

recessive for both c and r, it is very easy to determine its genotype with respect to the Bh genes by simply crossing with a series of stocks, each one of which lacks one of the Bh genes. If the stock being tested is not recessive, then an F_1 plant to furnish the F_2 endosperm generation would have to be grown. In either case, the tests for blotching will also tell the genotype of the stock with respect to c and r so that the genotype for ten different loci can be determined from nine different pollinations. This assumes that the two systems have only one Bh gene in common.

Stocks which prove to be identical or nearly so in these ten loci are very likely to be closely related.

6. Half-tunicate from Peru, Ecuador and Paraguay.

The half-tunicate character, which originally occurred as a mutation in one of our tunicate stocks, has been picked up in collections from Peru, Ecuador and Paraguay. When repeatedly backcrossed to the inbred Al58, the half-tunicate from these exotic races is indistinguishable from the mutant half-tunicate. Half-tunicate is especially common in the Peruvian coastal race, Perla. Mr. Alexander Grobman of the National School of Agriculture near Lima tells me that 1-2 percent of the inbred strains isolated from this race are segregating for this character.

Half-tunicate should not be confused with papyrescent, another character involving prominent glumes described in this Letter, which also occurs in South American maize.

7. An inhibitor of half-tunicate.

We have for some years past assumed that pcd corn, if it is the ancestral type, is not inherently monstrous and that its frequent monstrousness can be explained in terms of a relict "wild" gene superimposed upon the genetic background of modern, highly domesticated maize. On this assumption, we have selected for modifier complexes which would reduce the expression of the tunicate character, and we have found such complexes to be especially common in the pop corns. This in itself is significant since the pop corns as a class are the most primitive types of maize extant.

We have now found that, in addition to the complex of minus modifiers for tunicate which many pop corn varieties carry, there are in some varieties of pop corn a gene which strongly inhibits the expression of half-tunicate. This gene, which in preliminary tests appears to be linked with Y on chromosome 6, has so far been studied only in half-tunicate stocks; it is recessive and acts only in the homozygous condition. It causes tu^htu^h to act like tu^htu and it renders tu^htu almost indistinguishable from tu tu.

We have crossed the inhibitor with Tu stocks. If it has a similar effect upon these, as it almost certainly will, then the genotype Tu Tu should become more or less similar to tu^htu^h in ordinary stocks and should not be monstrous.

That a major inhibitor of the expression of genes at the Tu locus, as well as minus modifying complexes, should be found in pop corn varieties, which are primitive in other respects, is highly significant and is probably more than mere coincidence.

Paul C. Mangelsdorf

8. Genotypes involving the Tu-tu locus compared in isogenic stocks.

In an earlier News Letter (1953) we compared a number of genotypes involving the Tu-tu locus in characters of the ears and tassels. However, the stocks then available were not completely isogenic and not all genotypes were included. We now have data involving a comparison of six genotypes in isogenic stocks resulting from repeated backcrossing to the inbred A158. These are shown in the table on the following page.

A study of the data show that four profound changes of obvious evolutionary significance are involved in the transition through the genotypes from Tu Tu to tu tu.

A. The terminal inflorescences, the tassels, decline and the lateral inflorescences, the ears, gain in prominence. The fact that the gain in weight of the ears (line 11) greatly exceeds the loss of weight of the tassels (line 1) suggests that the shortened lateral branch is more efficient in laying down dry matter than the terminal inflorescence. Indeed, it may be this fact which renders maize more productive, on the average, than any other cereal.

B. The ratio of pistillate and staminate spikelets in the tassel is drastically changed (line 10).

C. The central spike of the tassel becomes relatively more prominent at the expense of the branches (line 4). Since the ears are the counterpart of the central spike, this change accounts for the fact, previously noted in other studies, that branched ears are more common among tunicate stocks than among non-tunicate.

D. The rachises of both inflorescences become more prominent at the expense of the glumes (lines 6, 8 and 15-16). This is especially significant in the ear, since a large rachis offers a greater grain-bearing surface and at the same time is capable of containing a larger system of supply. These facts are reflected in the increased number and weight of the kernels and the higher shelling percentage (lines 17-19).