Hybrid	Number of selfed F_1 plants	Average percentages of affected grains
089 x 077	11	0.46
077 x 359	9	2.48
359 x 077	9	2.50
535 x 077	22	4.63
077 x 520	19	3.50
077 x 368	20	0.38
077 x 686	26	4.68

4. - The study of segregating progenies obtained from F_1 plants by selfing or back-crossing has not revealed any Mendelian disjunction. The rates of necrotic grains on the ears vary in a continuous manner from 0 to 70%.

The study of the distribution of the affected grains on selfed ears of line MR 077 shows that these grains are much more numerous on the basal part or the middle of the ear than on the terminal part. The greatest number of healthy grains is to be found towards the apex of the ear.

Investigations are being continued but at present it would seem that this hereditary "disease" of the embryo may be ascribed to a non-Mendelian "factor", free with regard to the chromosomes, and transmittable by the female gamete and by the male gamete.

-- A.Cornu

SYRACUSE UNIVERSITY
Syracuse, New York

1. Atypical variegated phenotype arising from orange variegated pericarp maize.

Preliminary tests of a very light variegated phenotype, which originated as a somatic mutation on an orange medium variegated ear ($\underline{P}^{ovov-2}/\underline{P}^{ww}$), demonstrate that this mutant is not a typical variegated, but rather represents a new phenotype not previously described. This mutant phenotype is due to a $\underline{P}$ allele and, in heterozygotes with $\underline{P}^{ww}$, exhibits a low frequency of colored stripes in an otherwise colorless pericarp and cob, comparable to very light variegated (Brink 1954). It differs from very light variegated, however, in that the stripes are not a homogeneous red but are sectors of orange variegated phenotype typical of $\underline{P}^{ovov-2}$. This difference is not apparent in most ears because the mutant sectors are usually very narrow. In occasional sectors extending over one-half or more of the abgerminal side of the kernel and one sector that included two entire kernels and a part of a third, the orange variegated phenotype is obvious.

The progenies obtained in large families of this mutant allele are summarized in Table 1. The parent ears, from plants heterozygous for the atypical variegated allele and $\underline{P}^{ww}$, had been back-crossed to the recurrent inbred parent, 4Co63, ($\underline{P}^{ww}/\underline{P}^{ww}$), so that one-half of the progeny would be expected to be like the parent plant and one-half, homozygous $\underline{P}^{ww}$ (colorless pericarp and cob). Table 2 summarizes the classes of progenies obtained from orange medium variegated ears ($\underline{P}^{ovov-2}/\underline{P}^{ww}$) backcrossed to 4Co63.

Table 1

Family number	Parent ear phenotype	Number of progeny: Colored pericarp and cob: Lt V	Very lt V	Or med V[1]	Total	Colorless	Total
8-47A	Very lt V	1	119		120	134	254
8-47B	Very lt V	1	87	1	89	103	192
Total		2	206	1	209	237	446

1 Or = orange

Table 2

Family number	Parent ear phenotype	Number of progeny: Colored pericarp and cob: Or med V	Or lt V	Red	Total	Colorless	Total
8-585	Or med V	51	5	3	59	54	113
8-847	Or med V	77	2	8	87	84	171
8-47C	Or med V	90	16	16	122	109	231
Total		218	23	27	268	247	515

It should be noted that the atypical very light variegated allele is very stable, with only 3 out of 209 colored progeny (1.4%) differing from the parent phenotype. The one orange medium variegated ear in this group was unexpected and appeared typical of *povov-2*. The distribution of progenies of the orange medium variegated ears is similar to that obtained from other orange variegateds, with a low frequency of orange light variegateds and a slightly higher frequency of self reds. The higher frequency of colorless progeny in the atypical variegated families (53.1%) than in the orange variegated families (48.0%) may be due to the occurrence of subliminal variegateds which would be classified as colorless.

