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1. Prehistoric wild and cultivated maize from Tehuacan Valley in Mexico.

We have recently made a detailed study of all of the prehistoric maize from four caves in the Valley of Tehuacan in southern Puebla, Mexico, uncovered by MacNeish and his associates. These prehistoric specimens number more than 10,000 and include all parts of the plant: roots, stalk, sheaths, leaves, husks, prophylls, shanks, cobs, kernels, tassel fragments, and anthers. Together they provide a fairly complete picture of corn's wild progenitor and furnish abundant evidence of an evolutionary sequence from wild maize to modern cultivated maize.

The most numerous prehistoric specimens are those of cobs. The earliest cobs from two of the caves, San Marcos and Coxcatlan, most of which are well preserved, dated by radio-carbon determinations of associated wood at about 5000 B.C., are almost certainly those of wild maize since they are quite uniform and there is no evidence from other species that the practice of agriculture had become established. These cobs are small and slender, about two centimeters in length and taper at both ends. The kernel row number is usually eight but a few cobs are four-rowed and distichous. The rows bear six to eight spikelets - the average number of spikelets on intact cobs is 55. The spikelets are uniformly paired. The glumes are long in relation to the rachis diameter and are approximately like the glumes of half tunicate associated with minus modifiers. Tissues of both rachis and glumes are soft - not indurated like those of teosinte and Tripsacum. Many of the cobs have slender stumps, presumably of staminate tips which have been broken off in handling.

The specimens of lower stalk internodes with attached roots show that the seminal root system was well developed - probably an adaptation to somewhat droughty conditions. There is no evidence of tillers. The leaf sheaths are predominately completely glabrous. One intact husk covering from an early zone consists of only two husks: a thick outer one and a much thinner inner one. The low husk number and the short shank suggests that the ear was born in a high position on the stalk. The leaves are wide in relation to their length and the leaf veins are closely spaced as in teosinte and Tripsacum.

At about 4000 B. C. cobs somewhat larger in size but having the same botanical characteristics as the wild maize make their appearance in the two caves. Since by this time there is evidence of cultivation of beans, squashes, and chili peppers, we assume that the slightly longer cobs are those of early cultivated maize.

At about 1000 B.C. a completely different maize with tripsacoid characteristics, presumably the product of hybridization with teosinte or Tripsacum, makes its first appearance. Since neither teosinte nor Tripsacum is known in Tehuacan Valley today and since no archaeological remains of either species have been uncovered in the caves although the remains of other indigenous grasses are abundant, we assume that the tripsacoid maize has been introduced from elsewhere.

The hybridization of the introduced tripsacoid maize with the early cultivated maize of Tehuacan Valley gave rise to types resembling two living Mexican races: Chapalote and Nal-Tel, the former now found in northwestern Mexico, the latter in southern Mexico. The two races are closely related, differing primarily in pericarp color, Chapalote having brown and Nal-Tel orange pericarp. Since both colors occur among the prehistoric kernels in the Tehuacan caves there is no way of distinguishing Chapalote from Nal-Tel in the prehistoric cobs - both are obviously components of the same complex.

It now seems probable that wild maize, though perhaps never abundant in any part of Mexico, was widely distributed geographically. Fossil pollen from deep drill cores from the Valley of Mexico, identified by Barghoorn et al., show that wild maize once grew there. The appearance of a tripsacoid maize in the Tehuacan Valley suggests that adjoining regions also had maize. The popcorn race from the Valley of Toluca, Palomero Toluqueño, differs from the Chapalote-Nal-Tel complex of the Tehuacan Valley in having pilose leaf sheaths and pointed kernels and it may represent the descendant of a fourth distinct geographical race.

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2. Further data on the components of the tunicate locus.

In previous News Letters (35, 36) we reported that the two components of the Tu locus which had been separated by crossing over appeared to have slightly different effects. After an additional backcross to the inbred A158 which produced lines which are theoretically 61/64 or 95.3 percent A158 there is now no doubt that this is true. The differences are apparent in a number of characteristics. Lines heterozygous for the locus tu^{h-d} have more prominent central spikes, longer staminate glumes, and longer, thicker pistillate glumes than lines heterozygous for tu^{h-1}. Although the kernels are not completely enclosed in either group of lines they are shelled off with difficulty from the tu^{h-d} lines and more easily from the tu^{h-1} lines.