information from the data gathered from cytological studies, and thus would provide a useful supplement to the latter.

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1. Polarized variation in R-locus expression among gametes from single plants.

It is a common assumption in genetics that within the same organism gametic equivalence for a specific phenotype is the rule under conditions where explanations invoking segregating modifiers can be eliminated. In the tassel of a single heterozygous plant (Rr) it is expected that all pollen which carries the R gene will produce the same endosperm phenotypes when testcrosses are made to inbreds which carry those genes necessary for pigment production. The data presented below show that this equivalence for R-locus expression for pollen from within a single tassel cannot be taken for granted.

RR^{st} plants in corn grass background (a background selected for its tillering ability) were pollinated with rr to isolate Rr heterozygotes. Because of the effect of R^{st} (paramutation) the ability of R to produce pigment is reduced and symbolized by R'. The R'r heterozygotes were grown under field conditions; numbered plants on the first and fifth day of anthesis were testcrossed to Inbred W22 rr. Testcross kernels were then scored for amount of endosperm pigment present by matching R' phenotypes against a set of standard kernels which ranged from 0 - 22, colorless through completely pigmented respectively.

It can be noted from the data that the earliest pollen samples from a tassel have produced the lightest phenotypes; those pollinations made from florets which shed pollen on the fifth day were measurably darker.

R' Phenotypes From Pollen Collected the First and Fifth Day of Anthesis

Day Pollen Collected	50-kernel Ear Means From Five Different Tassels Tassel No.				
	1	2	3	4	5
1st	3.34	4.74	2.56	4.40	3.86
5th	5.58	5.16	4.76	6.14	4.22

It would be expected from the above data that comparisons of pollen samples from tillers of the same plant might also reveal differences similar to those found from the main tassel above. The tassels from the earliest tillers might be expected to give lighter scores than those tassels going through anthesis several days later.. The results given below show that this is the case. The tassel of the main axis, the first to begin anthesis, produces the lightest phenotypes; subsequent tassels on the same plant can be considerably darker. Thus, within each of the tassels and between each of the tassels of a single plant the R-locus expression appears to be polarized within the plant. The lightest phenotypes are produced by pollen from the upper part of the tassel among florets which pass through anthesis earliest; darker expressions will be found from pollen samples from lower florets and lower tassels which pass through anthesis several days later. Tests will be conducted to see if these differences are carried over into the next generation.

R' Endosperm Pigment Scores From Different Tassels of Same Plant

Tassel	Plant						
	#1	#2	#3	#4	#5	#6	#7
Main Stem	3.34	6.28	2.46	9.04	3.80	6.14	2.46
Tiller #1	7.74	11.06	2.56	11.18	5.00	13.80	8.14
Tiller #2	6.58	8.90	4.40	12.18	9.00	10.66	3.90
Tiller #3	6.94		3.86				

Since the above differences originated from gametes, it was of interest to enquire whether a polarized expression could also be found in somatic tissues. Closely linked to R is a gene responsible for anthocyanin pigment in anthers. The two genes have been symbolized as R^r where the superscript represents the presence of a factor for anther pigment. Plants of Inbred W22 with R^r were grown under greenhouse conditions and twenty anthers were sampled from florets at the tips and bases of tassel branches. Anthocyanin was extracted from anther walls in .1 N HCl.

Results below show that the tips of the tassel branches tend to produce anthers with less extractable pigment, while the basal florets of branches tend to produce anthers with more pigment. The pigment variation in the somatic tissue of the anther wall parallels that of the pigment produced by gametes with R' from the same relative positions.

Comparison of Anthocyanin Pigment Extracted from Anther Walls

	% Light Absorption in Anther Extracts from Different Tassel Branches*									
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Florets from upper part of a branch	48	35	32	23	13	79	76	72	37	37
Florets from lower part of a branch	51	37	37	28	44	82	78	83	42	45

*Samples were made from Inbred W22 RR and Rr plants.

It may be objected that the above observations are peculiar to R' expression (paramutated R) and cannot be related to "normal" R genes which have not undergone treatment with R^{st}. Where the standard R gene has been put into a tillering background and the Rr heterozygote has been testcrossed, somewhat the same orientation of phenotypes can be observed as was described above for R' expression. The variation in expression of R from pollen from the earliest tassels and latest tassels is

not as great as that of plants with R'. As seen from the data below the main tassel tends to be slightly but consistently lighter than the tillers. It has long been known that in testcrosses of R the resulting endosperm will give a "mottle" expression. The data below shows that the degree of mottling can be determined by the position of origin of the gamete in the tassel.

R-locus Expressions From Rr Heterozygotes

	Scores from four separate plants and their tillers			
	#1	#2	#3	#4
Main Tassel	15.32	18.68	20.68	18.18
Tiller #1	20.44	19.56	19.76	18.08
Tiller #2	19.90	20.16	21.40	20.14
Tiller #3	20.84	19.76	21.12	19.88

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1. Screening for monoploids of maize by use of a purple embryo marker.

A new system for differentiating putative monoploids from diploids in the embryonic stage may eliminate need for germination of large numbers of kernels. This system utilizes a male parent which we have called the "Purple Embryo Marker". This marker carries a set of genes, b pl A C $R^{nj:Cudu}$ pr P^{wr} which produce a deep purple pigment in the embryo. This color is visible in the dormant kernel itself. The purple embryo marker stock also produces a purple aleurone color by which contaminant kernels, produced by accidental pollination with