Tests were conducted to determine whether there was a difference in the time and frequency of *Ds*-type chromosome breakages induced by these alleles. An *Mp*-tester stock (McClintock's homozygous *A*; *C Ds*; *R* and lacking *Ac*) was used as the male parent in crosses with heterozygous atypical variegated/*PwW* and *povov-2/pww* plants (both homozygous *A*; *c*; *r*). The resulting kernels on the orange medium variegated ears were easily scored and approximated the expected 1 colored (no *Ds* events) to 1 colored with colorless sectors (*Ds* events). Only a few kernels on each of several of the atypical variegated ears, however, could be positively classified as colored with colorless sectors. The remainder appeared to be colored. The *R*-mottle due to the *Rrr* genotype of the aleurone was not pronounced in these crosses and did not interfere with the classification. Because of the difference in the two groups in this test, a further cross was made to compare the pattern of chromosome breakage at *Ds* induced by a single dose of the Modulators. Seed from these ears was planted and pollen from the resulting plants was placed on silks of inbred 4Co63 (homozygous *A*; *c*; *r*) and also used for self-pollinating each plant. The kernels produced on the 4Co63 ears were scored, and those from the atypical variegated cross as well as the orange variegated were found to approximate the expected classes: 75% colorless, 16% colored, and 9% colored with colorless sectors (due to independent assortment of Modulator, *C Ds*, and *R* loci and 26% crossing over between *C* and *Ds*). There was no obvious difference in the frequency of large colorless sectors representing chromosome breaks occurring

early in the development of the endosperm. Kernels from the atypical variegated cross, however, exhibited a high frequency of very small colorless sectors (6 to 8 aleurone cells each) which was not found in the kernels from the orange medium variegated crosses.

The occurrence of the orange variegated phenotype as pericarp sectors and among the progeny of this mutant atypical very light variegated indicates that the Modulator component of p^{ovov}, Mp^{a}, has not changed to a new state (mutant form). The loss of Mp^{a} from p^{ovov} which results in the orange variegated phenotype, however, is inhibited except for rare somatic and germinal changes which allow the normal expression of this unstable allele. This atypical variegated phenotype could most easily be explained by postulating a second transposable element as a component of this new mutant P allele that suppresses p^{ovov} until it leaves the P locus by transposition allowing the normal expression of p^{ovov}. The difference observed in the Ds-type chromosome breakage pattern induced by the atypical very light variegated and by p^{ovov} could then be attributed to the action of this second element. The action of this second transposable element at P would appear similar to that of the Mp component of P^{vv} as postulated by Brink and Nilan (1952). In this new mutant allele, however, the action of Mp^{a} as well as P^{rr} (i.e. p^{ovov}) would be suppressed. The present tests do not provide direct evidence for such a second element. Additional tests now in progress may provide information which will clarify the nature of this atypical very light variegated allele.

-- F. A. Valentine

TENNESSEE AGRICULTURAL EXPERIMENT STATION
and
UNITED STATES DEPARTMENT OF AGRICULTURE
Knoxville, Tennessee

1. Fertility restoration in Southern inbreds.

The fertility restoring inbred lines K55, Ky21, T115, Mp307, T210, T216, H·40B, Mp460, A14, E184 and A447 have been used in restored sterile hybrids in Tennessee. The last three are South African lines. All lines were crossed with A14Tcms and E184Tcms and advanced to F_2. All crosses failed to segregate sterile plants indicating that the restoring factors in all lines are allelic and controlled by a single dominant gene. This fact was also demonstrated by F_2 crosses and backcrosses. It is assumed from the tests that all lines carry the two dominant complementary genes as demonstrated for Ky21 and K55 by other workers and which are lacking in WF9.

-- L. M. Josephson

2. Studies with 33-16 male-sterile cytoplasm.

F_1 hybrids of 33-16 as seed parent and CI.61, CI.43 and H21 have been completely fertile while those with K63, Mo2RF, Ky27, K64 and K6 have been only partially fertile. In backcrosses, plants segregate completely fertile, completely sterile, and into various degrees of partially fertile plants indicating that more than one genetic factor, or at least modifiers, as well as sterile cytoplasm is operating in determining sterility. Some crosses indicate only a single gene for partial fertility is operating while others indicate both a gene for complete fertility and one for partial fertility are operating. Further backcrosses to sterile plants have generally rendered the populations completely sterile. Inbred Ky27 has remained completely sterile through 13 generations of backcrossing. This source has in turn been transferred to several other inbreds and has remained stable.