

### 3. Pollination techniques with Zea mays.

Four experiments were conducted to determine the effects of certain pollination techniques on seed set of corn. Data were obtained on 300 single-cross plants in each experiment.

(a) A comparison of polyethylene (a new plastic type) and glassine shoot bags. Ten characteristics were used for comparison. A better seed set was obtained by the use of glassine bags.

(b) The effect of time of pollination on seed set. Five time-periods were used to divide the day into five pollination periods. No significant differences in the number of kernels per ear for the five periods were obtained. However, on the basis of average daily temperatures, the number of kernels per ear decreased as the temperature increased.

(c) The relationship of length and age of silks at time of pollination to seed set. No significant differences in seed set occurred between "cut" silks and "uncut" silks. Two- to three-day-old "non-mass" silks produced an average of 318 more kernels per ear than five- to ten-day-old "mass" silks.

(d) Pollen viability in cold storage. Comparisons were made between pollen stored 48 and 72 hours under four temperatures ranging from 2° to 25° C. Fresh pollen, the control, set 140 times more seed than stored pollen. The 48-hour storage gave better results than the 72-hour storage.

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#### 1. The tunicate locus dissected and reconstituted.

In previous News Letters we reported that the two components of the Tu locus could be separated by crossing over. When compared in isogenic stocks produced by repeated backcrossing on the inbred A158, the two loci proved to be different in their phenotypic effects; lines heterozygous for the locus, tu<sup>d</sup>, having longer glumes, both staminate and pistillate, than lines heterozygous for tu<sup>l</sup>. We have now reconstituted the Tu locus by restoring its separate components to their original positions on the same chromosome. Plants heterozygous for both tu<sup>l</sup> and tu<sup>d</sup> in a trans configuration were crossed on two inbred strains of the genotype tutu. It was assumed that the progeny of these test crosses would consist of the heterozygous genotypes, tu<sup>l</sup>tu and tutu<sup>d</sup>, in approximately equal numbers and that the great majority of the plants would fall into these two categories. It was assumed further, however, that there would be rare crossovers between the two components and that these would be of two complementary types, tu<sup>l</sup>tu<sup>d</sup> and tutu.

In a winter crop in Florida and a summer crop in Massachusetts a total population of 10,090 plants were classified. Of these, eight were identified as Tutu and seven as tutu.

The rate of "mutation" (crossing over) involved in reconstituting the locus, 1 in 1261, is of the same order as that, 1 in 1319, which occurred in the experiment involving the dissection of the locus.

The experiment on reconstituting the tunicate locus shows why pod corn, which Weatherwax and others have assumed to be a mutant form, has never been reported in pedigreed cultures although millions of ears of inbred strains and their first-generation hybrids have been studied by corn breeders. Pod corn, as the type represented by the Tu locus, can appear as a mutant only in stocks of half-tunicate maize. If our genetic analysis is valid, it cannot occur as a mutant in modern commercial nontunicate maize.

It now appears that there may have been two kinds of wild corn: one of the genotype, tu<sup>1</sup>tu<sup>1</sup>, the other of the genotype, tu<sup>d</sup>tu<sup>d</sup>. When these were brought together under domestication by the American Indians, hybridization would have produced—as it did in our experimental cultures—two new types: (1) an extreme form of pod corn which the Indians in parts of both South and Middle America preserved (and still do) for its supposed magical properties; (2) a nonpodded corn similar to modern corn in lacking conspicuous glumes, which is more productive and in other ways more useful than pod corn as a cultivated food plant.

We now have some evidence, still quite preliminary in nature, that one of the components of the Tu locus, tu<sup>d</sup>, is itself compound. Crosses to test this possibility have been made.

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## 2. Prehistoric maize, teosinte, and Tripsacum from Tamaulipas, Mexico.

We have finally analyzed the archaeological maize and other specimens which MacNeish uncovered in Romero's Cave in southwestern Tamaulipas, Mexico, in 1954. The collection includes 3015 intact or nearly intact cobs, 457 cob fragments, 47 pieces of stalk, 9 leaves, 219 husks, 8099 tassels or tassel fragments, 151 quids of chewed stalks, young ears, or tassels, 5 specimens of Tripsacum, 9 of teosinte, and 4 of maize-teosinte hybrids.

The great majority of the cobs, about two thirds of the total, were classified as belonging to the race Chapalote or its precursors or derivatives. This race is found today only in western Mexico but it was once much more widespread. The prehistoric wild corn uncovered in caves in the Valley of Tehuacan in southern Mexico is related to Chapalote (Mangelsdorf et al., SCIENCE 143:538-545) as is also the earliest prehistoric corn from Swallow Cave in Chihauhau and from a number of sites in the southwestern United States (MNL 32).