change brings a great increase in bivalent formation, and eliminates formation of the more complex types of quadrivalents.

If this change in E. perennis can be considered to be evolutionary in nature, it may be deduced that E. perennis is intermediate along the road from autotetraploidy to functional diploidy. If the goal is merely the attainment of 100% chiasma interference for whole chromosomes, it seems likely that the end result could be an individual whose chromosomes pair randomly at pachynema, but which has only bivalents at diakinesis. Such a quadridiploid would show the 5:1 backcross ratios typical of autotetraploids, but would have perfect chromosome stability.

The finding of a probable inversion in the short arm of chromosome 9 in perennial teosinte (article 8 above) indicates that E. perennis is a recent autotetraploid. The modification in chiasma frequency may therefore relate to a more or less simple genetic system. If simple, it may be amenable to use in improving the fertility of tetraploid maize.

-- Donald L. Shaver

13. Pollen physiology and biochemistry.

A study of pollen biochemistry is in progress. Preliminary results (see MNL 33:23, 1959) suggest that the pollen grain can be considered as a metabolically rich entity, analogous to a microorganism. Relatively small samples of pollen can be used for micro-qualitative and quantitative chemical determinations, as well as for physiological observations. From a knowledge of pollen biochemistry, it may be possible to judiciously employ specific chemical tests to elicit a colored test-reaction, thus affording the possibility of describing pollen phenotypes.

To deal with individual pollen grains, the autonomy of the grains and their contents is required in the test system. This requirement can be met favorably by "plating" pollen on agar-type surfaces. Pollen grains will absorb some chemical test materials from 1-5% agar (Difco certified Bacto-agar), yielding the color test. The use of petri dishes for plating is particularly adapted to rapid counting by using the standard equipment of the bacteriologist. Although aliquots of only dried, non-viable pollen samples have been studied thus far, samples of viable pollen will be tested as the pollen becomes available.

-- D. B. Walden

14. Effect of the abnormal chromosome 10 on chiasma formation and metaphase orientation in T6-9b heterozygotes.

Cytological observations at diakinesis, metaphase I, and quartet stage were made on two T6-9b heterozygotes, sib plants which differed in that one was N 10/N 10 and the other was N 10/abn 10. The break in 9S is proximal to the Wx locus and the break in 6L is between Y and the centromere. A large knob was present on chromosome 9 while the 6^9 chromosome was knobless. The results are tabulated below:

Stage	Configuration	N 10/N 10	N 10/abn 10
Dk	rings of 4	14.9%	75.8%
	chains lacking a chiasma in 9S*	81.9	20.8
	other	3.2	3.4
		(502 cells)	(149 cells)
MI	alt. ring	0	5.9%
	adj. ring	3.4%	50.9
	alt. chain of 4	16.5	23.0
	adj. chain of 4	21.3	18.5
	triv. & uni.	58.8	1.8
		(437 cells)	(222 cells)
Quartets			
1 | 1 / 1 | 1	(alt, adj-1, triv. & uni.)	65.1%	74.8%
2 | 2 / 0 | 0	(adj-2, triv. & uni.)	29.8	23.3
1 | 2 / 1 | 0	(triv. & uni.)	5.1	1.9
		(1205 quartets)	(873 quartets)

* includes chains of 3 in which a chiasma was lacking in 9S and 6S.

The frequencies observed at Dk may not be very accurate since many cells were discarded because of superimposed chromosomes in the region of the nucleolus. However, it is obvious that a much higher chiasma frequency in 9S is found in plants carrying the abnormal chromosome 10. As a result, ring formation is higher at MI and the trivalent plus univalent class, in which chiasmata are missing in 9S and 6S, is very rare. The observed frequencies of quartet types can be derived from the observed MI frequencies for both N 10/N 10 and N 10/abn 10 plants if the following assumptions are made:

1) no interstitial crossing over

2) no loss of the univalent in the cytoplasm

3) equal adj-1 and adj-2 disjunction from the open ring

4) mainly adj-1 disjunction from chains of 4

The great majority of chains of 4 at Dk lack a chiasma in 9S. At MI these chains are oriented so that the terminal members go to the same pole.

Unfortunately pollen abortion counts were not made on these 2 plants. The predicted abortion is 54% for the N 10/N 10 plants and 70% for the N 10/abn 10 plants. It is interesting to compare the ovule abortion on sib ears with and without abnormal 10 in the same and in related families.

N 10/N 10 plants	No. ovules	% abortion
22708-A	508	53.1
B	477	41.3
2	458	43.4
6	230	45.6
22703-10	485	50.7
19	556	60.6
A	376	50.5
B	328	51.2
22708-8	527	57.3
9	443	54.9
18	462	65.4
21	428	63.4
M	484	61.4
22703-1	349	70.8
22704-1	400	66.7

	N 10/N 10	N 10/abn 10
average % abortion	50.1	63.0

The lower seed set on ears from plants with abnormal 10 is presumably due to a higher frequency of open rings at metaphase I. These would lead to adjacent disjunction and aborted ovules. The almost complete absence of zigzag rings at metaphase I must be a consequence of the extreme shortness of the two arms, 6S and 9S, which makes it difficult for the necessary twist to occur.

It is evident that the abnormal chromosome 10 causes a striking increase in chiasma frequency which, in turn, alters the types of MI configurations. This is in agreement with the increase in genetic crossing over observed by Rhoades and Kikudome and also noted in these translocation heterozygotes. The fact that zigzag rings are more frequent in plants carrying abnormal 10 may indicate that the effect of this chromosome is to cause a greater flexibility of the chromonemata permitting the occurrence of more chiasmata, as well as zigzag rings.

-- Ellen Dempsey

15. A test for pseudoallelism at the A_2 locus.

A mutant a_2 allele ($a_2^{Bl\,Mex}$) which was found by Rhoades in Black Mexican sweet corn is being tested for pseudoallelism with the standard a_2 allele (a_2^{St}). A cross of $\frac{Gl\ 17\ a_2^{Bl\,Mex}\ Bm}{gl\ 17\ a_2^{St}\ bm}$ X $gl\ 17\ a_2^{St}\ bt$ ♂ gave 10 A_2 seeds in an estimated population of 20,900. These plants were selfed and 8 proved to be contaminants while 2 arose by hetero-fertilization and had a_2 embryos. A second cross was made in which markers to the right and left of a_2 were available: