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1. Equation of heredity to include cytoplasmic effects.

Results from our experiments on female and male cytoplasmic effects in the F_1 and F_2 generations of double-cross maize hybrids suggest that we alter the common equation of heredity, $P = G + E$, to include cytoplasmic effects.

The final expression of the phenotype (P) is the manifestation of the genotype (nuclear genes), the cumulative effect of the cytoplasms, and the environment. Thus, the new equation which we suggest to include cytoplasmic effects is $P = G + (C_f + C_m) + E$.

A. A. Fleming
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2. Does the male contribute cytoplasm?

"Yes," is our answer to this question. Our affirmative answer is given on the basis of the effects of the male cytoplasm on the zygote.

It was once thought that no cytoplasm is contributed to the offspring by the male parent. We have obtained data from several experiments which reveal differential male cytoplasmic effects and differential female cytoplasmic effects on the expression of various agronomic characters.

In our most recent F_1 experiments, significant effects of the male cytoplasm were obtained for time of silking, ear height, leaves below top ear, leaves above top ear, total leaves, number of shoots, and number of green ears. We also found significant effects of the female cytoplasm for time of silking, stalk diameter, leaves below top ear, leaves above top ear, number of green ears, number of shoots, and ear number at harvest.

Data for plant height, ear number, and yield approached the .05 level of significance in the F_1 experiments on male cytoplasm. Characters approaching the .05 level for the female cytoplasm were total leaves, erect plants, and yield.