identification. In such cases, the resolving power for purposes of identification may have minimal estimates in excess of the 2% and 6% respectively, cited above.

We obtained an estimate of 35 as the number of nuclei which should be analyzed to obtain the level of significance needed to independently detect all chromosomes in the maize complement. This estimate will change as specific chromosome changes are introduced through experimental procedures.

The real value of these biometrical procedures lies not in whole nuclei analysis but in analysis of specific chromosomes. As few as 70 observations (one per 70 cells or two per 35 cells) for a single homologue will provide a discriminating power of greater than 90%.

We are extending these analyses to additional normal stocks and several aberrant stocks. Particular attention will be paid to segment specific variation as well as to the changes induced by the aberrant stocks.

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1. A description of R^{ch} alleles.

Even though R^{ch} was discovered more than twenty-five years ago (Anderson 1941, MGNL 15:4) no detailed description of its phenotype is available in the literature. In Dr. Brink's laboratory a good collection of R^{ch} stocks has been assembled; all of them have been repeatedly backcrossed to W22 and so possess a uniform genetic background. I worked with this collection for a considerable time and I hope the following description will be helpful to the future workers.

Three of the original collections, namely Peru Corongo 120 R^{g}, Peru Corongo 150 R^{g}, and Ecuador R^{r}, were not initially suspected to be cherry alleles and only during subsequent study was their ability to promote pericarp pigment discovered. Subsequently these alleles have

been found to behave differently from others in certain respects and so the original gene symbols were not changed. In general terms, however, all the R alleles that are capable of developing cherry pericarp will be referred to as R^{ch} alleles. The salient features of some of the cherry alleles are given in Table 1.

Table 1

Main phenotypic characteristics of some R^{ch} alleles

Allele	Identification	Aleurone phenotype (R r r)	Pigmentation		
			Roots and coleoptile	Leaves	Anthers
Stadler R^{ch}	-	Pale mottling	+	-	+
New Mexican 1 R^{ch}	PI 218151	Pale mottling	+	-	+
New Mexican 2 R^{ch}	PI 218159	Pale mottling	+	-	+
Pueblo R^{ch}	-	Pale mottling	+	-	+
Ecuador R^{r}	1172	Self color	+	+	+
Peru Corongo 120 R^{g}	-	Self color	+	+	-
Peru Corongo 150 R^{g}	-	Self color	+	+	-

The R^{ch} seedlings in germinating pans under constant light resemble those of R^{r} except the coleoptiles and roots show relatively less anthocyanin pigment. The presence of Pl has no effect at this stage of plant growth. The seedlings can develop some pigment in darkness, but this is neither a constant nor a distinct feature. The mature R^{ch} plants can be distinguished from other genotypes by examining the nodes which are characterized by deep red colour. The presence of Pl usually accentuates this character but if both B and Pl are present then identification by this method will not be possible. Anther colour when present is in small streaks on the anther walls; when Pl is absent and R^{ch} is heterozygous with a green anthered allele, then the anthers are practically green. The anther colour of Ecuador R^{r} is as red as standard R^{r}, and hence is an exception. Pink silk colour is a common property of all cherry alleles in the Wisconsin collection. This is also true for r^{ch}.

It should be noted, however, that while all cherry alleles are characterized by pink silks the converse is not true. Argentina $\underline{R}^{r}$, $\underline{R}^{nj}$ and many varieties of sweet corn, none of which react with Pl to produce pericarp colour, were found to possess pink silks.

The appearance of anthocyanin pigment in the aleurone of $\underline{R}^{ch}$ is not different from that of $\underline{R}^{r}$, but the kernels with one dose do not exhibit the mottling characteristic of standard $\underline{R}^{r}$, but show a phenotype with dilute coloured patches on dark background. The nonparamutable $\underline{R}^{ch}$ alleles, like Ecuador $\underline{R}^{r}$, do not show any type of mottling. Stadler $\underline{R}^{ch}$, Pueblo $\underline{R}^{ch}$, and both alleles from New Mexico have been found to possess one or two dominant modifiers which partially inhibit the aleurone pigment. The modifiers are not known to affect any other property of $\underline{R}^{ch}$. Standard $\underline{R}^{r}$ and Ecuador $\underline{R}^{r}$ are not sensitive to their action.

The basic feature of all cherry alleles is their ability to promote formation of a deep red, water soluble pigment in the pericarp when another factor, Pl, is also present. It has been found that even b pl $\underline{R}^{ch}$ plants develop pericarp pigment if the ears are exposed to light by removing the husks. The details of this technique have been already reported (MGNL 39:178).

Plants of Ecuador $\underline{R}^{r}$ and both Peru Corongo alleles, in addition to the above mentioned features, show some red pigment in the leaf blades, and more prominently in the mid-rib region. The pigment develops when the plants are 8-10 weeks old and is best scored after two or three cool nights. When these stocks were grown in India, plants never developed leaf colour in the summer season. Presence of Pl accentuates this character.

From the preferential segregation pattern, both New Mexican $\underline{R}^{ch}$ stocks are inferred to carry the heterochromatic knob on chromosome-10. On W22 background at least, when the knob is present in homozygous condition, the plants bend and tend to be twisted.

The aleurone-pigmenting ability of Stadler, Pueblo and New Mexican $\underline{R}^{ch}$ alleles is reduced when they pass through the heterozygous condition of $\underline{R}^{st}$. In this sense, they are paramutable. Their pigmenting ability in the pericarp is not affected. Ecuador and Peru Corongo alleles are not paramutable.

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