4. A cytological survey of some "problem" restorer lines of maize.

Using the "Eckhardt" system for introducing the "F" pollen restoring gene(s), it has been the writer's experience (Maize News Letter 1956 pp. 160-161.) that 10 to 15% of maize inbred lines show normal restoration in the F_1 and BC_1 recovery generation after crossing with a restorer source with "T" sterile cytoplasm. However, these exceptional "problem" lines show either merely partial or no restoration in the later back cross generations. Since such lines are by necessity quite exceptional, at least in their "T" cytoplasm restoring characteristics, it was thought worth while to investigate the possibility that the behavior of such lines might relate to cytologically detectable differences or abnormalities. The following F_1 crosses between restorer sources and "problem" lines were investigated: Ky21 X S134, K55 X S134, Ky21 X S139, K55 X S139, I153 X W22, K55 X W22, I153 X 159, I153 X Oh51a, and K55 X Oh51a.

No irregularities in chromosome morphology, pachytene pairing, diakinesis, anaphase I, anaphase II, or pollen grain formation were noted.

This may be considered as negative evidence in favor of the precept that the unusual behavior of these lines as noted relates purely to "genetic" causes.

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1. A popcorn fertility restorer.

An inbred line of popcorn (W41) isolated from a strain of the White Rice variety obtained from Dr. Oliver E. Nelson of Purdue University appears to be equally as good as either T x 127C or K 55 in restoring fertility to the Texas type of cytoplasmic male sterility.

The fertility restoring ability of this inbred is indicated by the following comparisons with K 55 and T x 127C. The segregation for fertility restoration of F_2 as well as single crosses with non-restorer inbreds when crossed on cytoplasmic male sterile stocks is also shown.

Cross	Fertile plants	Sterile plants
Male sterile x K 55	22	0
Male sterile x T x 127C	92*	0
Male sterile x 41	144	0
(Male sterile x 41) F_2	43	16
Male sterile x (41 x non-restorers)	58	47

* Six of these plants in an early planting appeared to be only partially fertile.

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1. Studies on the inheritance of resistance to corn leaf rust Puccinia sorghi Schw.

It was reported in the 1955 Corn Genetic Newsletter that greenhouse seedling inoculations on 165 lines of corn showing field resistance revealed that 25 strains possessed protoplasmic resistance to one or more biotypes of the pathogen. A table included in the report indicated that resistance in each of B38, K148 Cuzco and GG208 was due to a dominant allele at a single locus. The following table shows the reaction of these strains to 11 cultures of Puccinia sorghi.

Reactions to 11 cultures of Puccinia sorghi

Source of resistance	901@	904	908	917	921	922	926	927	928	929	930
B38	0;	0;	0;	0;	0;	0;	0;	3	0;	0;	0;
K148	1-	1-	3	1-	1-	1-	1-	3	1-	1-	1-
GG208	1-	1-	1-	1-	0;	1-	1-	1-	1-	1-	3
Cuzco	0;	0;	0;	0;	0;	0;	0;	0;	0;	0;	0;

This table shows that these strains have different genotypes for resistance. It is necessary to know how many genes for resistance each source has and the number of loci involved among the four strains. Some