Table 2
Distribution of Chromosome Numbers in the Microspores of 62-588-89

| | Number of Chromosomes | | | |
|---|---|---|---|---|
| | 10 | 11 | 12 | 13 |
| Microspores observed | 3 | 9 | 12 | 3 |
| Microspores expected with random distribution | 3 | 10 | 10 | 3 |

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10. Intra- and intergenomic affinities of maize and Tripsacum chromosomes.

In order to assess the significance of chromosome association in maize-Tripsacum hybrids, intragenomic synaptic relationships of maize and Tripsacum were studied. The frequencies of chiasmatic associations and side by side associations of chromosomes (which probably represent homologous or homeologous pairing, Person, Canadian Jour. Bot. 33:11-30, 1955; Kimber and Riley, Bot. Rev. 29:480-531, 1963) at meta-anaphase of meiosis in a haploid maize plant and at metaphase in the haploid genome of Tripsacum from the triploid hybrid [(maize x T. floridanum) x maize] were scored. If the association frequency found in the hybrid (chiasmatic and side by side) resulted to a large extent from intergenomic pairing, then such association should be in excess of the sum of the individual pairing frequencies of the haploid genomes of the constituent species. If, on the other hand, the pairing in the hybrid is autosyndetic or predominantly so, then the association in the hybrid should be equal to or less than the sum of the pairing in the haploid genomes of the parental species. The mean per cell of chiasmatic association in haploid maize, haploid genome of Tripsacum, and the $F_1$ hybrid was 0.06, 0.20, and 2.28 respectively while the mean per cell of side by side association in the three materials respectively was 0.28, 0.20, and 0.69. It can at once be seen that the pairing in the hybrid is much higher compared to the sum of mean pairing in the haploid genomes of maize and Tripsacum (2.28:0.26 chiasmatic and 0.69:0.48 side by side associations). Thus a significant amount of pairing in the maize-Tripsacum hybrids is intergenomic and involves maize and Tripsacum chromosomes.

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11. Nonrandom segregation of Tripsacum floridanum chromosomes in the progeny of the triploid hybrid [(maize x T. floridanum) x maize].

In order to study the mode of segregation of the Tripsacum chromosomes on the female side of the triploid hybrid, the distribution of chromosome numbers in a progeny population of 150 plants obtained by backcrossing the triploid hybrid by the maize parent was studied. The data are presented in the following table.

Random segregation of Tripsacum chromosomes would follow a distribution obtained by expanding the binominal $(1/2 + 1/2)^{18}$. The above data show clearly that the distribution is extremely skewed toward the side of the

Table 1
Segregation of Chromosomes in the Progeny of the Triploid Hybrid [(maize x T. floridanum) x maize]

| Chromosome Number | Number of Extra Tripsacum Chromosomes | Observed Frequency | Frequency Expected on Random Segregation of Chromosomes |
|---|---|---|---|
| 10 | 0 | 1 | 0.00 |
| 20 | 0 | 29 | 0.00 |
| 21 | 1 | 46 | 0.00 |
| 22 | 2 | 21 | 0.15 |
| 23 | 3 | 13 | 0.45 |
| 24 | 4 | 18 | 1.80 |
| 25 | 5 | 7 | 4.95 |
| 26 | 6 | 7 | 10.65 |
| 27 | 7 | 2 | 18.15 |
| 28 | 8 | 1 | 25.05 |
| 29 | 9 | 2 | 27.75 |
| 30 | 10 | 1 | 25.05 |
| 31 | 11 | 0 | 18.15 |
| 32 | 12 | 1 | 10.65 |
| 33 | 13 | 0 | 4.95 |
| 34 | 14 | 0 | 1.80 |
| 35 | 15 | 0 | 0.45 |
| 36 | 16 | 1 | 0.15 |
| 37 | 17 | 0 | 0.00 |
| 38 | 18 | 0 | 0.00 |
| Total | | 150 | |

low chromosome classes (0-5). It appears that gametic or zygotic combinations involving high numbers of Tripsacum chromosomes are systematically eliminated.

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12. Transmission frequencies and phenotypic effects of two Tripsacum floridanum chromosomes in addition monosomics of maize.

In the summer of 1962 several maize plants which are addition monosomics for T. floridanum chromosomes were isolated from the progeny of the triploid hybrid [(maize x T. floridanum) x maize]. Synaptic relations, transmission frequencies and phenotypic effects of two of these, identified at pachytene as Tripsacum chromosomes 5 (length, 39.96 microns; arm ratio, 4.1:1.0) and 11 (length, 22.04 microns; arm ratio, 4.0:1.0) are studied and reported here. Neither of these chromosomes showed any synaptic relations with any of the maize chromosomes at pachytene or other stages of meiosis. At pachytene, however, their terminal knobs were usually seen to be sticking with the knobs on the maize chromosomes. This sometimes persisted to diakinesis where configurations consisting of associations of three chromosomes were found.

In backcross progenies the two addition monosomics showed transmission frequencies of 32.0% (chromosome 5) and 29.2% (chromosome 11).