It is significant to note that total mutation frequency when ears were irradiated 12 hours after pollination increased two-fold over the frequency found with ears irradiated immediately after pollination.

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1. The genetics and environmental interaction of a new pale midrib mutant.

A new chlorophyll mutant, tentatively designated pale midrib-2, was found in 1965 at The Pennsylvania State University in a line of "supersweet" corn. The leaves of the affected plants are green at the margins, with the midrib and adjacent tissue chlorotic from the base of the leaf to the tip. In the region near the margin the chlorosis is in the form of a fine stripe so that there is a gradation of yellowing from the completely green tissue to the completely yellow chlorotic tissue. In the field-grown plants the trait did not appear until about a month after planting. However, plants germinated in a growth chamber segregated for the chlorosis at the time of germination. The expression of the trait by the plants grown under artificial light closely resembled that of field-grown plants.

The two original mutant plants were selfed and outcrossed to inbred W153R. The following summer seeds from these pollinations were planted and both were found to segregate for the pale midrib character. The selfs resulted in 11 green and 24 pale midrib plants while the outcrosses resulted in 46 green and 31 pale midrib plants. Furthermore, among the chlorotic plants in the population resulting from selfing, six plants appeared to be more severely affected than the others. These data suggest that the expression of this character is controlled by a single incompletely dominant gene and that the severely affected plants were perhaps homozygous for the pale midrib gene. Because of the inbred background of the shrunken-2 line from which this mutant was obtained, the progeny from the selfing lacked vigor. The chlorotic plants were even less vigorous and the severely affected plants were extremely stunted and did not set seed. However, the mutant plants which resulted from the outcrosses were quite vigorous, with excellent seed set.

Seeds from the above selfs and outcrosses were grown in a growth chamber on a 16-hour photoperiod and on several temperature regimes. When the night temperature was 15°C and the day temperature was maintained either at 21°C or 26°C, 1:3 and 1:1 segregations, similar to those observed in the field, were obtained. It was also possible under these conditions to distinguish mildly and severely affected plants. However, when the day and night temperatures were held at 29°C, the progeny of the self

pollinations segregated in a ratio of three green to one pale midrib and the seedlings from the outcrosses were all completely green. These data are summarized in the table below.

	Temperature	Expression: Green	Expression: Pale midrib	Ratio	p
Selfed	Field	11	24	1:3	0.40
	21°-26°C day / 15°C night	12	21	1:3	0.10
	29°C day and night	25	7	3:1	0.70
W153R Outcross	Field	46	31	1:1	0.08
	21°-26°C day / 15°C night	19	14	1:1	0.35
	29°C day and night	48	0	---	----

It appears that at higher temperatures such as those encountered in the field, the pale midrib-2 gene acts either as a dominant or an incomplete dominant, while at lower temperatures it acts as a recessive. This difference may be controlled by the night temperature alone or by a combination of day and night temperatures. The expression of this mutant was compared to that of pale midrib-1 and was found to be considerably different. The expression of the recessive pm$_1$ is characterized by white streaks in the vicinity of the midrib. Allele tests and chromosome location studies are presently being conducted.

David K. Shortess

2. Inheritance, environmental and preliminary linkage studies of the lutescent maize mutant.

It had previously been reported (MNL 39:146) that the expression of the lutescent character in maize resulted from a single recessive gene, probably located on chromosome 5. The location of a lutescent gene locus on the fifth chromosome has been confirmed. However, the expression of the character appears to depend on two recessive genes rather than on one. Furthermore, the expression of this trait was found to be temperature dependent.

The original lutescent material was outcrossed to two inbred lines, Oh51A and Pa423, and to one single cross, Pa32 x CMD5. F_2 and testcross populations were grown in Pennsylvania in the field and in the greenhouse in January and April, and in a growth chamber on a 16-hour photoperiod. The