recurrently used. It appears, therefore, that this particular a2 bt/a2 bt stock is not only the donor of A-m(r) but also of the En. This is presently being tested.

A-m(r) is not responsive to all En elements as revealed by the negative results with a different En source, nor are all A alleles responsive to En-A-m(r). Thus, A-m(r)-En-A-m(r) represents a quasi-specific interaction.

Jaime Gonella and Peter A. Peterson

R-mo(cu), a new allele of the Fcu controlling-element system

In the course of investigations of the Fcu controlling-element system (Abstracts 1975 International Maize Symposium) a new allele at the R locus was uncovered. Of three crosses of the type C/c sh wx, R/r-cu x r/r, wx/wx (where the R allele in the female parent came from a previous cross by a c sh wx/c sh wx tester stock) one ear showed an unusual phenotypic segregation consisting of the following three kernel types: colorless, a variously expressed dilute, and mottled kernels. The first two classes were expected based on the variable expression of r-cu, which produces a continuous range of phenotypes from colorless to seemingly fully colored (MGNL 48:66-68 and the 4th section of this report). The mottled class, however, was not expected.

The three phenotypic classes from the unusual phenotypic segregation were used to test the basis for the allele conditioning the mottled behavior. The colorless progeny were testcrossed by r/r, wx/wx producing 14 progeny ears: 6 segregated dilute and colorless kernels (ear genotype r-cu/r); the other 8 showed mottled and colorless phenotypes (ear genotype R-mo(cu)/r). The test crosses of the dilute sibs gave only dilute and colorless kernels. The segregation of the mottled sibs is given in Table 1.

Table 1. Phenotypic segregation from testcrosses of mottled progeny, R-mo(cu)/r x r/r, wx/wx.

Cross	Colorless	Mottled	Total
'4 1037-1/1235	209 (78.28)	58 (21.72)	267
-2/36A36	309 (77.64)	89 (22.36)	398
-3/1235	421 (82.87)	87 (17.13)	508
-4/1238	330 (79.90)	83 (20.10)	413
-5/1235	245 (53.73)	211 (46.27)	456
-6/36A34	368 (67.28)	179 (32.72)	547
-7/1236	239 (64.77)	130 (35.23)	309
-8/1239	216 (70.36)	91 (29.64)	307

It can be observed from the table that no consistent segregations were obtained when the mottled class of kernels was tested. It was suspected, however, that the cause of the erratic behavior might be the particular r tester used. Accordingly, mottled progeny were selected and crossed by either W22 r-g/r-g or the r/r, wx/wx tester with the resulting data in Table 2. None of the crosses by W22 r-g/r-g gave a Chi-square value significant at the 0.05 level for a 1 mottled:1 colorless segregation. However, the deviations from 1:1 were very highly significant when the r/r, wx/wx tester was used. This R allele conditioning a mottled phenotype will be designated R-mo(cu), where mo identifies the mottled behavior and cu indicates that it responds to Fcu. Proof for this is now presented.

The possibility that R-mo(cu) responds to Fcu signals was tested by crossing mottled progeny (R-mo(cu)/r) by plants identified for the presence or absence of Fcu (determined with an Fcu tester stock - r-cu/r). The findings are presented in Table 3. The results show that the presence of Fcu in the male parent is associated with variegation and conversely, no variegation occurs when the male parent lacks Fcu. It is concluded that R-mo(cu) is an allele of the Fcu controlling-

Table 2. Phenotypic segregation from testcrosses of mottled progeny by two different r testers, R-mo(cu)/r x r-g/r-g or r/r, wx/wx.

Cross	Colorless	Mottled	Total	χ^2(a)	(b)
'5 4550-1/4651	197 (47.70)	216 (52.30)	413	0.87	ns
-2/2102	200 (47.39)	222 (52.61)	422	1.15	ns
-3/2106	138 (47.75)	151 (52.25)	289	0.58	ns
-4/2105	198 (53.51)	172 (46.49)	370	1.83	ns
-5/2105	116 (44.62)	144 (55.38)	260	3.02	ns
-6/2109	217 (50.00)	217 (50.00)	434	0.00	ns
-7/2102	182 (45.27)	220 (54.73)	402	3.59	ns
-8/2105	185 (46.84)	210 (53.16)	395	1.58	ns
'5 4552-1/4651	174 (53.21)	153 (46.79)	327	1.35	ns
-2/4651	155 (46.55)	178 (53.45)	333	1.59	ns
-3/4652	200 (53.91)	171 (46.09)	371	2.27	ns
† -6/4722	256 (76.42)	79 (23.58)	335	93.52	*
† -7/4721	267 (78.99)	71 (21.01)	338	113.66	*
† -8/4722	232 (72.50)	88 (27.50)	320	64.80	*
† -9/4722	370 (82.41)	79 (17.59)	449	188.60	*

