A survey of the published data on convergent improvement shows that results are, as expected, conflicting and the method has been unsuccessful more often than not. The data showing lack of improvement are of particular interest here. Of 54 single crosses of second cycle recovered lines of B2 and K4 tested by Sprague et al. (1959) not a single one was equal in yield to the original single cross. Of 40 single crosses involving recovered lines of Wf9 and 38-11 tested by Lonnquist (1960) not one was equal in yield to the original single cross.

When blocks of teosinte or Tripsacum genes are involved in heterosis convergent improvement is obviously not a valid test to distinguish between dominance, overdominance, and epistasis as the principal factor in heterosis. Practiced for a sufficient number of cycles on inbred strains carrying blocks of teosinte or Tripsacum genes, convergent "improvement" will almost certainly lead to eventual extinction of the lines.

P. C. Mangelsdorf

4. Linkage relations of the gene for pointed kernels.

An indication previously reported (MNL No. 35) that pointed kernels, characteristic of certain varieties of popcorn, may be a simple Mendelian character exhibiting incomplete dominance and having its locus on chromosome 4 has been substantially confirmed by additional data obtained in 1962. F_2 populations of crosses of round and pointed kernels segregated as follows:

	279A	279B	660 Su su	660 su su	Total
Pointed	45	36	104	18	203
Intermediate	96	86	177	56	415
Round	31	32	66	36	165
	172	154	347	110	783

The data fit a 1:2:1 ratio with reasonable closeness and in this respect differ from those of Hayes and East, 1915, which indicate that two factors are involved in the inheritance of pointed kernel shape. The consistent deficiency of round genotypes is probably due to the effect of the fourth chromosome Ga factor carried by the pointed-kernel stock. Evidence of linkage with Su, another chromosome 4 gene, is furnished by the data from family 660 in which 19 percent of the ears originating from starchy seeds were round kerneled compared to 31 percent among those originating from sugary seeds.

Family 660 was also segregating for Ts5. The segregation for this character among the three classes for kernel shape was as follows: pointed, 63:59; intermediate, 129:104; round, 57:45. There is no indication in these data of linkage between Ts5 and kernel shape. Therefore if kernel shape is indeed linked with the Su-su and Ga-ga loci as the other data indicate the sequence of genes must be Pt Ga Su Ts5. Additional tests involving backcrosses are being made to determine whether this conclusion is correct.

There is some indication of linkage between kernel shape and development of a staminate tip on the ear. Segregation for presence and absence of a staminate tip among the three classes for kernel shape was in one population as follows: pointed, 8:13; intermediate, 26:20; round, 13:2. If this indication is confirmed by further tests one more primitive character will be added to the list of those, Tu, Ga, Pt, and possibly Ts5, which have their loci on chromosome 4.

P. C. Mangelsdorf
W. C. Galinat

5. Low penetrance of mutant dwarfs arising in teosinte derivatives.

We have repeated the experiments reported earlier (MNL 35) in which mutant dwarfs occurring in teosinte derivatives failed to segregate normally in F_2 populations of crosses with various inbred strains. The data on segregation of dwarfs obtained in 1962 are similar to those previously reported but are now explicable. The ears in F_2 populations in which the parental mutant dwarfs failed to reappear could be classified with respect to their ears into normal, intermediate, and tripsacoid. In 14 F_2 populations in which the dwarfs failed to appear or occurred in low frequencies, the ears were classified as follows: normal, 152; intermediate, 330; tripsacoid, 165.

These data show that the segregation for the tripsacoid condition is approximately normal. In some populations the tripsacoid condition of the ear is accompanied by conspicuous dwarfing of the plants, in other populations it is not.

P. C. Mangelsdorf
W. C. Galinat

6. The tripsacoid nature of variable mutants.

Because the mutants arising in maize-teosinte derivatives are often variable and difficult to classify, it occurred to us that some of the variable mutants arising spontaneously in maize or appearing after inbreeding might have arisen in the same manner and may be tripsacoid