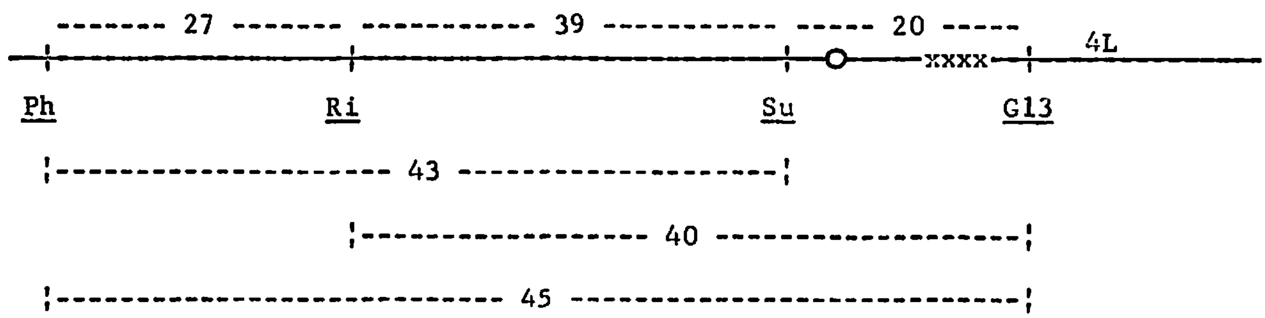
in an eight-rowed background, has been transferred to maize on a corn-*Tripsacum* interchange chromosome (M2-Tr9). In a row-number background higher than eight-rowed, the effect is only a reduction in row number. This dominant factor from *Tripsacum* is allelic to two-ranking from teosinte, as shown by a hybrid with a two-ranked teosinte derivative that failed to segregate the many-ranked condition through the F_3. At first the dominant factor was unstable regarding the point at which its phenotype was manifest. However, in due course a factor, possibly from teosinte, was selected which synchronized its expression with the onset of rachis formation. The nature of this synchronizing factor is unknown.

As one of the essential traits which distinguishes corn from teosinte, the inheritance of the two-ranked spike has special significance. The development of two-ranked, string cob sweet corn is possible and well underway.

Walton C. Galinat

Abscission layer development in the rachis of Zea: its nature, inheritance and linkage — Abscission occurs independently in two regions of the rachis, namely the rind and the pith, as seen in longitudinal sections of cobs from corn-teosinte derivatives. Our studies reveal that development of the abscission layer in these two regions is controlled by two different genes on chromosome 4 (Tables 1 and 2). These genes, hereby designated as *Ph* for pith abscission and *Ri* for rind abscission, are placed on the short arm as shown in Figure 1.

Figure 1. Placement on chromosome 4 of factors for abscission layer development in maize-teosinte derivatives.



xxxx = possible small inversion in the *Su*-*Gl3* region

Table 1. Backcross segregation data for rind and pith abscission layer development from Nobogame teosinte with chromosome 4 markers from corn.

	Su G13	Su g13	su G13	su g13	Total
Ph Ri	205	51	31	119	406
Ph ri	52	32	24	78	186
ph Ri	58	14	6	38	116
ph ri	118	31	29	213	391
Total	433	128	90	448	1099

Table 2. Four-factor linkage analysis of Su, G13, Ph and Ri.

	Combinations	Frequencies	Total	Recombination
Parental	Su G13 + su g13	433 + 448	881	
Recomb.	Su g13 + su G13	128 + 90	218	20%
Parental	Su Ph + su ph	340 + 286	626	
Recomb.	Su ph + su Ph	221 + 252	473	43%
Parental	Su Ri + su ri	328 + 344	672	
Recomb.	Su ri + su Ri	233 + 194	427	39%
Parental	G13 Ph + g13 ph	312 + 296	608	
Recomb.	g13 Ph + G13 ph	280 + 211	491	45%
Parental	G13 Ri + g13 ri	300 + 354	654	
Recomb.	G13 ri + g13 Ri	223 + 222	445	40%
Parental	Ph Ri + ph ri	406 + 391	797	
Recomb.	Ph ri + ph Ri	186 + 116	302	27%

In the corn background of the backcross segregation reported here, abscission in the rind portion of the rachis was partially suppressed in the sense that its expression in most specimens required special treatment. After longitudinal sections of 1099 cobs from the backcross were soaked in water and then spread out, cut surface uppermost, on the greenhouse bench for a period of one year, some previously obscure abscission layers in the rind were revealed. In some of the shorter, more condensed cobs the expression of rind abscission was apparently completely suppressed despite this year-long treatment because of the tight fusion of the apex of the cupule to the glume cushion of the spikelet pairs above; this resulted in a slight deficiency in the rind abscission phenotype despite all efforts to observe it. With either gene the expression of abscission layers in the heterozygote is intermittent and more frequent toward the tip of the ear where condensation is slightly relaxed.

The non-shattering rachis becomes semi-lethal in teosinte because it inhibits seed dispersal. But the reciprocal condition, partial abscission layers in the corn cob, may be tolerated because a comparatively high level of condensation in corn prevents complete rind abscission through a fusion of the apex of the cupule to the glume cushion above. Pith abscission is ineffectual in the absence of complete rind abscission, so modern corn can cope with some gene flow from teosinte for these two abscission factors because of their usual neutral effect on the corn cob.

The reduction in crossing over between Su and Gl3 in this segregation from the usual 34 percent to 20 percent is interpreted as being due to interference from a small heterozygous inversion.

Walton C. Galinat

Adaptiveness of knobs in teosinte — The chromosome knob constitutions of 310 plants from 54 collections of Mexican teosinte and 88 plants from 7 collections of Guatemalan teosinte have been determined. The analysis of the regional distribution of knob types showed that they occur in combinations that are characteristic for each population.

There are two general knob categories in Mexico: (1) knobs that are widely distributed in almost all local populations, and (2) knobs that have a more specific regional distribution; furthermore, within each of these groups the knobs of different size generally do not show the same frequencies within and between regions. Some of the data illustrating these points are given in Tables 1 and 2 in terms of the relative frequencies found in each of the geographical regions.

The knobs found at the 3L1, 5L1 and 9S positions are representative of the first group. The 5L1 position is predominated by the large knobs in all regions except Nobogame in northern Mexico; the medium knobs and the knobless positions are always present but in relatively lower frequencies than the large knobs. On the other hand, although all the regional populations have knobs in the 3L1 and the 9S positions, their frequency varies according to the region. The 3L1 position is predominated by large knobs in the Chalco region; in the regions of Guerrero-S.E. Michoacan-W. Mexico, this position is predominantly knobless. There are higher knob frequencies in the Guanajuato-N. Michoacan region than in the regions farther south where the large and medium knobs and the knobless