

being combined with the vestigial glume (Vg) gene for comparative studies. One of these from Mangelsdorf's collection came from Chapalote maize and it modifies the expression of the Vg gene in a manner identical to that of the Chapalote factor which was isolated independently (Galinat, MNL, 1955) and is presumed to be the same gene. Weak tunicate alleles derived from other races (Wilbur's Flint, Guatemala 197, and Mexico 1740) tend to have a similar, although less pronounced, effect in restoring tassel glumes to Vg plants bearing glumeless ears.

13. A minus-modifier for the Vg gene from Nobogame teosinte.

During the course of incorporating the Vg gene into Nobogame teosinte, a minus-modifier which restores tassel glumes to Vg plants was encountered in heterozygous condition in the recurrent parent. This modifying factor, which appeared in 50 percent of the Vg plants in the BX-3 generation, could only have come from teosinte because any accidental outcrossing to maize would have been readily apparent. Previous crosses to teosinte involving the F<sub>1</sub> and first two backcrosses yielded essentially glumeless tassels, indicating that not all plants of Nobogame teosinte carry the modifier. When the Vg teosinte plants with long tassel glumes were outcrossed to normal (non-tunicate) maize, normal tassel glume development reappeared in 50 percent of the Vg progeny. Thus this modifying factor is dominant. Its effect on the expression of the Vg gene is quite similar to that of the tunicate factor from Chapalote.

14. Occurrence of bifurcated midrib in the first leaf above the coleoptile.

Bifurcation of the midrib to the first leaf above the coleoptile was observed in 18 out of 22 related families of 30 seedlings each. It occurred at various frequencies ranging from 3 to 63 percent. The average frequency was 18 percent.

If such bifurcation is inherited, the penetrance of the genes is not complete or uniform. Perhaps the double midrib in this leaf results from an intergrading influence between that which normally results in the development of two main ribs in the coleoptile and the single midrib of most other leaves. Sometimes this bifurcation will extend to several leaves or, more rarely, the shoot itself becomes involved.

15. Leaf bloom in the corn grass and teopod mutants.

A waxy bloom occurs on the upper side of the leaf blades in these narrow-leaved mutants as it does in certain other grasses (sorghum) as well as on the narrow leaves (the lowermost or seedling leaves) of normal maize. Pubescence replaces the bloom on the broad, more distal

leaves in normal maize. When corn-grass leaves are somewhat broader than those of the original grass-like extreme, as may result from minus modification, then the upper leaves have streaks of bloom interspersed with pubescent areas.

Another peculiarity of the original grass-like type of corn grass plant, which has not been recorded previously, is a convex rolling of the leaves. The direction of this roll is opposite to that which occurs in normal leaves which have been subjected to drought.

Walton C. Galinat

16. Further cytological studies of maize-teosinte derivatives.

Materials and techniques used and some of the results of the cytological studies of maize-teosinte derivatives were reported in last year's News Letter. The following is a brief account of additional studies.

A. Asynapsis: Asynaptic configurations varying in size, shape, location, and the chromosomes involved were observed at pachytene. Involved in this type of irregularity were chromosomes 1 and 4 of Florida teosinte, and chromosomes 8 and 10 of Durango teosinte,

B. Non-homologous association: In the derivatives of Durango teosinte foldback types of non-homologous association involving chromosomes 2, 4, 5 and 8 were observed, while in Florida-teosinte derivatives non-homologous association between two different pairs involving chromosomes 7 and 8 were found. The length of the chromosome segments within various non-homologous associations varied in different collections.

C. Chromosome knobs: In Durango-teosinte derivatives additional knobs were recorded on chromosomes 2, 5 and probably 8. In Nobogame-teosinte derivatives an additional knob was present on chromosome 4.

D. Inversions: Since the last report a terminal inversion on the short arm of chromosomes 8 was found in three more progenies of Durango-teosinte. At diakinesis the chromosomes, heterozygous for this inversion, usually did not pair normally. Among 151 cells studied in the progeny No. 5913, 29 had the two chromosomes completely dissociated and acting as univalents. In the remaining 122 cells some of the chromosome 8 bivalents were associated only at one end. Bridges and fragments at anaphase I or early telophase were found. However, frequencies of the appearance of bridges and fragments were very low (see table). Furthermore, no bridges were recorded at anaphase II among 1090 cells studied.

It was also observed that at anaphase I the heterozygous chromosomes 8 frequently underwent precocious division. These early-divided chromosomes were always found persistent in the center of the cells, while the other diads had approached the poles.