UNIVERSITY OF MASSACHUSETTS
Waltham, Massachusetts
Suburban Experiment Station

and

HARVARD UNIVERSITY
Cambridge, Massachusetts
Bussey Institution

1. A congruous background for the tr and pd genes.

The mutant genes in maize for a two-ranked spike (tr) and for single female spikelets (pd) are usually unstable in expression, especially in the heterozygous condition and in a genetic background of typical modern maize. A sporadic proliferation to many ranks and to paired spikelets appears to be promoted by the extensive vascularization of a thick modern cob. When the tr and pd genes are transferred to a background of the string cob (Sg) trait in combination with the teosinte chromosome 4 complex, the axis is vascularized more like that of teosinte and these mutant genes acquire a stable phenotype and are fully fertile in the homozygous compound (tr tr, pd pd).

Both the tr and pd reduce vascular development in the cob. The additive effects of such reductions in the compound tr tr, pd pd may result in either female sterility through lack of style development or the expression of one of the genes may exclude that of the other with the phenotype fluctuating back and forth on a single cob. But when teosinte chromosome 4 is introduced a harmonious balance is reached which allows fertile expression of the double mutant combination. This teosinte segment, discovered and extracted by Mangelsdorf, increases vascular development in the rind of the cob and this is tied into the spikelet supply trace by fusion in the glume cushion.

Walton C. Galinat

2. On the individual breeder's gene pool.

With the hazards of genetic erosion now common knowledge, the corn breeders, both commercial and public and almost without exception, have started their own isolated gene pools of variation into which they introduce all available exotic stocks of maize. The idea of their own

living bank is to have a ready source of variation to screen for any trait of emergency value. If the breeder wishes to maintain maximum variability comparable to that in a wild population of teosinte, only 1 or 2 seeds from each plant, regardless of ear size, should be saved to propagate the gene pool. In contrast, if all seed is bulked and a random sample planted, there will be automatic selection for certain traits such as increased ear size with resulting loss of variability. The least productive plants may, in some adverse circumstances, hold the greatest potential for corn improvement.

Walton C. Galinat

3. Chromosome morphology of white multiple tester and its hybrid with Burnham Spreader.

In view of the fact that the white multiple tester is used extensively in genetic studies, it was found desirable to study in detail the chromosome morphology to distinguish the individual chromosomes.

The ten chromosomes of these two stocks have been identified from preparations of cells showing all the ten chromosome pairs. The averages of ten such cells, with additional information on some of the chromosome pairs lying free of the rest either individually or in groups of varying numbers, have been tabulated. The rates of contraction of different chromosomes within cells and between cells tend to vary. Hence, a great number of cells was examined.

White multiple tester:

At pachytene the twenty chromosomes form 10 bivalents and one of them is the nucleolus organizing pair. The longest chromosome is 84.6 u with an arm ratio of 1.9. Chromosome 4 has a knob situated internally on the long arm. The fifth chromosome, which has a nearly median centromere, has a small chromomere in the longer arm. The nucleolus organizer chromosome has a small internal knob in the long arm and is similar in morphology to the organizer chromosome of other stocks; it occupies the 6th position by virtue of its length. The long arm of chromosome 8 bears an internal knob and adjacent to this knob towards the terminal end there is a small chromomere. Chromosome 9 is terminated by a knob in its short arm while chromosome 10 is distinct in having a short arm the greater part of which is heterochromatic (Table 1).