

C. Pericarp pigmentation in developing R^{nj} seeds exposed to light.

Two R^{nj} strains (R^{nj} *cu*du and R_{6}^{nj} , a compound allele derived by Brink from a stippled crown allele $R^{nj:st}$) were included in the experiment described above. Aleurone pigmentation in R^{nj} stocks is normally confined to the crown of the seed and usually pigment does not start forming until late in the development of the kernel. Although R^{nj} pericarp is normally colorless, it was found that when the seeds were removed from the cob and exposed to light for four days, anthocyanin forms in the pericarp. The potential for this light induced pigment formation is present at about twenty-five days after pollination and lasts until the time when aleurone pigment starts to form (approximately fifty days after pollination under our conditions). Pigment does not form in the pericarp of R^{nj} seeds kept in the dark.

Sastry (MGNL 39:178) has shown that although Pl is normally required for pigment formation in R^{ch} pericarp, pl R^{ch} plants can develop pericarp pigment if the husks are removed from the ears, thus exposing the pericarp to the light. Although it has been reported that R^{nj} does not produce pericarp pigment with Pl, it does seem to have the potential for pericarp pigmentation under certain conditions, as demonstrated in this experiment. The fact that R_{6}^{nj} showed the same pattern of pericarp pigmentation as R^{nj} *cu*du is worth noting, because R_{6}^{nj} is similar to R^{st} and R^{sc} in plant color distribution (i.e., green plant and anthers) and it is similar to R^{nj} only in aleurone pigment distribution. Other R^{nj} alleles, including R^{nj} *cu*du, have red seedlings, red anthers and deep red silks. If, as Sastry has suggested (MGNL 43:204), some R alleles have a component (Ch) for pericarp color, then it would seem that R_{6}^{nj} does contain such a component, perhaps normally inactive, and that this component was retained together with the aleurone pigmenting component when the $R^{nj:st}$ compound allele was derived.

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2. Peonidin in W22 Pr pericarp and cob glumes.

The ratio of cyanidin to other anthocyanidins in pigmented tissues of W22 Pr strains is normally weighted very heavily towards cyanidin.

Pelargonidin and peonidin occur usually only as minor components. An exception to this rule seems to exist in the pericarp and cob glumes.

The following table shows the ratio of cyanidin (Cy) : pelargonidin (Pg) : Peonidin (Pn) in various W22 Pr stocks that give anthocyanin in pericarp and cob glumes. Also shown are the ratios of the same three pigments in the aleurone from the same ears and the relative concentration of the pigment in the pericarp in terms of relative O.D. units per gram of pericarp.

Strain (all <u>Pr</u>)	Tissue			Relative O.D./gm. pericarp
	Aleurone Cy:Pg:Pn	Cob glumes Cy:Pg:Pn	Pericarp Cy:Pg:Pn	
New Mexico $\underline{R}^{\text{ch}} \underline{R}^{\text{ch}} \underline{Pl} \underline{Pl}$	1:.07:.06	1:.86:.23	1:.39:.29	719.8
Costa Rica $\underline{R}^{\text{ch}} \underline{r}^{\text{g}} \underline{Pl} \underline{pl}$	1:.01:.03	not made	1:.07:.24	415.5
Stadler $\underline{R}^{\text{ch}} \underline{R}^{\text{ch}} \underline{Pl} \underline{Pl}$	1:.01:.12	1:.04:.11	1:.03:.20	57.9
Ecuador $\underline{R}^{\text{r}} \underline{r}^{\text{g}} \underline{Pl} \underline{Pl}$	1:.01:.03	1:.08:.23	1:.04:.41	54.7
Ecuador $\underline{R}^{\text{r}} \underline{r}^{\text{g}} \underline{Pl} \underline{pl}$	1:.01:.03	1:.14:.21	1:.07:.34	30.9
$\underline{r}^{\text{ch}} \underline{r}^{\text{g}} \underline{Pl} \underline{Pl}$	colorless	1:.09:.15	1:.02:.22	339.4
$\underline{r}^{\text{ch}} \underline{r}^{\text{g}} \underline{Pl} \underline{pl}$	colorless	1:.06:.10	1:.05:.23	98.7
$\underline{r}^{\text{g}} \underline{r}^{\text{g}} \underline{Pl} \underline{Pl}$ + leaf and pericarp factor from \underline{R}^{r} Ecuador	colorless	1:.04:.11	1:.10:.22	11.4

Although there are some inconsistencies, there seems to be a definite tendency for quite high relative concentrations of peonidin in the pericarp and cob glumes. Also, the relative concentration of peonidin seems to be independent of the absolute concentration of all anthocyanins in the tissue. It could be argued that this is a Pl effect, because Pl is normally required for anthocyanin pigmentation in these tissues. However, we are inclined to think that it is more likely to be a tissue specific effect, because preliminary results indicate that pericarp pigment from pl $\underline{R}^{\text{ch}}$ ears exposed to light is high in peonidin, and also that other pigmented tissues in Pl plants are low in peonidin. It may be significant

that the P gene is expressed in these same two tissues, but as yet we see no obvious relationship between P controlled pigment and the production of peonidin, which is a methylated form of cyanidin.

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1. Genetics of photoperiodism in corn.

Genetic studies of photoperiodism of corn under natural conditions (field or greenhouse) have been carried out in the past two decades (Singleton 1946, Galinat and Naylor 1951, Shaver 1967, Brown 1967). The short-day corn, Indeterminate (id/id), and the long-day corn, Gaspe Flint, were well established genetic stocks. Observation of these genetic stocks under artificial light in controlled environment was made in this study in order to determine whether photoperiod alone initiates or inhibits the sexual differentiation and flowering process.

Two identical growth chambers (each illuminated with 12 150 W incandescent light bulbs and 34 96" fluorescent lamps) were used to grow the corn plants. Total intensity of the combined light sources was around 10,000 foot-candles at 4 feet distance. Temperature was maintained at 72°-75° F by cooling and heating systems of the growth chambers. Fresh air was circulated through the rooms to insure the normal content of CO₂. Indeterminate and Gaspe Flint seeds were sown in gravel beds and sub-irrigated with nutrient solution twice daily. One room had a 10-hour photoperiod (short-day) from 7 a.m. to 5 p.m.; the other had a 15-hour photoperiod (long-day) from 6 a.m. to 9 p.m.

One hundred seeds from the progeny of a selfed Id/id stock were sown in the short-day room on 12/26, 1967. The silks and tassels emerged on both Id/- and id/id plants on 2/8, 1968. A total of 42 days was required to reach the flowering stage. There were 80 Id/- plants and 20 id/id plants: roughly a 3:1 ratio. The id/id plants were easily