

($R^R R^{st}$) (Genetics 41: 872). Marbled (R^{mb}) has a similar, but not the same, effect on standard R^R in $R^R R^{mb}$ heterozygotes (PNAS 43: 1053). No evidence has been obtained to date proving that the action of stippled is altered in $R^R R^{st}$ heterozygotes. That is, the transallelic effect appears to be non-reciprocal.

Germinally transmissible mutations of stippled to self-colored aleurone (termed R^{sc} here, for convenience) occur in our standard stippled strain (inbred W22 background) with a frequency of about 2 per 1000 gametes (R. B. Ashman data).

All such R^{sc} mutants from R^{st} thus far tested have proved stable in $R^{sc} R^{st}$ heterozygotes. That is, they are refractory to the kind of genetic change which standard R^R invariably undergoes in $R^R R^{st}$ plants. It appeared earlier, on the basis of the results of a limited test, that these R^{sc} mutants from stippled likewise were incapable of "inducing" a heritable change in R^R in $R^R R^{sc}$ heterozygotes. (M.G.C.N.L., No. 31). This is known now to be incorrect. More extensive tests carried out in 1957 show that some self-colored mutants from stippled promote a marked change in color determining action of standard R^R in $R^R R^{sc}$ heterozygotes, and that others are either inactive in this respect, or only weakly active. Thus when stippled mutates to self-colored aleurone the capacity shown by the parent R^{st} allele to induce a genetic change in standard R^R in $R^R R^{st}$ heterozygotes, may or may not change also.

R. A. Brink

UNIVERSITY OF WISCONSIN
Madison, Wisconsin
and
MACDONALD COLLEGE OF MCGILL UNIVERSITY
Prov. Quebec, Canada

1. Mutation spectrum of variegated pericarp.

A progeny test involving more than twenty-five thousand plants, was used to study the mutation rate of a common variegated pericarp allele (P^{vv}) in homozygous (P^{vv}/P^{vv}) and heterozygous (P^{vv}/P^{wr}) maize plants in two otherwise near-isogenic stocks corresponding to inbred lines W22 and W23. The results were first reported in the 1956 News Letter (30: 137-138). Additional mutant types were observed in the study which were not relevant to the main problem and so were not included in the initial report. Data on the spectrum of mutation of a specific allele are rare in comparison with reports on the frequency of mutation, and it is now proposed to place in the record the complete data bearing on this point.

The P^{VV} allele common to all of the stocks used in this study exhibits a spectrum of mutation comprising six types. In addition to the medium variegated parental type, the frequencies of light variegateds, very light variegateds, orange variegateds, self reds, near selfs, and colorless pericarp and cobbed offspring are listed in the accompanying table according to the two inbred backgrounds in which the P^{VV} allele was tested. About half the offspring from heterozygous P^{VV}/P^{WR} plants, of course, had colorless pericarp, red cobs. They are entered separately in the table.

Pericarp Class	W22				W23			
	Homozygous		Heterozygous		Homozygous		Heterozygous	
	No. of Plants	Per Cent	No. of Plants	Per Cent	No. of Plants	Per Cent	No. of Plants	Per Cent
Med. var.	4325	94.546	2137	95.487	6114	90.097	3293	81.269
Lt. var.	101	2.208	48	2.145	330	4.863	314	7.749
V. lt. var.	7	0.153	0	0	7	0.103	15	0.370
Orange var.	2	0.044	0	0	4	0.059	4	0.099
Self red	125	2.732	46	2.055	257	3.787	390	9.625
Near-self	7	0.153	6	0.268	45	0.633	21	0.518
P ^{WV}	8	0.175	1	0.045	29	0.427	15	0.370
P ^{WR}	(0)		(2433)		(0)		(4018)	
Total of colored	4575		2238		6786		4052	

The abbreviated table in the 1956 News Letter showed that (1) mutation of the variegated pericarp allele to red and light variegated is much lower in homozygous P^{VV}/P^{VV} than in heterozygous P^{VV}/P^{WR} plants in the W23 but not in the W22 background, and (2) the rate of change to both red and light variegated was markedly lower in the W22 than in the W23 background.

Unequivocal conclusions cannot be drawn from the data in the present table on the relationship of heterozygosity or homozygosity and W22 or W23 background to the rate of mutation to very light variegated, orange variegated and near-self reds. The pattern, however, probably parallels that noted for mutation to red and to light variegated. This leads to the conclusion that all the mutants arise following some event which is subject to the already known Modulator dosage effect. Valentine (N. L. 31: 129-171, 1957) has interpreted orange variegated, however, as due to a mutation of the M_p component of the P^{VV} allele.

Colorless pericarp and cob mutants do not show an effect of heterozygosity on rate of origin from medium variegated. Furthermore, they occur with approximately the same frequency as very light variegateds, which would not be true if they arose by a further multiplication

and transposition of tr-Mp in very light variegateds. This relatively high frequency of occurrence, together with the observation that occasional medium variegated ears have a sizeable patch of mutant P^W tissue, leads to the tentative conclusion that these colorless pericarp types do not involve a detectable transposition event. This conclusion is supported by Brink's observations that a P^W mutant derived in a single step from P^{VV} produced the same Ds chromosome breakage pattern as the parent medium variegated.

Several additional points may be noted about the rarer mutants in the mutation spectrum here reported for P^{VV}: (1) two phenotypes, very light variegated and colorless pericarp and cob, were recorded among the offspring of variegated plants which were not expected as primary mutant types (Brink, Genetics 39: 724-740, 1954), (2) two phenotypically distinct classes of reds were obvious, but as yet the relationship of near-selfs to self reds is not clearly understood, and (3) a consideration of all the data indicates that orange variegated is the rarest of the P^{VV} mutational spectrum yet recognized.

Finally, one ear in this study had a large patch of dark variegated pericarp, a phenotype not previously reported in the pericarp work. This phenotype is transmissible, and is being studied further.

2. Transallelic change at the C locus.

An invariable transallelic change of the kind reported by Brink for Rst and R^{mb} in heterozygotes with R^r was not found at the C^I - C locus when a particular C^I allele was used in a mating scheme similar to that developed by Brink (see Genetics 41: 872-889, 1956).

The C^I allele used has been in the genetic cultures at Macdonald College for many years. It is distinguished from the typical C^I allele by the phenotypes it produces in C^IC^IC and C^ICC aleurones. Selfed ears on C^IC plants carrying the Macdonald C^I allele contain four equal and rather distinct phenotypes: (1) entirely colorless, (2) near colorless background (?) but with a few spots of deep pigment, (3) heavily flushed with pigment over the entire kernel and with numerous distinct small spots of deep pigment clearly visible through the flush of pigment, and (4) deeply pigmented overall.

It was thought that the apparent mutable nature of this C^I allele might be affected by the C allele in heterozygotes. However, C^I alleles from C^IC^I homozygotes and C^I alleles from C^IC heterozygotes produce the same phenotype when placed on homozygous A C R pr silks in Wisconsin inbred 22 background.

The effect of this C^I allele on various C alleles extracted from heterozygotes with it remains to be tested.

R. I. Brawn