2. The location and penetrance of a gene (tr) for two-ranked (distichous) spike from Tripsacum.

One of the phenotypic effects of *Tripsacum* chromosome Tr9 when transferred to maize that was observed first in an interchange derivation of this chromosome by Maguire (1961) is that of reducing the number of kernel rows on the ear. When we recently altered the background of our chromosome 2 tester gene stock to that of 8-rowed or 4 ranked ear, the effect of the extra alien chromosome Tr9 in reducing kernel row number was manifested as a change to the four-ranked or two-ranked spike, a taxonomic trait of both *Tripsacum* and teosinte which distinguishes, in part, these relatives from maize. This evidence suggests a gene for two-ranks in Tr9 which is only able to express itself when the maize background is fixed at a low degree of floral compaction (condensation). The basic change controlled by this gene on Tr9 appears to be distichous *vs* decussate spike.

Because the long arm of Tr9 is known to carry at least 6 loci in common with the short arm of maize M2, a linkage test for a *tr* mutant gene out of northern flint was made with the M2 marker genes lg_1 gl_2 v_4. In each case the F_2 repulsion phase data indicated independent assortment with the *tr* gene. Because Tr9 is also known to have pairing affinity with M10, a linkage analysis of *tr* with chromosome 10 markers is being made.

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3. A formula for giant ears in maize.

Ears up to 22 inches long when wet and grown at wide spacing in Waltham, Massachusetts have been developed from the following combination of characteristics.

1. Heterozygosity for teosinte chromosome 9. A factor on this chromosome elongates the rachis internodes in the upper half of the ear and, thereby, eliminates a fasciated tip by allowing interlocking of cupules and spikelets. In highly condensed ears of certain North American corn, the surface area necessary for development of many rows near the ear tip comes from a flattening (fasciation) of the rachis.
2. Homozygosity for fasciation (high condensation) of the ear. This causes the cob to be highly vascularized at its base.

3. A single main ear borne lower than half-way down the stalk.
4. A tall (9 to 10') late flowering plant with tillers.
5. A long central-spike in the tassel.

Wide row spacing in the field is essential for the development of maximum ear size by this formula. Its plants may even be barren at high population densities. Because the current fad requires that U.S. corn be adapted for close row spacing, this giant eared corn may be better suited to tropical and sub-tropical areas where the greater food demands are met by intercropping such as the ancient corn-beans-squash eco-system or possibly this in combination with multiple cropping or with crops of different maturities. For example an early small sweet corn in alternate rows might be harvested before it competed with the giant eared corn for solar radiation.

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4. Pollen size and the origin of maize.

Because the size of the oldest known *Zea* pollen is larger than that of present-day Mexican teosinte (Table 1), one can only conclude that the oldest known pollen could not be that represented by any of the present-day Mexican teosintes. Because this oldest known pollen compares more favorably in size with that of present day corn, it has also been concluded that "the ancestor of corn is corn and not (Mexican) teosinte," (Mangelsdorf).

If we consider Mexican teosinte and maize to be products of co-evolution resulting from disruptive selection between man and nature for features involved in their different adaptations for seed dispersal and survival, the above pollen size data could also be interpreted as the result of an alternate possibility involving a large-pollen teosinte such as certain types from Guatemala. The smaller pollen (and fruit case) in present day Mexican teosinte may be, like the block inheritance distinguishing these species, part of a system evolved to cope with some aspects of gene flow from maize. Increased condensation together with increased kernel size due to maize introgression into teosinte produces an incongruous combination of parts for survival in the wild because an expanded kernel that protrudes outside a condensed fruit case is left