

CARNEGIE INSTITUTION OF WASHINGTON
DEPARTMENT OF GENETICS
COLD SPRING HARBOR, LONG ISLAND, N. Y.

February 14, 1960

Dear Curt:

I found your letter of February 3rd on my desk when I arrived at the laboratory yesterday after being in Mexico for several months. In it you asked the question: Is there a series of phenotypes (in maize) so that 1-2-3 doses build up toward normal?

There are alleles associated with the development of starch -- the wx alleles (waxy), and the su (sugary) alleles-- and others associated with the development of anthocyanin pigment-- the C (color in aleurone layer of kernel) and I (inhibitor of anthocyanin expression) alleles-- that are clearly quantitative in that additions of a particular allele build toward the normal phenotype. Each addition of the allele adds a definite quantity of the substance that is responsible for the "normal" phenotypic expression. This may be illustrated by the wx alleles.

In the endosperm of the kernel, which is triploid, the "normal" phenotype is characterized by the presence of 28% amylose starch, the remainder being amylopectin. The basic recessive allele, wx, or a deficiency of Wx, results in the absence of amylose starch. We have various alleles, each of which in one dose, produces a definite amount of amylose. As an example, an allele that produces 10% amylose in one dose (wx allele/ basic wx/ basic wx) will produce 20% amylose in two doses and 28 % amylose in 3 doses. In other words, with increased doses of the allele, the normal phenotype is reached.

The C-I series is another example. Increased doses of C increase the amount of anthocyanin pigment that is developed in the aleurone layer of the kernel. By means of duplications, it is possible to obtain kernels with 6 or more C alleles. I, on the other hand, inhibits the production of anthocyanin in the aleurone layer of the kernel. Sometimes, I/C/C kernels have some color in the aleurone layer but none is seen with I/I/C constitutions. However, by means of duplications, it is possible to get constitutions that are I/C/C/C/C/C. Often, the presence of I is not detected in kernels of this constitution.

There are other allelic combinations of similar type but I hope that the above may serve your purposes. Also, I hope that this does not arrive too late for your purposes.

It is good to get home again after two months of intensive work in Mexico City. During the past two years, I have spent a lot of time in Latin America and it looks as if I will be spending more time there in the future. I have been working with the maize group in the Rockefeller Foundation in helping to trace the origins of races of maize found in the Americas. My job has been to examine the knob constitutions of plants of different races and by means of the particular combinations of knobs, to determine the origins and migrations of the races. I started doing this as a "contribution" to our Latin American relationships but it is proving to be quite

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interesting as a piece of research. Surprisingly enough, the knob constitutions of the chromosomes in the races are excellent indicators of these relationships. Also, it looks now as if a knowledge of such constitutions may serve to select those races that should be used for future improvements of commercial maize. The Rockefeller Foundation is anxious for me to take over the job of further analysis of South American races. Because of the possibility that extended study may illuminate the origin of maize, its migrations through the centuries, and also because it may give us a means of selecting those plants that may be potentially successful in given areas, I am tempted to continue the study.

I have had very little news of you and the family recently. There must be some interesting news, too. I do hope that all has been well with each of you.

Cordially,

Barbara