allele. Double crossover bivalents contribute single crossover strands to the region (1) and region (2) classes and noncrossover strands to the (0) class and it was assumed the complementary strands would occur in the same proportion of 70% $\underline{Lg}$ and 30% $\underline{lg}$. Bivalents with single chiasmata in region (1) also give rise to heteromorphic dyads and again the assumption of 70% preferential segregation was made. Noncrossover bivalents and bivalents having a single chiasma in region 2, according to the crossover hypothesis, result in homomorphic dyads and random segregation. If there is no chromatid interference, the percentage of megasporocytes with double chiasmata, with a single chiasma in region 2 ($\underline{Lg}$-$\underline{A}$), with a single chiasma in region 1 ($\underline{Gl}$-$\underline{Lg}$), and with no chiasma in the long arm of chromosome 3 can be calculated. The chiasma values can then be converted back to strand frequencies. The calculated frequencies of the different kinds of chromatids are given below with the actual numbers obtained.

	(0) Gl Lg A	(0) gl lg a	(1) gl Lg A	(1) Gl lg a	(2) Gl Lg a	(2) gl lg A	(1-2) gl Lg a	(1-2) Gl lg A
obs.%	26.2	12.1	22.3	9.2	11.6	6.6	8.4	3.6
calc.%	25.5	12.8	22.1	9.4	11.5	6.7	8.4*	3.6*

*Observed values used as basis for calculation.

The close agreement between the calculated and observed values suggests that the same amount of preferential segregation takes place in all heteromorphic dyads and is further indication of the validity of the crossover hypothesis.

M. M. Rhoades

3. <u>A test of preferential segregation in microsporo-genesis.</u>

Preferential segregation through the female of heterozygous abnormal chromosome 10 and other chromosomes heterozygous for knobs in the presence of

abnormal 10 has been studied thoroughly. Based on these studies, the theory has been proposed that preferential segregation is dependent upon crossing over and preferential orientation of knobbed chromosomes toward the functional basal megaspore in the linear tetrad. Preferential orientation is attributed to the abnormal 10 associated neocentric activity in the regions of chromosomal knobs. No reports of attempts to obtain preferential segregation through the male have yet appeared. Since the tetrad of microspores is non-linear, preferential orientation might, therefore, not be expected though neocentric activity is present. Thus, tests for preferential segregation throug the male could begin to test the above theory through negative results could be attributed to other possible differences in microsporogenesis and megasporogenesis.

In order to study the effects of abnormal 10 through the male, one cannot merely score for segregation of a gene closely linked to a knob which is heterozygous since all pollen grains function. The type of preferential segregation which might be observed must necessarily involve at least two different heterozygously knobbed chromosomes and their heterozygous markers closely linked to the knobs. Segregation in such a female with abnormal 10 results in more megaspores carrying both knobs and their linked markers than is expected by chance alone. Crosses were therefore set up to determine whether segregation of knobbed chromosomes through the male also might result in more microspores carrying both knobbed chromosomes, and/or the reciprocal class of neither knobbed chromosome, than would be expected by chance alone.

In the first experiment segregation of abnormal 10 itself was not scored. Followed instead were markers closely linked to two other knobs known to be affected by abnormal chromosome 10 in the female.

$$\frac{k9\ wd}{k9\ wd}\quad \frac{k3\ lg}{k3\ lg}\quad \frac{k10}{k10}\ \text{♀}\qquad x \qquad \frac{K^M9\ Wd}{k9\ wd}\quad \frac{K^M3\ Lg}{k3\ lg}\quad \frac{K^L10}{k10}\ \text{♂}$$

Wd Lg	Wd lg	wd Lg	wd lg
2782	2720	2641	2700

The second experiment involved abnormal 10 marked by r and knobbed chromosome 3 marked by Lg.

$$\frac{k3\ lg}{k3\ lg} \quad \frac{k10\ r}{k10\ r}\ ♀ \quad x \quad \frac{K^L 3\ Lg}{k3\ lg} \quad \frac{K^L 10\ r}{k10\ R}\ ♂$$

$$\frac{r\ Lg}{1755} \qquad \frac{r\ lg}{1683} \qquad \frac{R\ Lg}{1812} \qquad \frac{R\ lg}{1811}$$

These results indicate preferential segregation does not take place in the male under the conditions of these experiments. Since the above data only apply to segregation at MII, further crosses are being made to determine MI segregation as well as MII segregation in plants with knob consitutions differing from those in the crosses reported here.

Annette Waters

4. Studies with tetraploids and haploids containing abnormal 10.

The perennial question as to the relative influence of chromosomal and genetic effects on autotetraploid sterility is being re-examined in maize. Tetraploid seeds, with and without abnormal 10 (K10), have been obtained by selecting full grains from the cross, K10/k10 as X 4N, and will be grown this summer, sporocyted, and selfed to determine fertility levels. Data on chromosome association and anaphase behavior will be collected from the sporocyte material and correlated with the fertility data to determine the effects of K10-induced meiotic alterations on fertility.

Haploid plants, with and without K10, will be selected this summer from among the gl seedlings resulting from the cross, K10/k10 gl X Coe's haploid inducer stock-6. These plants will be sporocyted and outcrossed as females to provide material amenable to an analysis of the effect of K10 on the nature of crossing-over in maize haploids (see Alexander, 1964, Nature 201:737).

A. J. Snope

5. Recombination in homozygous T6-9b and normal chromosome 9.

Crossover studies with $\frac{Yg\ c\ Wx}{wd\ C\ Wx}$ $\frac{T6\text{-}9b}{T6\text{-}9b}$ individuals showed an altered distribution of exchanges when compared with standard values for the same regions in plants having normal chromosome structure. Crossing