2. Inbreeding depression in autotetraploid maize.

The rate at which autotetraploids approach homozygosity during inbreeding is slower than in diploids. In diploids, loss in vigor during selfing parallels loss in heterozygosity. If, in autotetraploids, one assumes that:

(1) homozygosity, per se, is responsible for reduction in vigor,
(2) all three heterozygotes are equal in vigor (AAAa = AAaa = Aaaa),
(3) only chromatid segregation occurs,
(4) the ultimate amount of vigor loss is 73% (based on Jones' diploid single cross data),
(5) all plants are euploid,

then it turns out that the reduction in vigor from the S_0 to the S_1 amounts to approximately 7%. If one considers chromosomal segregation only, the value amounts to approximately 3%.

In 1959, 40 S_0 and S_1 families were compared in a replicated split-plot trial. The S_1 was found to be considerably less vigorous, as measured by yield of grain, than we had expected. The S_1, on the average, yielded 70% as much as the S_0, a value comparable to that encountered in diploid material. However, in 1960, 25 S_0 - S_1 comparisons were made, and the S_1 mean yield was 82% of the S_0.

A significant family x generation was found in the 1960 data. Six of the 25 families showed less than 10% loss in vigor after a generation of selfing.

D. E. Alexander
E. H. Sonnemaker

3. Tetraploid genetic stocks now available.

We now have marker stocks of the following types available and will share them with those interested in them:

sugary 1
white endosperm
waxy
golden 1
chocolate pericarp
liguleless 1
ACRPr (probably homozygous)
brown midrib 1

A number of combinations of these, and other mutants, are made up. New stocks are also being worked up.

In addition, diploid stocks homozygous for el are available. These stocks are of different maturities and are related to the inbreds, WF9, W22, W23, Oh40B, K155 and R4. Hybrids between some of these strains also are available.

C. S. Levings, III
D. E. Alexander

4. Performance of advanced generations of hybrids of autotetraploid maize and Euchlaena perennis.

In 1957, crosses were made between elongate-derived autotetraploid strains of corn and the 40 chromosome teosinte, E. perennis. The F_1 was weakly perennial. One plant was maintained in a pot in the greenhouse for three years and continued to flower intermittently for two and a half years before dying.

Advanced generations of the hybrid continue to resemble the F_1 closely with respect to tillering, plant morphology, flower morphology and time of flowering. A few segregates, however, have been found that possess eight-rowed and six-rowed ears; none of the segregates is strongly rhizomatous.

These observations suggest that preferential pairing occurs. This has not been verified cytologically, however.

Seed of E. perennis and of advanced generations of the hybrid through F_6 is available to anyone interested.

D. E. Alexander
J. B. Beckett

5. Genetic location of centromeres in maize.

Ordered tetrads of some of the fungi provide us with a mechanism for the mapping of centromeres. Autotetraploid maize likewise provides us with a unique mechanism for the mapping of centromeres although this mechanism differs from that of the ordered tetrads. This technique is based upon the occurrence of the phenomenon of double reduction. Double reduction occurs when the meiotic mechanism partitions 2 chromatids from 1 chromosome to the same gamete, which is in contrast to the ordinary circumstance when each gamete regularly receives one chromatid from each of 2 chromosomes of the 4. α has been designated by Mather as the coefficient of double reduction. In order for this phenomenon to take place a single cross-over must occur