A counterpart of this situation occurs in some Peruvian races of corn which have been isolated geographically from Tripsacum and which cross more easily with Tripsacum (Farquharson, 1957).

If T. floridanum is the most primitive species of its genus as studies of its morphology indicate and if it is an amphidiploid of two n=9 species such as Manisuris, as certain cytological data suggest, then its crossability with corn may be more than a matter of segregation and drift. The polyploid nature of T. floridanum may have enabled it to overcome the genetic barriers which originally separated its n=9 ancestors from wild corn (n=10). This idea has some support in the fact that a higher level of polyploidy in the n=36 forms of Tripsacum dactyloides helps to overcome the present genetic barriers to crossing with corn (Weatherwax, 1955 p. 11).

The present high degree of incompatibility between Tripsacum and corn in Mexico and Guatemala may have resulted from a limited amount of reciprocal introgression between them as the range of this first species of Tripsacum overlapped with that of corn. Such reciprocal introgression might also account for the present tripsacoid races of corn and maizoid species of Tripsacum.

A possible alternative explanation of T. floridanum's crossability is that it is a peripheral species which, extending its range and becoming no longer sympatric with maize, lost some of the genetic factors which had previously served as barriers between the species.

The distribution of T. floridanum in the Everglades National Park is spotted. Once it takes hold in the rough oolite region between the pine lands and the glades or at the margins of small hummocks in the glades, it may spread out to several hundred clumps. Its numerous short tillers and narrow stiff leaves cause it to blend in with the other grasses and sedges about it.

Collections of T. floridanum at a number of sites in the Park have been made in an attempt to find a reduced n=9 form and to study variation in this species.

W. C. Galinat

11. The association of pollen grain size with ear length in corn.

After observing the features of a certain unusually long ear of open-pollinated Longfellow Flint corn, it occurred to the writer that the adjustments related to the evolution of increased ear length in ears enclosed in husks might include an increase in pollen grain size. This open-pollinated ear was divided into four regions, each

of which has a bearing on the hypothesis. In the terminal region, the grain was partly destroyed by birds. Proceeding downward the next region had scattered purple kernels indicating some outcrossing with foreign pollen. Still lower all of the grains were yellow as if they had resulted solely from selfing or sibbing, and finally the lowermost region was barren. These differences were interpreted to indicate that, although the unusually large pollen of Longfellow Flint had sufficient energy and/or cytoplasm to grow down the styles further than the foreign pollen, it was not able to reach the ovules at the base of this very long ear. Inasmuch as the loss of grain from near the tip of the ear would have been proportionately greater if the ear and husks were shorter, natural selection would favor longer ears which were associated with larger pollen or pollen with an ability to send tubes all of the way down the longer styles of such ears. Also, artificial selection by man for longer ears would have a similar or supplemental effect in increasing pollen grain size, especially if because of bird or insect damage to the tip a higher percentage of the lower kernels were planted.

A preliminary test of this theory was made with data already available. The results were even more striking than expected. The r-test showed a highly significant correlation at the one percent level between ear length and pollen grain size as shown in the accompanying table.

Probably the correlation is not the result of pleiotropic action by single genes. Rather the increase in pollen grain size seems to be a secondary effect of selection in long-eared corn. Where necessary, the corn breeder might improve seed set at the base of the ear by just planting the "large rounds" which screen out from this region.

The association of pollen grain size with ear length in corn.

| Race and stock | Ear length (c m)[1] | Pollen size (u)[2] |
|---|---|---|
| Nal Tel, Mex. 1749 | 7.9 | 81.2 |
| Polomero Toluqueño, Mex. 1757 | 10.2 | 77.4 |
| Tepecintle, Mex. 1718 | 10.4 | 79.1 |
| Conico, Mex. 1751 | 13.6 | 89.5 |
| Cacahuacintle, Mex. 1758 | 14.5 | 82.9 |
| Tabloncillo, Mex. 1779 | 16.4 | 101.4 |
| Vandeño, Mex. 1719 | 17.2 | 83.9 |
| Tuxpeño, Mex. 1750 | 19.7 | 95.0 |
| Jala, Mex. 1787 | 30.5 | 101.4 |
| Huesillo, Costa Rica 10453 | 33.0 | 106.2 |

[1]from Wellhausen, E. J., et al - Table 14 in Races of maize in Mexico, 1952

[2]from Mangelsdorf, P. C. - unpublished

[3]Ear length from actual specimen

r = 0.881* (coefficient of simple linear correlation)

With 9 degrees of freedom at 1% level, significance = 0.735* (Tables of Snedecor, G. W., 1955)

*Highly significant since r is greater on the 1% level.

W. C. Galinat

12. Reciprocal introgression of high and low condensation in the American Maydeae.

The inflorescences of Tripsacum, teosinte and primitive corn are elongate and, in the staminate portions, are pendant as a result of low or relaxed condensation. But selection for higher kernel-row-number during domestication of corn has resulted in compact inflorescences with high or tight condensation. This high condensation might be associated with an objectionable fasciation or flattening of the ear, as it is in certain popcorns, if it were not for teosinte introgression in the more evolved races. Apparently the effects of genes for high condensation and fasciation in corn are modified by genes for low condensation from teosinte to the extent that the cob attains many rows but remains symmetrical. This observation was first made on some 700 year old cobs from Richards Cave, Arizona, in which there was a tendency for strongly fasciated cobs to be less Tripsacoid (Galinat, et al, Bot. Mus. Leaf 17 (4) ). Reduced condensation, which may come directly from Tripsacum introgression in certain South American races of corn (Mangelsdorf), may be so extreme as to allow space for the grain of the race Coroico to round out in shape and tesselate or interlock (Cutler, 1946.). Ordinarily the internodes are so short (condensed) that the adjacent pairs of grain are staggered by only one-half their thickness but in Coroico the internodes become sufficiently long for the kernels to round out and interlock so that the right member of one pair falls into a vertical row with the left member of the adjacent pair. The over-all effect is to reduce the kernel-row-number by one-half, a result which could also be achieved by the abortion of one member from each pair.