an arrangement which ensures maximum photosynthetic activity (loci: narrow-leaf, brachytic, etc.). Maximum fecundity in the floral region requires many abrupt modifications although the shift to inflorescence development becomes gradual in the presence of either the Corn-grass or Teopod genes. The natural protection and dissemination of the grain and protection of the young anthers from sun-burning requires a very precise accommodation in leaf (glume) shape, size, and texture (loci: Tunicate, Vestigial glume, Papyrescent) although the ideal natural form may not correspond to the ideal domestic form. Where floral leaves would be useless or harmful to fecundity, such as in rachis phytomers, they are completely inhibited or reduced to glume cushions (loci: Corn-grass, Teopod). The genes at four loci control the production of phytomers by various axes of the inflorescence (loci: ramosa 1 and 2, branched-silkless, and polytypic).

W. C. Galinat

7. Evolution of a low glume/rachis ratio in the American Maydeae.

The introduction of the tunicate (or half-tunicate) gene from maize into teosinte transforms the cupulate fruit case into another type of fruit case with a quite different glume-rachis relationship. This synthetic form has long glumes and slender rachis segments in a combination which except for the increased size of the parts resembles Elyonurus tripsacoides in the closely related tribe Andropogoneae. Such an equal enlargement of parts may only reflect increased vigor while, on the other hand, differential development would have taxonomic significance. In modern maize and its relatives, the ordinary-sized pistillate glumes in combination with thick rachises produce low glume/rachis ratios. Since the tunicate gene can reverse this condition in at least maize and teosinte (and probably in Tripsacum) by producing a high glume/rachis ratio of a type typical for the Andropogoneae, this gene or its locus may well have been involved in the evolutionary divergence of the American Maydeae from the Andropogoneae.

W. C. Galinat

8. Intra-plant ear competition in Argentine popcorn.

The many-eared characteristic of Argentine popcorn tends to provide a series of forms intergrading between tassel branches at the top of the plant and tillers at the base of the plant. The progressive changes involved may reflect those which occurred during the evolution of a large centrally-located ear enclosed in many husks from a tiny sub-tassel ear enclosed by only a few husks (Mangelsdorf, 1958). That a central position along the stalk is a more favorable one for development of a larger, more productive ear is supported by the following data:

	Position at Various Nodes Below the Tassel				
Ear Character	1	2	3	4	5
Kernel Rows	8	10	12	14	14
Total No. Kernels	64	190	220	350	336
Weight ear (gms.)	3.2*	10.0	11.3	14.4	12.5
Length Shank (cm.)	2.4	2.7	4.4	5.4	6.3
No. husks	4	5	6	7	8

* including 0.5 gms. in a staminate tip

The data indicate that ears borne below an optimum position may be reduced in size probably because of competition with longer shanks and more numerous husks.

W. C. Galinat

9. Clustered spikes, an extreme feature of teosinte, present in maize-Tripsacum hybrid.

Since the clustering of spikes is unique to teosinte among the American Maydeae, this character seems at first to oppose the theory that teosinte is derived from a maize-Tripsacum hybrid. But the presence of clustered spikes in an F_1 hybrid between multiple-tester maize and Tripsacum dactyloides, which is currently under study, demonstrates that this feature is merely a hybrid product of combining two other characters from maize and Tripsacum. When the many-noded shank (peduncle) of maize, which has a lateral bud at each node, is combined with the small two-ranked spike of Tripsacum there is a development of the lateral buds into clusters of spikes.

W. C. Galinat

10. Cytological studies of F_1 hybrids between maize and teosinte.

A. Chalco teosinte - maize hybrids. Two F_1 plants of the cross of an inbred maize strain of Wilbur's Flint x Chalco teosinte and its reciprocal were cytologically investigated. A practically terminal inversion was found at pachytene in the short arm of chromosome 8 in both of these plants. This inversion, like In 8 in other varieties of teosinte, formed loop-shaped, ring-shaped and asynaptic configurations. The length of this In 8 and the percentage of the short arm which it occupies are shown in Table I.

Table I. Length of In 8 in Chalco teosinte

Cell No.	Length in microns		Percent of
	Short arm	Inversion	Short arm
1	16.0	13.6	85.0
2	14.0	9.2	65.7
3	12.8	9.6	75.0
4	14.2	10.7	75.3
5	13.4	9.6	71.6
Average	14.0	10.5	74.5

The chromosomes in these F_1 plants were well spread and easily identifiable. There was one knob on the long arm of chromosome 1, and one on each arm of chromosome 2. The long arm of chromosome 3 had a medium-sized knob. A small subterminal knob was present on the short arm of chromosome 4, and a relatively large knob occurred on the long arm. A large knob occurred on the short arm of chromosome 5. Two knobs were found on the long arm of chromosome 6, and a small terminal knob or a large chromomere on the short arm of the same chromosome. A large knob was also present on the