

The deviation from independent inheritance is not significant, although there is in both ears a higher percentage of Su seeds in the Bh class than in the bh class.

The data so far available indicate that the sequence is Bh, Bh, Su, and that it involves a total map distance of the order of 80 units. This suggests that both Bh genes occur in the long arm of chromosome 4.

The third Bh gene in this system appears to be linked with F1. Following are the data from three backcross ears:

Row	Number of Individuals				Total	Recombinations	
	Bh F1	Bh fl	bh F1	bh fl		No.	Percent
190	241	295	275	261	1072	502	46.8

If the F1 gene is the one on chromosome 2, then Bh is almost certainly on the short arm of this chromosome, near the lg locus. Crosses have been made to test this possibility.

### 3. Bh genes in common in the two blotching systems.

Since the two blotching systems involving the c and r genes are similar in their manifestations, and since both involve a locus on chromosome 4 with 40-45 percent crossing over between Bh and Su, the question arises whether the two systems have loci in common. In preliminary tests in 1955, stocks lacking one Bh gene in the c system were crossed with stocks lacking one Bh in the r system. The F1 seeds were, of course, completely colored because of the complementary action of C and R. Blotched seeds appeared in the F2 in about one half of the progenies. This indicated that stocks from one system were carrying Bh genes of the other, but did not prove that the Bh genes themselves were identical since many stocks which have no blotching do carry one or more Bh genes.

A more critical test was made in 1956. Fifteen different stocks of the composition cc rr but carrying all four of the Bh genes of the c system, were pollinated by two stocks of the r system, each lacking one Bh gene. It was assumed that if only part of the fifteen stocks carrying the four Bh genes of the c system were capable of producing blotches in crosses with stocks lacking one Bh gene in the r system, then it could not be concluded that the two systems had genes in common. But if all of the stocks carrying the four Bh genes of the c system were capable of completing the r system, then there would be at least a strong indication, if not final proof, that one of the four genes in the c system is identical with one of the five or more in the r system.

All fifteen of the crosses with row 162 showed blotching. All fifteen of the crosses with row 163 lacked blotching. Other tests showed that row 162 involves the same Bh gene as rows 188 and 189 above, in which linkage of Bh with Su is shown.

Our conclusion from the data now available is that the two systems have a Bh gene on chromosome 4 in common. Further tests could show, however, that there are two distinct Bh genes on this chromosome - one involved in the c system, one involved in the r system - and that these two genes are so closely linked that crossing over between them is rare.

4. The blotching inhibitor appears to affect both systems.

In last year's News Letter it was reported that the inbred Conn. P39 carries an inhibitor of blotching in the r system which is closely linked or allelic to one of the Bh genes. The question is whether this gene also inhibits blotching in the c system. To determine this a stock carrying all four of the Bh genes in the c system was crossed with Conn. P39. The F<sub>1</sub> seeds were Cc Rr and completely colored. The F<sub>2</sub> seeds segregated in a 9:7 ratio for self-colored and colorless or blotched. If the F<sub>1</sub> was heterozygous for all four Bh factors, then 31.6 percent (81:175 ratio) of all cc RR/Rr seeds should be blotched (31.6% x 75% x 25% = 5.925%). If the inhibitor from Conn. P39 suppressed blotching in the c system, then only one fourth of this percentage (1.48 percent) blotched seeds should occur. The data from six ears follow:

Total	Number of Kernels			Percent Blotched
	Colored	Blotched	Colorless	
2219	1221	49	949	2.2

The percentage of blotched seeds, 2.2 percent, is nearer the percentage expected, 1.48 percent, from the action of an inhibitor than the 5.9 percent expected if the inhibitor does not act on this system.

The inhibitor of blotching has no discernible effect upon the development of self-color, but the chromosome 9 inhibitor of aleurone color, the I gene, completely inhibits blotching.

5. The possible utilization of Bh genes in the classification of maize.

The four Bh genes in the c system and the five or more Bh genes in the r system may prove to be quite useful in the classification of races, varieties and inbred strains of maize. If the maize in question is