the effect. Crosses were made on several unrelated lines using pollen from mutant plants. In all cases the offspring segregated for mutant and normal types.

To exclude the possibility of a common external infection, kernels of a cross of normal by mutant (for both cases) were washed in 2.63% sodium hypochlorite, soaked in water overnight, and the embryos excised. The embryos were washed again and grown on a sterilized agar medium in testtubes. The mutant phenotype appeared on a number of the cultured seedlings, though not in numbers that would confirm a 1:1 ratio. Efforts to obtain fungal cultures from affected leaves have been unsuccessful.

Based on evidence so far obtained, one would conclude that the mutants are dominant mimics of two states of susceptibility to the fungus H. maydis. However, the striking resemblance of the mutant phenotypes to actual disease lesions raises some doubt.

A number of mutants resembling the large lesion type have been reported. Emerson (Cornell Memoir 70:3-16, 1923) describes a recessive mutant called blotched leaf (bl) which is expressed just before flowering. Simmonds (MNL 24:26-27, 1950) and Hornbrook and Gardner (Radiation Botany 10:113-117, 1971) report similar cases. Ghidoni (Academia Nazionale Dei Lincei, 1973) reports a necrotic lesion mutant linked to wx.

M. G. Neuffer

5. Interactions of the brown-plant anthocyanin factors.

The loci A, A2, Bz, Bz2, and C2 have recessive expressions characterized by partial or complete replacement of anthocyanins by brown pigments in husks, sheaths, cobs, and other plant tissues. Strains homozygous for B and Pl, in intensely pigmented, uniform background were developed. The comparative phenotypic expressions of a, a2, bz, bz2, and c2 now can be described with confidence from several years of tests and observations, along with the effects of these factors in combinations, two at a time. For the combinations, F2 families segregating for two factors were graded and defined without knowledge of genotype. Genotypes were identified individually from testcross results following harvest (the technical assistance of M. D. Murray in the conduct of these tests

is appreciated). The phenotypes of each of the combinations, recessive for one factor and homozygous dominant, heterozygous, or homozygous recessive for the second are given in Table 1, arranged repetitively to simplify systematic comparisons.

The effects of a, a2, and bz in combinations have been reported previously from limited observations in progenies segregating for b, pl, and other factors (Laughnan, Genetics 36: 559, 1951; Coe, Am. Naturalist 91: 381, 1957). Little can be added, apart from comparative descriptions, to the observations reported by Laughnan for these three factors, namely that a is epistatic to a2 and bz, and that a2 and bz together display a new phenotype. Combinations involving bz2 and c2 show some new information and unique effects. In all combinations a is epistatic: all display the gold phenotype. In all combinations c2 results in substantial weakening of color, similar to its effects singly (i.e., purple vs. mocha), and shows a dosage effect for intensity without alteration of the brown color type of the factor with which it is in combination. The combination a2 bz2, unlike a2 bz, is not different from a2 Bz2; consequently these plant color interactions agree with complementation tests in the aleurone tissue (Reddy and Coe, Science 138: 149, 1962) in signifying that the action of Bz2 follows the action of A2. The combination bz bz2 has a new phenotype, similar to that of a2 bz, providing no information on the order of action of Bz and Bz2 but suggesting that Bz function (glucosyl transferase) is diverse, and that it affects the formation of brown pigments specifically. In fact, it can be specified that the actions of A, Bz, and C2 are each essential to the formation of the darker brown pigmentations (ochre and mahogany), as are B and Pl, but A2 and Bz2 are not essential to their formation. The sensitivity of bz2 and of c2 tissues to dosage for A2, in which heterozygosity appears to heighten the intensity of brown pigmentation, is curious but apparently real. The dosage effect of A in bz2 plants, reducing necrosis when A is heterozygous, suggests that A may be limiting in the development of the necrotic phenotype.

The following action sequence is supported by the plant color interactions:

A - A2 - Bz2

Table 1

Expressions* of the factors controlling anthocyanins vs. brown pigments in plant tissues, singly and in combinations, with B and Pl.

	a a	a2 a2	bz bz	bz2 bz2	c2 c2
+ +		ochre-nec.	mahog.-nec.	mahog.-nec.	mocha
+ a	gold	ochre-nec.	mahog.-nec.	mahog.	mocha
a a		gold	gold	gold	wk. gold
+ +	gold		mahog.-nec.	mahog.-nec.	mocha
+ a2	gold	ochre-nec.	mahog.-nec.	dk. mahog.-nec.	dk. mocha
a2 a2	gold		caramel	ochre-nec.	wk. ochre
+ +	gold	ochre-nec.		mahog.-nec.	mocha
+ bz	gold	ochre-nec.	mahog.-nec.	mahog.-nec.	mocha
bz bz	gold	caramel		caramel	wk. mahog.
+ +	gold	ochre-nec.	mahog.-nec.		mocha
+ bz2	gold	ochre-nec.	mahog.-nec.	mahog.-nec.	mocha
bz2 bz2	gold	ochre-nec.	caramel		wk. mahog.
+ +	gold	ochre-nec.	mahog.-nec.	mahog.-nec.	
+ c2	lt. gold	lt. ochre	mahog.-nec.	mahog.	mocha
c2 c2	wk. gold	wk. ochre	wk. mahog.	wk. mahog.	

*gold: medium intensity brown with rich gold cast
ochre: dark brown with some yellow cast
mahog. (mahogany): dark brown with brick-red cast
mocha: medium brown with soft reddish-gray cast
caramel: light brown with slight yellow to red cast
nec.: necrotic in sheaths and husks after flowering
dk.: darker than is typical for that color
lt.: lighter than is typical
wk.: lighter than lt. (weak color)

The action of Bz follows that of A; that of C2 cannot be specified. The action sequence for these factors indicated by complementation in the aleurone tissue is not in disagreement with the above:

C2 - A - A2 - Bz - Bz2

E. H. Coe, Jr.