguishable from 20 chromosome plants on the basis of gross morphology. Test crosses with multiple recessive stocks give normal disomic ratios for all markers tested with the possible exception of g_1 for which classification was difficult and recessive progeny seemed to be deficient. Tests with chromosome 10 tester stocks are currently underway.

This Tripsacum chromosome is particularly interesting, however, because of the fact that it is transmitted by 21 chromosome plants through the egg to about 84 percent of its progeny. Twenty-one chromosome plants are highly pollen and ovule sterile. In microsporogenesis the Tripsacum chromosome lags in about 89 percent of anaphase I cells. It divides in about 54 percent of pollen mother cells and is apparently included in telophase I nuclei without having divided in most of the remainder. In those cases where the Tripsacum chromosome divides in the first division it lags at anaphase II and is sometimes excluded from telophase II nuclei so that it is present in about 30 percent of microspores. Scant data available from selfing are consistent with the interpretation that the Tripsacum chromosome actually is transmitted through the pollen with about the same frequency with which it occurs there. So far no anaphase configurations have been found at megasporogenesis, but the basal megaspore has been functional in all of the 44 ovules examined which were at the appropriate stage for such a determination. Genetic tests indicate that parthenogenesis cannot explain the high transmission frequency of the Tripsacum chromosome, and it is thought unlikely that it divides twice or has extra centric activity in megasporogenesis since neither of these seems to occur in microsporogenesis. The most likely explanation for the high transmission frequency at present appears to be that eggs or embryos not carrying the Tripsacum chromosome are strongly selected against in the maternal background in which this Tripsacum chromosome is present.

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1. Teopod-2 and sr_2 in relation to preferential segregation in chromosome 10.

In crosses of Tp_2 with chromosome 10 stocks, it was found that R-Tp_2 showed about 36% recombination, while g-Tp_2 showed independence. This placed Tp_2 distally to R in the long arm of chromosome 10. In a cross with T9-10b (break in short arm of chromosome 10), Tp_2 showed independence to wx, and so, corroborated the location of Tp_2 far distally on the long arm of chromosome 10.