The first is purely cytological and comes from the study of plants trisomic for chromosome 6 with and without abnormal 10.

% trivalents		% of trisomic progeny as ♀ parent	
N10 N10	Abn10 N10	N10 N10	Abn10 N10
74%	87%	36%	45%

The argument is clear. Abnormal 10 increases crossing over; this is reflected in an increased number of chiasmata. More chiasmata mean an increase in number of trivalents which in turn leads to a greater number of n+1 megaspores since disjunction of a trivalent usually gives equal numbers of n and n+1 spores.

Data of a different sort comes from studies of plants heterozygous for T6-9b with and without abnormal 10. Plants with abnormal 10 have more genetic crossing over than do N10 N10 sibs; they have more chiasmata as shown by the higher percentage of rings of 4 and by the drastic reduction in trivalent frequency. The cytological observations and genetic data, shown in the following table, are consistent with the theory that chiasmata are essential for metaphase association.

	% rings	% chains	% trivalents	Sh-Wx recomb. in ♂ B. C.
N10 N10	19.4	48.4	32.2	11.5
Abn10 N10	68.8	30.4	0.8	24.0

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6. Genic interaction with the mutant plastids induced by the iojap gene.

In 1943 I reported that the iojap gene induced plastid mutations which were irreversible. However, Mazoti (1950) found that strains of maize carrying the R allele gave only green progeny when used as the pollen parent onto iojap silks, while strains with the r^r allele gave green and colorless seedlings. Mazoti's results suggested that the expression of the mutant plastids was subject to genic control and that restorer genes existed. This would parallel the finding of restorer genes for male sterile cytoplasm. We have confirmed Mazoti's conclusion that some strains of maize yield only green seedlings while others give varying proportions of whites when crossed onto iojap ears, although it is questionable that the R locus is involved. This past summer ten different lines were used as the pollen parent in crosses with iojap. Five of the ten strains gave only green seedlings while the remaining five gave progenies with both green and white seedlings. The presence of restorer genes in the lines failing to yield white seedlings will be tested this summer in the following manner. If some of the egg cells of the iojap plants possessed

mutant plastids which were restored to normal functioning by one or more restorer genes brought in by the pollen parent, the F_1 plants coming from these zygotes should possess mutant plastids whose expression would be realized in F_2 plants lacking the restorer genes. The ratio of green to white offspring would depend on the number of segregating restorer genes. The selfed F_1 plants which segregated whites in the F_2 would also be crossed as the pollen parent onto lines free of white alleles. None of the F_2's from these outcrosses should segregate for white seedlings since normal plastids were contributed by the egg parent of the P_1 generation. If these results are obtained it follows that irreversible plastid mutations are produced by iojap and that, even though they may be restored to normal activity by genic interaction, their intrinsic mutant quality is retained and becomes evident when the restoring alleles are lost.

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7. Disturbed ratios due to semi-lethality of etched kernels.

Ears segregating for the etched allele, which is 12 units distal to A in chromosome 3, often have a deficiency of homozygous etched kernels. Deviation from the expected percentage varies in different genetic backgrounds; in some, no marked discrepancy is found while in others there is a significant reduction in the number of etched kernels. Tests were made to determine if the deficiency of etched is gametophytic or zygotic in nature. Crosses of a Et/a Et x A Et/a et pollen gave 1 : 1 ratios for the A:a pair so transmission of et pollen is normal. Crosses of A Et/a et by a Et pollen also gave 1 : 1 ratios for A:a so et megaspores are fully viable. However, the crosses of A Et/a et by a et showed that the deficiency of etched kernels is due to the deleterious effect of et on kernel development- i.e., etched acts as a semi-zygotic lethal. Etched kernels may abort early in development.

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8. A test for recombination between the bt_1 and sh_3 alleles in chromosome 5.

Although the recessive mutants bt_1 and sh_3 differ markedly in their effect on kernel development, they are allelic. The compound bt/sh is similar in phenotype to sh homozygotes. The phenotypes produced by the two mutants are so unlike that their allelism was unsuspected for some time and was accidentally revealed through a chance cross of the two mutant strains. Differing as they do in