The demonstration that the results are not those expected if a two-factor system were operative for this Ga factor (which is probably Ga_2), is applicable only to this factor. It shows, however, that not all 5th chromosome gametophyte factors require the presence of an inhibitor (In) at another locus in order to exert their effect.

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5. A test for fifth chromosome gametophyte factors in some Mexican races.

The 5th chromosome tester A_1, C, R, a_2 bt pr synthetized by Burnham has been a most useful stock in the investigation of chromosome 5 gametophyte factors because it has not appeared to carry any gametophyte factors itself. For example, in the F_2 of crosses times 4541 (a Black Beauty popcorn inbred which is A_1, C, R, A_2 Bt Ga Pr), we have found 5.1 percent bt kernels and 10.4 percent a_2 kernels. Thus, the gametophyte factor in 4541 is approximately 10 C.O. units distal to bt and is apparently at the locus designated by Brieger as Ga_2. With respect to 4541, the tester appears to be ga_2.

The genotype of various Central American races with respect to the 4th chromosome gametophyte factor, Ga_1, has long been of interest to us. Results of various tests have been reported in previous M.N.L.'s. Last year we decided to test a few Mexican varieties for their allelic constitution at the Ga_2 locus by crossing onto the a_2 bt ga pr tester and selfing. Four Mexican races, Celaya, Conico Norteño, Cuatero de la Virgen, and Vandeño were used. The results are recorded in Table 1.

It is evident that for 3 F_2 progenies (those involving Conico Norteño, Cuatero de la Virgen, and Vandeño) there are significantly more bt kernels than expected. There are several possible explanations.

In the first place it is possible that there is a multiple allelic series at the Ga_2 locus such that gametes with a particular allele have a competitive advantage over those gametes carrying an allele which is lower in the series but are at a competitive disadvantage relative to gametes carrying an allele higher in the series. In this particular case, the allele $ga_2{}^B$ in the Burnham tester stock would be almost completely eliminated when competing against Ga_2 from 4541. It would, however, be at a competitive advantage against the ga_2 alleles from Conico Norteño, Cuatero de la Virgen, and Vandeño. In the case of Cuatero de la Virgen, for example, if the ga_2 locus is approximately 10 C.O. units from bt as we've calculated, fertilization was effected in 68 percent of the ovules by the $ga_2{}^B$ allele from the tester stock.

Alternatively, it is possible that the Ga_2 locus is not implicated at all in these cases of preferential fertilization but that another gametophyte locus on chromosome 5 is responsible for the excess of bt kernels. We have detected in other stocks the existence of a second gametophyte factor on Chromosome 5. It is located about 30 C.O. units distal to bt. If the a_2 bt ga pr tester were Ga at this locus while Conico Norteño, Vandeño, and Cuatero de la Virgen were ga and if Ga gametes always effected fertilization, then the observed results would be attained. No decision on which alternative is more likely can be made from these data.

Table 1. The totals and percentages of bt kernels in the F_2 progenies of a_2 bt ga pr x various Mexican races (1961).

a) (a_2 bt ga pr x Celaya)

Ear No.	Total kernels	% bt
-1	375	24.5
-2	401	24.7
-3	441	25.9
-4	449	23.8
-5	384	21.4
-6	328	23.8
	2378	24.1

$X^2 = 1.13$ $P > .20$

b) (a_2 bt ga pr x C.N.)

Ear No.	Total kernels	% bt
-1	394	32.0
-2	334	28.1
-3	348	29.3
-4	328	30.8
-5	282	30.5
-6	368	22.8
	2054	28.9

$X^2 = 16.41$ $P < .001$

c) (a_2 bt ga pr x C. d.l. Virgen)

Ear No.	Total kernels	% bt
-1	520	30.2
-2	417	30.9
-3	468	34.6
-4	503	30.6
-5	452	28.1
-6	319	37.6
-7	317	32.8
	2996	31.8

$X^2 = 74.08$ $P < .001$

d) (a_2 bt ga pr x Vandeño)

Ear No.	Total kernels	% bt
-1	415	37.1
-2	455	27.3
-3	431	29.3
-4	399	28.8
-5	398	28.1
-6	377	30.2
	2475	30.1

$X^2 = 34.35$ $P < .001$

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1. Sweet corn investigations.

a. Adaptation at the northern limit of maize cultivation. Sweet corn is the sugary seeded form of maize, and has been grown on a limited scale in Perthshire for some years. It is very sensitive to several external factors, particularly day-length, light intensity, soil temperature during germination and temperature prior to flowering. In addition the crop is readily attacked by the frit-fly (Oscinella frit.). Hence the growing of sweet corn in Eastern Scotland, which is at the most northerly limit of its cultivation by Man, affords interesting