(a) Chi-square value for a segregation of 1 mottled:1 colorless
(b) ns = χ^2 not significant at the 5% level of probability; * = probability of a greater χ^2 is < 0.005
† = indicates crosses by the r wx/r wx tester

element system and that the element present in r-cu which makes this allele responsive to Fcu must also be present in the R-mo(cu) allele.

Table 3. Results of testing the responsiveness of R-mo(cu) to the variegation inducing Factor Fcu (*). R-mo(cu)/r x Fcu line.

Cross	Presence of variegation	Presence of Fcu in male
'5 4553-1/4625-3	+	+
-2/4625-3	+	+
-3/4625-9	+	+
-4/4625-10	-	-
-5/4626-1	-	-
-6/4626-1	-	-
-7/4626-3	+	+
-8/4626-6	+	+
-9/4626-6	+	+
-10/4626-7	+	+
-11/4627-3	+	+
-12/4626-9	-	-

*All ears segregated colorless and mottled kernels

As far as can be determined from pedigree analysis and utilizing crosses by an r/r tester, the c sh wx/c sh wx stock from which the R-mo(cu) allele originated was R/R, indicating that R-mo(cu) most probably originated in the plant where its characteristic mottled phenotype was originally observed. Despite extensive test

crosses of R/r-cu genotypes no R-mottled type allele or any other unusual R allele has been found.

Jaime Gonella and Peter A. Peterson

Comparison of the Fcu controlling element system to the spotted-dilute R system: The relationship between Fcu and Spf

The spotted-dilute R system was originally described by Sastry and Kurmi (MGNL 44:101-105). They explained the aleurone spotting behavior of unstable R alleles designated as spotted-dilute (R-sd) based on two dominant factors, Dil (diluting factor) and Spf (spotting factor). In the presence of Dil alone the R allele of R-sd isolates conditions a dilute phenotype with no spots whereas Spf by itself results in spots on a colorless background. In further studies, Singh et al. (MGNL 49:45) showed that when both Dil and Spf are present spots appear on a dilute background, indicating that the two factors are autonomous and their effects superimposable.

The r-cu allele of the Fcu controlling element system has a variable expression in aleurone color ranging from completely colorless to dark dilutes and apparently fully colored phenotypes (MGNL 48:66-68 and the following section of this report).

The question was asked whether Fcu could substitute for Spf in inducing spots on ears that would be segregating dilute (R-r Dil) kernels from R-sd Dil Spf/r-r ⊗ and from R-r/r-r Dil/+ x r/r by crossing by plants of an Fcu line (stock segregating Fcu) whose Fcu content was determined with the Fcu tester r-cu/r. The results are shown in Table 1. The data indicate that when Fcu is present in the

Table 1. Results of tests of the relationship between Fcu and Spf.

Cross	Presence of spotted kernels	Presence of Fcu in male
'5 4607-1/4625-9	+	+
-2/4626-2	-	-
-7/4626-4	-	-
-8/4626-6	+	+
-9/4626-7	+	+
-11/4628-9	+	+
-13/4628-10	+	+
'5 4605-1/4626-7	+	+
-2/4628-5	+	+
-3/4628-9	+	+
-4/4628-10	+	+
-6/4625-10	-	-
-7/4625-6	-	-

male parent spotted kernels are produced in the crosses. Conversely, spotted kernels are absent if the male tester does not contain Fcu. It can be concluded that the factor at the R locus associated with the spotting behavior of R-sd isolates (i.e., responds to Spf) is also responsive to signals from Fcu. Based on this relationship one might also expect that r-cu should respond to signals from Spf. Tests of the type presented in Table 1 gave negative results, however.

When R alleles from R-sd isolates are separated by segregation from the factors Dil and Spf a full color phenotype appears and the associated R allele no longer responds to either factor. This differs from the Fcu system, from which no colored derivatives have been isolated, as will be shown in the following section.

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