7. Progress towards isolating the Tripsacum homoeolog to maize chromosome 3.

Previously the tripsacum homoeolog to maize chromosome 3 has always immediately dropped out from the progeny of the second backcross to the marker stock maize. In a single plant it has now survived to the third backcross to maize, although unexpectedly captured together with three other extra tripsacum chromosomes. The four extra chromosomes of this plant (2n = 20 + 4) appeared throughout meiosis as univalents, indicating they are different from each other. At least one of them may carry $\underline{A_1}$, $\underline{Sh_2}$, $\underline{Lg_2}$ loci corresponding to maize chromosome 3.

From 56 observations made at pachytene, it was possible to tentatively identify two out of the four univalents. One is a very short knobless chromosome averaging only 12.9 u in length, or similar to that of chromosome 18, the smallest in the complement of T. dactyloides. The other is the important nucleolus organizing chromosome, Tr 16, of tripsacum. Tr 16 as a univalent was observed to associate with the maize nucleolus along with the chromosome 6 bivalent of maize. The remaining two chromosomes each have a terminal knob. They could not be classified.

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8. Trivalent frequencies in one of the control crosses for the triple heterozygote of maize chromosome M4, teosinte segment t4s and tripsacum partial homoeolog Tr 7.

In last year's MNL (45:101) we reported that when tripsacum chromosome Tr7 marked by the $\underline{Su_1}$ locus was added to the heterozygous fourth chromosome segment of teosinte to give the triple heterozygote M4, t4s, Tr7 a high frequency of trivalency of 60 to 70% was observed at diakinesis and metaphase I. One of the two isogenic controls, M4, M4, Tr7, has now been produced and studied. The second control t4s, t4s, Tr7 has not been studied.

In the first control, M_4, M_4, Tr7, 65 cells examined at diakinesis showed 24.6% trivalency and 30 cells at metaphase I had 20% trivalency.

In addition to the true trivalency, 33% of cells at diakinesis and 20.3% of cells at metaphase I showed a false association of the tripsacum univalent with one of the maize bivalents. In these cases the univalent was positioned in such a way that a chiasma could not be inferred.

Thus, it could be that the higher trivalency in the triple heterozygote (65%) over that of one control (23%) was due to the presence of the teosinte segment. On the other hand, it is possible that mere heterozygosity for this segment had an effect. This possibility will be tested by combining Tr7 with the homozygous t^4s, t^4s teosinte segment.

In the triple heterozygote M_4, t^4s, Tr7 reported last year, the pachytene spread was generally very poor. Whenever we could identify the tripsacum univalent in a small sample of analyzable cells, it either appeared as a univalent or it was clearly "hooked" onto the maize-teosinte fourth chromosome bivalent in the long arm and not with the short arm where the essential segment of teosinte has been assumed to be located. Additional linkage studies of this teosinte chromosome segment are necessary and are in progress.

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9. Altered morphology of the Gl_3 chromosome in progenies showing a higher transmission rate.

During a cytological study of a family of plants showing a higher transmission rate of the Gl_3 chromosome (Tr 13) in progenies of 20 + 1 plants, a single plant was found where the original Tr 13 chromosome seems to have suffered a morphological change. This chromosome, which originally had a knob in its long arm, lost it and appeared as a small fragment at pachytene. In 10 of the 15 observations made at pachytene, the fragment was found to be attached to the centromere of a maize bivalent. In three cases it was found lying free and in two other cases it was found on a maize bivalent. A somewhat similar fragmentation of the Su^d chromosome (Tr 7) has been reported earlier by Rao and Galinat (MNL 42:105-106). It is not known if the fragment represents the knobless arm of the original Tr 13 chromosome, derived as a result of breakage at