Cross	P. sorghi Culture	Observed Ratio Res.	Seg.	Susc.	x^2	P Value (1:2:1)
NN14 x B14	90laba	36	67	22	3.784	0.10-0.25
NN14 x B14	933a	36	67	22	3.784	0.10-0.25
M16 x B14	90laba	17	41	15	1.219	0.50-0.75
M16 x B14	933a	17	41	15	1.219	0.50-0.75

No progeny in the F_3 was uniformly resistant or susceptible to one culture and segregating for the other or uniformly resistant to one but susceptible to the other.

The dominant gene has previously been designated as Rp_3. Gene Rp_3 acts as a dominant in conferring resistance to culture 90laba of P. sorghi and as a resessive in conferring resistance to culture 933a. The apparent reversal of dominance may be accounted for on the basis of dosage effect of a single allele or on the basis of two alleles being closely linked.

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1. Preferential pairing in chromosome 10 structural heterozygotes.

Rhoades (1952, in Heterosis, Iowa State Press) has observed at diakinesis a high degree of preferential pairing of structurally alike homologs in chromosome 10 trisomes which were duplex or simplex for abnormal chromosome 10 (K10). Results indicating preferential pairing of chromosome 10 are reported here for duplexes (K10/K10/k10/k10) derived from K10-carrying asynaptic diploids crossed as females with an established tetraploid stock. The duplex heterozygotes were backcrossed to the tetraploid parent and the resulting progeny were scored for K10 in dividing root tip cells prepared by a modified Feulgen squash technique. The data obtained are presented below.

Duplex crossed as	#plants	# progeny with OK10	1K10	2K10	total
male	2	11	74	6	91
female	5	9	93	13	115
No. observed		20	167	19	206
No. expected with random chromosome segregation		34.33	137.33	34.33	205.99
x^2		5.98	6.42	6.86	19.26

The somewhat reduced ability of K10-carrying pollen to compete with k10 pollen in fertilization may account for the slight excess of male backcross progeny in the OK10 compared to the 2K10 class while the reverse imbalance noted in the female data might reflect the occurrence of preferential segregation of K10 (Rhoades, 1942, Genetics 27:395). Assuming that these two complicating factors would essentially cancel out each other, the male and female data were pooled for purposes of x^2 calculations.

The observed distribution of K10 among the progeny does not fit (x^2=19.26, P=0.005, df=2) that expected on the basis of random chromosome 10 pairing and disjunction in the duplex parents. Rather, the data suggest the occurrence of a high frequency of homomorphic bivalents (K10/K10 and k10/k10) leading to the excess of 1K10 progeny. Cytological data on chromosome 10 pairing relationships at diakinesis support this contention. It was found that homomorphic bivalents occurred in 195 (56.7%) among a total of 344 microsporocytes while heteromorphic bivalents occurred in only 43 cells (12.5%). Quadrivalents and trivalents plus univalents were found in 98 (28.5%) and 8 (2.3%) cells, respectively. If pairing and chiasma formation were random among the four chromosomes 10 in duplex heterozygotes, the frequency of homomorphic associations among total bivalents scored should be only 33.3% whereas it was actually found to be 81.9%. This represents considerable preferential pairing.

Undoubtedly preferential synapsis will render the factors of double reduction and numerical non-disjunction considerably lower in this case than the estimates of 2.7% and 2.6% for chromosome 4 (Catcheside, 1956, Heredity 10:205) so that their elimination from the above considerations is warranted.

A. J. Snope

2. The effect of abnormal chromosome 10 on numerical non-disjunction

Tetraploids carrying 0, 1, and 2 abnormal chromosomes 10 (K10) were derived from asynaptic diploids segregating for