Plant No.	Su Gl$_3$	Su gl$_3$	su Gl$_3$	su gl$_3$	Totals	% Su	% Gl$_3$	% C.O. Su Gl$_3$
211-4	76	39	79	136	330	34.8	47.0	35.8
5	39	33	63	95	230	31.3	44.3	41.7
7	106	39	59	147	351	41.3	47.0	27.9
11	38	28	40	69	175	37.7	44.6	38.9
12	77	53	75	103	308	42.2	49.4	41.6
Totals	336	192	316	550	1394	37.9	46.8	36.4

Previous experiments have indicated that this $\underline{Ga}$ is not transmitted through the pollen. If this is true then the percentage of $\underline{Su}$ and $\underline{Gl_3}$ represent respectively the percentages of crossing over between $\underline{Ga}$ and $\underline{Su}$ and between $\underline{Ga}$ and $\underline{Gl_3}$. On this basis the linear sequence must be $\underline{Ga} \ \underline{Su} \ \underline{Gl_3}$ and $\underline{Ga}$ must be on the short arm of chromosome 4, perhaps fairly near the terminal end.

P. C. Mangelsdorf
S. M. Sehgal

5. The mutagenic effects of homozygous and heterozygous teosinte chromosomes in an isogenic stock.

There has been some indication from previous studies that the mutagenic effects of teosinte chromosomes incorporated into an inbred strain (A158) are greater when the introduced teosinte chromosomes are heterozygous than when they are homozygous. To test this possibility further we conducted the following experiment: Eight different modified strains of A158 each containing one or more introduced teosinte chromosomes in the homozygous condition were scored for seed and seedling abnormalities. These same eight strains were crossed with the original A158 and the F_2 ears were scored for seed and seedling abnormalities. The results are shown in the following table:

Stock	No. ears Scored	Percent with Abnormalities		
		Seed	Seedling	Total
Control, pure A158	100	0.0	0.0	0.0
A158 with homozygous teosinte chromosomes	876	10.0	6.6	16.6
A158 with heterozygous teosinte chromosomes	658	15.2	19.4	34.6

It is probable that some of the abnormalities found are phenocopies rather than inherited mutations. However the fact that the frequency of abnormalities is more than twice as great when the teosinte chromosomes are heterozygous than when they are homozygous is highly significant. It suggests that crossing over between maize and teosinte chromosomes may be involved in the production of abnormalities. Since maize and teosinte chromosomes are probably not completely homologous, crossing over between them may often be unequal. This could result in deficiencies and duplications.

W. C. Galinat

6. Genetic control of phytomer development.

Although different regions of the plant differ greatly in final form, despite their common genom, their initial repetitious design, the so-called "phytomer," is identical. The role of specific genes in modifying development of the phytomeric parts, an internode with attached leaf and an axillary bud with associated prophyll for specialized functions, is revealed by certain genetic variants. In the central region along the plant the leaves are greatly enlarged and widely separated by elongated internodes

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:

Ear Character	Position at Various Nodes Below the Tassel				
	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