Two less-studied $\underline{R}^{ch}$ alleles are also present in the Wisconsin collection; of these two, Costa Rica $\underline{R}^{ch}$ (obtained from Dr. Mangelsdorf) more closely resembles Stadler $\underline{R}^{ch}$. The second one (maize morado, courtesy of Dr. Greenblatt) is still not well backcrossed. The paramutability of these two stocks has not yet been tested.

To complete this account, a few words about $\underline{r}^{ch}$ may be added. This allele has long been known to possess colourless aleurone, red anthers, pink silks, and cherry pericarp (in the presence of Pl). This is known to occur in nature and was also obtained as a mutant from $\underline{R}^{ch}$.

The interaction of $\underline{R}^{ch}$ and $\underline{r}^{ch}$ with other genes like $\underline{C}_1$ is very interesting. They will be described in another publication.

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2. Recombinational analyses of Ecuador R^r (1172) and Peru Corongo R^g alleles.

In 1964, Bray presented evidence (MGNL 38:134) for the presence of a plant colour factor closely and distally linked to the R locus (1 to 2 units) in Ecuador $\underline{R}^r$. The production of pericarp colour in the presence of Pl and the production of pink silks and red colour in the leaves were attributed to this factor. Since the appearance of Bray's work two more alleles from Peru (Peru Corongo 120 and 150) were also found to possess all the features of Ecuador $\underline{R}^r$ except that their anther colour is green (hence $\underline{R}^g$). A recombinational analysis of these alleles was conducted to study the problem further.

$\underline{R}$ $\underline{R}^{st}$ and $\underline{R}$ $\underline{r}^g$ plants of all three alleles were pollinated by W22 $\underline{r}^g\underline{r}^g$. From the resulting ears $\underline{R}$ $\underline{r}^g$ and $\underline{R}^{st}$ $\underline{r}^g$ or $\underline{r}^g$ $\underline{r}^g$ kernels were planted separately in detasseling plots. (These kernels were not in equal number and hence the discrepancy in parental classes in Tables 2 and 3). The staminate parent in the detasseling plots was W22 $\underline{r}^g$ $\underline{r}^g$.

When the plants were 8-10 weeks old the leaf colour was checked and all exceptional plants were tagged. Notes on silk colour were taken at pollination time and all exceptional plants were labelled. Two to three weeks following pollination the ears of exceptional plants were exposed to sunlight to determine their ability to produce pericarp pigment.

When the data thus obtained were summarized, three facts emerged: (1) In both Ecuador R^r and Peru Corongo alleles, pink silks and cherry pericarp are conditioned by different and separable elements. These will be referred to as (Si) for silk colour and (Ch) for pericarp colour. The leaf colour is conditioned by a different element which is designated as (Lc). (2) All three components are situated distally to (P) (S). ((P) = coloured anthers and (S) = coloured aleurone as in Stadler's terminology). (3) The different plant colour components of both Ecuador R^r and Peru Corongo R^g complexes are easily separable.

Table 2

Pooled linkage data for different components of Ecuador R^r complex: frequencies of different genotypes obtained from the crosses Ecuador R^r/r^g x r^g/r^g and Ecuador R^r/R^{st} x r^g/r^g. (In the following table r means either r^g or R^{st}.)

Combination	Genotype	No. plants	Percentage
Parental	R-Si-Lc	482	
Parental	r-si-lc	648	
Recomb.-I	R-si-lc	15	2.06
Recomb.-I	r-Si-Lc	9	
Recomb.-II	R-Si-lc	3	0.51
Recomb.-II	r-si-Lc	3	
Doubles	R-si-Lc	5	0.43
Doubles	r-Si-lc	0	
	Total plants	1165	

Expected double crossovers = 0.0234%
Observed double crossovers = 0.4300%
Coefficient of coincidence = 18.70%

Tentative map of Ecuador R^r complex

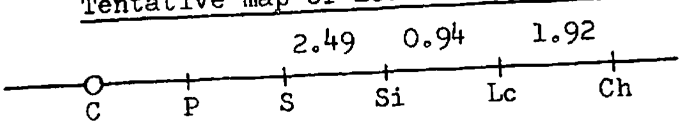


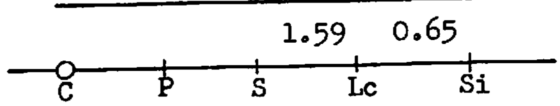
Table 3

Linkage data for different components of Peru Corongo R^g complex: frequencies of different genotypes obtained from the crosses Peru Corongo R^g/r^g x r^g/r^g and Peru Corongo R^g/R^{st} x r^g/r^g. (Data of both Peru Corongo alleles were pooled. In the following table r means either r^g or R^{st}.)

Combination	Genotype	No. plants	Percentage
Parental	R-Lc-Si	395	
Parental	r-lc-si	652	
Recomb.-I	R-lc-si	7	1.50
Recomb.-I	r-Lc-Si	9	
Recomb.-II	R-Lc-si	4	0.56
Recomb.-II	r-lc-Si	2	
Doubles	R-lc-Si	1	0.09
Doubles	r-Lc-si	0	
	Total plants	1070	

Expected double crossovers = 0.01%
Observed double crossovers = 0.09%
Coefficient of coincidence = 9.00%

Tentative map of Peru Corongo R^g complex



The linkage data are presented in Tables 2 and 3. Double recombinants in Ecuador R^r were found to be almost equal to recombinants between (Si) and (Lc) (region II). If the double recombinants are considered as recombinants in region II, then the position of (Si) and (Lc) will be switched as in Peru Corongo alleles. Tentative genetic maps are also given for Ecuador and Peru Corongo alleles under Tables 2 and 3, respectively. The position of (Ch) in the Ecuador R^r map has been fixed by studying its distribution in plants which are recombinants for (Si) and (Lc). The presence of more double recombinants than expected resulted in high negative interference (coefficient of coincidence in

Ecuador $\underline{R}^r$ = 18.70 and in Peru Corongo $\underline{R}^g$ = 9.00). No simple explanation can be given for this high negative interference, although some analogies can be drawn from similar phenomena occurring in organisms like Neurospora, Aspergillus and yeast. However, these analogies necessarily require elaborate and complex models for which no evidence is available in the present experiments. On the other hand, if some or all plant colour components are transposable, then also the results simulate "loose linkage" and "negative interference".

Mutation studies of Stadler $\underline{R}^{ch}$ and New Mexico $\underline{R}^{ch}$ alleles (described above) indicated that the two components (Si) and (Ch) are between (P) and (S).

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3. Further studies on mutable R from Bolivia.

In the 1965 Maize News Letter a short note on a new mutable allele from Bolivia was included. This material was grown in India during the winters of 1966 and 1967. The material obtained from the two crops showed a very low mutable pattern in aleurone tissue compared to the material grown in Wisconsin. Fully coloured plants (from fully coloured aleurone mutants) also showed less pigmentation. This may be due to higher temperatures in India. Such changes were not seen in any other R alleles.

An attempt to reconstitute mutable R from fully coloured mutants has failed.

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