

A MUTATION IN CORN PERICARP

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The ear of corn shown in Fig. 1 was observed in a farmer's corn field. The color variation is in the pericarp, the dark area being red, and the light portion yellow, the latter being due to yellow endosperm showing through colorless pericarp. The red pericarp was at first assumed to be the result of a mutation from colorless to dominant red pericarp. It was assumed that half of the red kernels should carry the gene for red pericarp in their embryos, if ovulatory as well as pericarp tissue was descended from the mutant cell. In order to test this hypothesis, a few red and yellow kernels were planted separately.

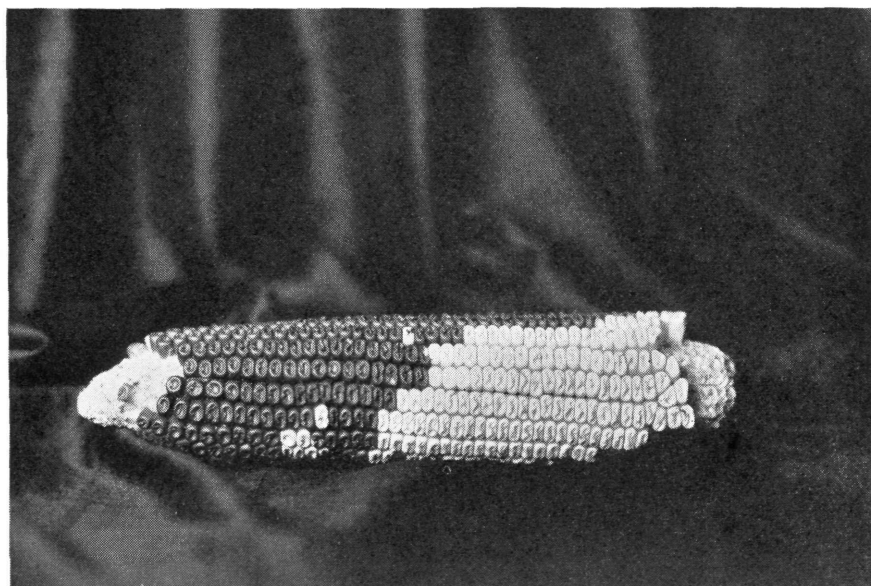


Fig. 1. Ear of corn in which a mutation occurred in the pericarp.

As predicted, half of the plants grown from red kernels produced solid red ears and the other half produced solid yellow ears (five plants of each). Surprising results were obtained from the yellow kernels. Instead of producing only plants with yellow ears, five produced plants with yellow ears and four produced plants with variegated ears. These variegated ears had red and colorless stripes in the pericarp of the individual kernels over the entire ears.

A series of multiple alleles determines pericarp color (Emerson, 1917; Hayes, 1917; Eyster, 1924). The gene P^{vv} results in variegated. Another gene, P^{wr} results in colorless, which is dominant to variegated. A third member of the series, P^{rr} results in solid red pericarp, which is dominant to both colorless and variegated.

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The plant which gave rise to the ear shown in Fig. 1 must have been heterozygous for colorless and variegated ($P^{wr} P^{vv}$). A mutation from variegated to red ($P^{vv} \rightarrow P^{rr}$) occurred in the developing ear. Female gametes within the red kernels were of two genotypes, half P^{rr} and half P^{wr} . They were fertilized by pollen from tissue of genotype $P^{wr} P^{vv}$. Half of the offspring of the red kernels should produce solid red ears and half should produce solid yellow ears. ($P^{rr} P^{wr} \times P^{wr} P^{vv}$). The yellow kernels should produce offspring in the ratio of three with yellow ears to one with variegated ears ($P^{wr} P^{vv} \times P^{wr} P^{vv}$). While the number of plants grown was too small to differentiate between 1 : 1 and 3 : 1 ratios, a mutation of the recessive gene for variegated to the dominant gene for solid red pericarp satisfactorily explains the peculiar breeding behavior.

LITERATURE CITED

- Emerson, R. A.** 1917. Genetical studies of variegated pericarp in maize. *Genetics*, 2: 1-35.
Hayes, H. K. 1917. Inheritance of a mosaic pericarp in maize. *Genetics*, 2: 260-284.
Eyster, W. H. 1924. A genetic analysis of variegation. *Genetics*, 9: 372-404.