Because of the competitive advantage of Ga gametes over ga gametes all progeny of the cross (Hy X cross-sterile inbred) F_2 should be either Ga /Ga or Ga/ga and induce a full seed set when pollinated onto the cross-sterile parent. When 401-127 was involved not all F_2 plants, when acting as pollen parent, would induce a seed set on 401-127. Results from testing individual plants from the cross (Hy X 401-127) F_2 by pollinating onto 401-127 as the seed parent and by a ga/ga type as the pollen parent led to the formulation of a two factor genetic basis of cross-sterility. This hypothesis must be tested.

Inbreds tested must be divided into two groups on the basis of their behavior in F_2 progeny involving these inbreds crossed with a brittle stock. The first group involving 1001, 4524, and 4501 resulted in percentages of brittle seed not significantly different from 25%. Progeny from the second group segregated as follows:

Inbred	No. F_2 ears	% bt
24-6	1	25.4
	2	11.9
4513	8	21.7
	5	8.2
4541	4	25.2
	5	6.9

It appears that plants involved in these crosses were heterozygous for gametophyte factors at the Ga$_2$ locus. The inbred 4513, when tested, segregated with an average of 21.7% and 8.2% brittle seed and both classes were significantly less than 25%. This inbred might possess modifying factors, or two gametophyte factors at the locus each with a different competitive advantage over ga gametes. These results are of particular interest because these popcorns are long time inbreds.

In 401-127 there are uncertain indications of the presence of gametophyte factors on chromosome three linked to the dwarf locus, and on chromosome nine linked to the shrunken locus. Several other indications of the presence of gametophyte factors were found in 4541 linked with opaque, 4501 linked with shrunken, 4513 linked with waxy, and 24-6 linked with shrunken.

Leland R. House

2. A multifactorial r mottling system.

Further investigations have been made of the r mottling system reported in the 1954 News Letter. Evidence was given at that time which renders it unlikely that a mutable r is involved. Recent work shows the likelihood of a multifactorial system which is responsible for the development of aleurone color in a high percentage of cells of the

constitution $\underline{A}_1$, $\underline{A}_2$, $\underline{C}$, $\underline{r}$. This is reminiscent of the $\underline{r}$ blotchings reported by Mangelsdorf in the 1955 News Letter.

The original mottled stock was derived from a cross of P51 ($\underline{A}_1$, $\underline{A}_2$, $\underline{C}$, $\underline{r}$) x SA 24 ($\underline{A}_1$, $\underline{A}_2$, $\underline{C}$, $\underline{r}$). The F_1 had colorless aleurone; a small percentage of F_2 kernels showed faint to moderate mottling; by selection of the most deeply mottled kernels, one could obtain by the F_4 generation some plants which gave all deeply mottled kernels.

Table 1 gives the percentage of mottled kernels observed in various crosses and selfed progenies involving the mottled stock and the two parents from which it arose. It is apparent in reciprocal crosses that there is a greater percentage of mottled kernels when the mottled stock is the female parent than when it is the male parent (cf. lines 1 and 3, 4 and 6, 7 and 8, 12 and 14, 13 and 15.) This does not seem ascribable to a cytoplasmic influence since it makes no difference whether P51 or 24 was used as the female parent in such crosses as (51 x 24) x M and (24 x 51) x M (lines 14 and 15). It is assumed then that the reciprocal differences noted are due to dosage. Further, 24 seems to have a greater effect towards mottling than P51 (cf. lines 5 and 7, 6 and 8).

It is clear that plants of the mottled stock used as testers were of different genotypes since different percentages of mottled kernels resulted on some occasions when the same plant was used as a pollinator on several mottled plants (see Lines 12 and 13). In light of these differences between tester plants, it is not surprising that the data are variable.

A purely formal explanation can be advanced which gives rise to expected values (% mottled) which are not too incompatible with the observed values considering the complications added by tester plants of undefined genotypes. If one assumes: (1) that 7 loci are involved in the production of the mottled phenotype; (2) that all effective alleles at these loci have an equal weight of 1 and cumulative effect; (3) that all show a dosage effect; (4) that 24-6 has effective alleles at 4 of the 7 loci and P51 at the other 3 loci; (5) that the dosage necessary for the development of any mottling is 16, and higher dosages produce larger colored areas as well as more intense coloring; then the expected values for the various crosses are as listed in Table 1. Note that no attempt has been made to assume different weights for different loci, not has linkage been considered. Postulates of both types might offer possibilities of closer fits to observed data.

