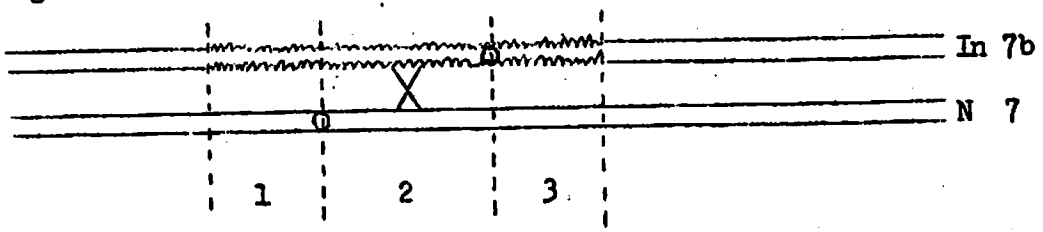
Non-homologous pairing is of frequent occurrence in inversion heterozygotes. In the case of pericentric inversions whose break points are of unequal distances from the centromere, non-homologous pairing leads to an interesting situation.



A crossover in region 2 will lead to the formation of a bridge and a fragment at the first anaphase, something which is not normally expected in a pericentric inversion heterozygote.

Limited data have been obtained using In 7b (S. 32 - L. 30) which is diagrammed above. It is difficult to get an unbiased estimate of the frequency of non-homologous pairing, since not all pachytene figures are analysable. However, with this inversion, which is a relatively short one, non-homologous pairing takes place about a third of the time. Three cases of a bridge and fragment were observed out of a total of 352 anaphases. Unfortunately sporocytes of control plants (normal sibs of the In 7b heterozygotes) are not available, so these data are inconclusive, since there is a possibility that the bridges could have arisen from small paracentric inversions which were not detected.

G. C. Doyle

NORTH CAROLINA STATE COLLEGE
Raleigh, North Carolina

1. Epistatic variance for yield in two varieties of corn.

Experiments have been underway at North Carolina State College to obtain estimates of epistatic variance in two open-pollinated varieties, Jarvis and Indian Chief. The genetic material included full-sibs and half-sibs from random inbred parents and non-inbred parents of each variety. The material has been grown in replicated yield tests at two locations for two years, and has given rise to the estimates presented in Table 1.

Table 1. Estimates of genetic variances in two corn varieties (pounds of ear corn per plant)

	Jarvis	Indian Chief
$\sigma_{10}^2 + 1/4\ \sigma_{20}^2 + 1/16\ \sigma_{30}^2 + \cdots$	.00176	.00125
$\sigma_{10}^2 + 1/2\ \sigma_{20}^2 + 1/4\ \sigma_{30}^2 + \cdots$	.00160	.00110
$\sigma_{01}^2 + 1/2\ \sigma_{20}^2 + 1/2\ \sigma_{11}^2 + 1/4\ \sigma_{02}^2 + 3/8\ \sigma_{30}^2 + \cdots$	.00272	-.00048
$\sigma_{01}^2 + 1/2\ \sigma_{20}^2 + \sigma_{11}^2 + \sigma_{02}^2 + 3/4\ \sigma_{30}^2 + \cdots$	.00061	.00070
$\sigma_{20}^2 + 3/4\ \sigma_{30} + \cdots$	-.00064	-.00060

σ_{10}^2 = genetic variance due to additive effects of genes.

σ_{20}^2 = epistatic variance due to additive x additive interaction effects.

σ_{30}^2 = epistatic variance due to additive x additive x additive interaction effects.

σ_{01}^2 = dominance variance due to dominance effects.

σ_{02}^2 = epistatic variance due to dominance x dominance interaction effects.

σ_{11}^2 = epistatic variance due to additive x dominance interaction effects.

The results obtained so far indicate that the additive genetic variance for yield is as large or larger than the dominance variance in both varieties. Estimates of epistatic variance are small and negative, and there is no evidence to date that an appreciable amount of the genotypic variance in yield in these varieties is due to epistasis. However, 83 percent of the lines from Jarvis and 67 percent of the lines from Indian Chief were lost during the process of inbreeding. This resulted in a five percent increase in yield and ear number in both varieties. If genetic variances are less in the reconstituted populations derived from the inbred lines because of changes in gene frequencies due to selection, the additive types of epistasis may be underestimated. Additional experiments are needed whereby the half-sib and full-sib families from non-inbred parents are also obtained from the reconstituted varieties.

S. A. Eberhart
R. H. Moll
H. F. Robinson