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1. A test for Spm control of mosaic pericarp.

Mosaic ($\underline{P}^{mm}$), one of the unstable alleles at the first chromosome pericarp locus, does not activate Ds and Barclay and Brink (PNAS 40:1118-1126, 1965) have inferred that the instability is not controlled by Mp or Ac. The mosaic pattern appears in a wider variety of patterns than variegated pericarp and it frequently changes from one unstable state to another. The instability controlled by Spm-En at other loci is so similar in many respects to mosaic, that it seems reasonable to suspect that an Spm-like element might regulate the $\underline{P}^{mm}$ allele.

To test this hypothesis an $\underline{a}_1^{m-1}$ $\underline{P}^{ww}$ stock lacking Spm but in which gene action is under the control of the Spm system was crossed as a male with six different geographical collections of $\underline{P}^{mm}$. The mosaic lines were fourth generation backcrosses to inbred A171 ($\underline{P}^{ww}$), and so the mosaic ears were homozygous $\frac{\underline{A}_1}{\underline{a}_1}\frac{\underline{A}_1}{m-1}$ and heterozygous $\underline{P}^{mm}/\underline{P}^{ww}$. The F_1's which were $\underline{A}_1/\underline{a}_{1\,m-1}$ and either $\underline{P}^{mm}/\underline{P}^{ww}$ or $\underline{P}^{ww}/\underline{P}^{ww}$ were backcrossed to $\underline{a}\,\underline{a}_{1\,m-1}$ $\underline{P}^{ww}$. It was expected that ½ the ears would be mosaic and ½ colorless pericarp and on each ear ½ the kernels would be $\underline{a}_1^{m-1}$.

The $\underline{a}_1^{m-1}$ kernels without Spm show pale aleurone pigmentation over all and with Spm they have deep spots on a colorless background. The presence of spotted kernels on the backcross ears would indicate response of $\underline{a}_1^{m-1}$ to Spm-like control. The ears were accordingly scored for pericarp color and the presence or absence of spotted aleurone. The results are shown in Table 1.

The data are confusing at best. One family, 2547, consisted of three ears with mosaic pericarp and approximately ½ spotted kernels, but also three mosaic ears without spots and one apparently $\underline{P}^{ww}$ ear with many spotted kernels. A sister family, 2548, with the same $\underline{P}^{mm}$ allele contained no spotted kernels. Ten other families segregating mosaic ears essentially did not show spotted kernels. Four of these ten families, however, each contained a single deeply spotted kernel. These single kernels could be contaminants from an Spm-carrying stock, but I am inclined to doubt it for (1) my usual pollination technique does not show this level of contamination, and (2) I have only a few known Spm-carrying stocks and these were widely separated from the mosaic stocks, which themselves were distributed over a considerable area interspersed with other corn.

The test does not give clear evidence that Spm controls gene action at the $\underline{P}^{mm}$ allele, neither does it rule out this hypothesis completely. Several explanations for these

Table 1

Tests of different P^{mm} alleles to promote gene action at the a_1^{m-1} locus.

Family	Source of alleles	Pericarp and aleurone phenotype of backcross ears: Mosaic P. spotted	Mosaic P. no spots	Colorless P. spotted	Colorless P. no spots
2547	Peru - from S. C. Harlan	3	3	1	0
2548	ditto	0	3	0	3
2549	Rainbow Flint - local strain	0	3*	0	3
2450	ditto	0	5	0	2
2558	P.I. 213797 - North Dakota	0	4*	0	2
2559	ditto	0	2	0	3*
2561	P.I. 214200 - Manitoba	0	2*	0	3
2562	ditto	0	1	0	5
2564	Assiniboine Flint - Manitoba	0	2	0	3
2565	ditto	0	1	0	4
2587	Medium mosaic - R.A. Brink	0	3	0	3

*a single kernel heavily spotted on one ear.

results are possible:
(1) An Spm-like element could be present in some plants of inbred A171 which I use as a recurrent parent throughout my genetic stocks. This is quite likely since I reported in 1964 that another breeding line carried an Spm-En like element. The four isolated spotted kernels, then, could more probably be contaminants. Family 2547 which seems to show independence between mosaic and spotted kernels would be explained.
(2) Spm-En occur in many states. (a) Mosaic pericarp might contain a state which does not regulate a_1^{m-1} ordinarily, but which may change into a regulating state as in family 2547. It might be expected that such a change would also be correlated with a change in pericarp phenotype. However, no difference in pericarp phenotype could be detected in ears with and without spots. (b) Inbred A171 could contain a non-activating state of Spm which changes to an activating state occasionally.
(3) All spotted kernels could have resulted from Spm contamination either this year or in a previous year.

One last comment - Some states of mosaic pericarp are difficult to distinguish from variegated pericarp. Family 2547 is one of these and it is possible that this family is really P^{vv}. As far as I know, no one has ever determined if variegated regulates a_1^{m-1} P^{vv} gene action. Or perhaps Family 2547 contains neither P^{vv} nor P^{mm} but another unstable allele which is controlled by an Spm-like element while the controlling element for mosaic pericarp remains unknown.

R. I. Brawn

2. A test for Spm in Diffuse pericarp.

Greenblatt has reported (M.G.C.N.L. 39:120. 1965) that the Diffuse pericarp gene Idf does not substitute for either Spm or Ac. I wish to present data which suggest that Idf may substitute for Spm.

A different tester stock was used in my studies than was used by Greenblatt. His test required the detection of dark purple spots on a dilute purple background if Idf caused instability in C_2/c_2^{mt} heterozygotes. This may be possible if Idf inhibits only the background pigment, for Greenblatt has shown that Idf does inhibit aleurone pigmentation somewhat. However, I find that C_2/c_2^{mt} Spm kernels are uniformly purple and so perhaps his test was not adequate to detect instability of c_2^{mt}.

My test involved the same a_1^{m-1} P^{ww} no Spm stock and crossing scheme described in Note No. 1. The Diffuse stock was also a fourth generation backcross to inbred A171 (P^{ww}) and so the Diffuse ears were A_1/A_1 and heterozygous P^{rr}/P^{ww} and Idf/idf. It was expected that ¼ the ears from the backcross of the F_1's to the a_1^{m-1} P^{ww} tester stock would be Diffuse, ¼ red and ½ colorless pericarp, and on each of