No germinal mutations to R have been observed in the mottled stocks which may be taken as evidence that the multifactorial system postulated is not causing $\underline{r}$ to mutate to $\underline{R}$ unless such events happen too late to take place in sporogenous tissue. Further, as Mangelsdorf noted in his $\underline{r}$ and $\underline{c}$ blotched stocks, the colored areas are not regular, nor do they show the same intensity of color.

Table 1. Comparison of observed % mottled and expected % mottled for various crosses.

	Pedigree	Observed % Mottled in 1956	Expected % Mottled
1.	P51 x M	0	0
2.	24 x M	0, 0, 4	0
3.	M x 51	100 (1 ear)	100
4.	M x 24	?	100
5.	(24 x M) x M	86, 90, 65, 78, 90, 83	87.5
6.	M x (24 x M)	100	100
7.	(51 x M) x M	80, 66, 65, 79, 64	62.5
8.	M x (51 x M)	99, 97, 89, 90, 86, 87, 98, 91, 99, 87	100
9.	M x (24 x M)	100	100
10.	P51 x 24	0	0
11.	24 x P51	0	0
12.	M x (51 x 24)	[1](48, 83), (65, 89) (95,90,80) (82,62), 85	94
13.	M x (24 x 51)	(68, 87) (63, 79), 89, 77, (69, 50)	94
14.	(51 x 24) x M	48, 52, 48, 50	50
15.	(24 x 51) x M	49, 59, 38	50
16.	51 x (51 x 24) or (24 x 51)	0	0
17.	(51 x 24) x 51	8, 2, 10, 3, 7, 4	6
18.	24 x (51 x 24) or (24 x 51)	0	0
19.	(51 x 24) x 24	4, 10, 4, 12, 9	6
20.	(P51 x 24) ♀	9, 7, 10, 5, 4, [2]72	4.5
21.	(P51 x M) ♀	38, 42, 38, 39, 47, 41, 37, 40, 36, 69	41
22.	(SA24 x M) ♀	61, 61, 60, 35, 26, 27, 27, 26	69

[1] Same pollinator used for data within parentheses.

[2] 1950 data.

An obvious possibility is that the multifactorial system is enabling or forcing r to become functional in some cells. We cannot, however, dismiss the possibility that the system acts to bypass the r locus, and the production of color has nothing to do with r.

Oliver E. Nelson, Jr.

3. A gene for iron chlorosis.

In the progeny of coop ear 54-613-1 (Oh 51A X "sh_3" pr selfed), four out of eleven plants were pale yellow striped and grew to approximately half the height of the normal sibs. One such plant was selfed and bred true in 1956. A complete nutrient solution including minor elements failed to bring about development of full green color in the greenhouse. Minor elements Ca, Mg, Fe, Mn, Cu, Zn, in combination with sulfate, phosphate, nitrate, and borate ions were added separately in excess. Not all possible combinations were tried. The Fe SO_4 treatment resulted in development of full green color whereas no other treatment was effective in overcoming the chlorosis.

J. M. Shively
H. H. Kramer

4. Interaction of endosperm genes.

Several new combinations of ha with su_2, du, and wx were synthesized and identified during the past year and showed some rather unusual interactions both with respect to the percent amylose in the starch and with respect to the temperature at which starch grains lose birefringence under polarized light. Data are given on page 120.

It appears that su_2 alone and with du and wx will reduce birefrengence end point temperature to about 55° C. Alone and in combination with su and su_2, ha raises the end point. Further the same genes, i.e. du and wx, which are lowered by su_2, also lower ha. The gene su which raises su_2 is also raised by ha.

With respect to amylose content, no combination with ha resulted in higher amylose than ha; su_2 combination with ha gave an unusually low value. The intermediate value of ha wx is of interest.