Further data in favor of the hypothesis come from the analysis of a sample of plants derived from stippled kernels with BFB cycle in their endosperm. These kernels, derived from testcrosses of G S-st P/g p s plants, proved upon germination to have lost P in 8 out of 16 cases. Accordingly they have been used in testcrosses to g p s plants to see whether loss of P of case 1 strand is associated with re-establishment of normal transmission and g - R recombination values:

Case 1 strand	Stippled phenotype	Crossing over % g to S-st	Case 1 strand transmission ♀♀	Case 1 strand transmission ♂♂	Inferred strand constitution
standard*	standard	1.98	44.6	20.6	G S-st P G
deriv. -1	dark	15.10	50.5	51.1	G S-st
deriv. -2	dark	2.07	40.6	38.0	G S-st G
deriv. -3	standard	0.62	44.0	--	G S-st G
deriv. - 4	very dark	1.51	47.6	51.0	G S-st G

*standard refers to a strand carrying P; the four derivatives lost it.

The data indicate that only one of the four derivative strands lost a major portion of the entire translocated duplication while the remaining three retained a portion marked with G. The apparent association of loss of the duplication or part of it with an altered stippled expression remains, at present, unexplained. More data are necessary to confirm it and to understand what might be the relationship between the two events.

G. Gavazzi and Graziella Anzani

Postzygotic lethals as a genetic tool for the analysis of embryogenesis

Embryogenesis in higher plants is a complex process involving many steps whose identification and temporal sequence might be analyzed by means of gene mutations affecting embryo and endosperm morphology. Different mutants of this kind are known in corn. They are also easily inducible with chemical mutagens. The frequency of selfed M2 ears segregating for such mutants following a 0.1% EMS treatment to seeds amounts to about 25% (C. Colella and G. Gavazzi, MNL 47:111). The induced mutants are either viable or lethal. The former consist of etched, collapsed endosperm and small seeds while the latter include the same types as well as aborted seeds, germless and defective endosperm type. Post-zygotic lethals are expected to be mutants of genes whose activity is required in embryogenesis, in the metabolism of the resting seed, or in catabolic reactions of the germination process. They would also include nutritional mutants with blocks in essential metabolites not diffusible from maternal tissues or required by the embryo at a late differentiation stage when the vascular flow originating in the mother plant is interrupted. These mutants are often recognizable at an early stage of seed development. Immature embryos can thus be excised and forced to germinate on enriched media.

Growth on such media should allow survival of some mutants with a nutritional block or with lethality confined to late stages of embryogenesis that are bypassed by inducing precocious germination. Other mutants that might be rescued are those whose endosperm development is genetically blocked, like those with defective endosperm.

We isolated more than 70 postzygotic lethals and began their analysis by excising immature mutant embryos, 1-2 mm long, on M2 and M3 ears, and transferring them on both mineral and enriched media (Gavazzi et al., Z. Pflanzenphysiol. 75:381-391). The results so far obtained on a group of 11 mutants can be summarized as follows:

- five of them do not have a structure identifiable with an embryo.
- three others do not show any growth after excision and transfer to the culture media.
- two others grow very slowly, showing after 10 weeks a small shoot but no roots.
- one mutant grows as much as the wild type on both mineral and enriched media, yielding an albino seedling with green leaf tips; preliminary results seem to indicate that subtraction of sucrose from the medium enhances its chlorophyll content.

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Variation of pollen fertilization ability in relation to the genotype of the stylar tissue

It has been ascertained that in maize there is a wide range of genetic variability with respect to pollen grain fertilization ability. The fitness of the male gametophyte is attributable to different factors, among which the tube growth rate has been shown to be particularly important in determining differences of competetive ability. This character may be affected not only by the pollen grain genotype, but also by the genotype of the stylar tissues where the tube grows.

In order to study the effect of the female plant genotype on the competitive ability of inbred lines of maize, four lines (Wf9, B37, C123, M14), differentiated with regard to this character (M. Sari Gorla, E. Ottaviano and D. Faini, Theor. Appl. Genetics 46, 1975), were compared two by two in all possible combinations. Mixtures composed of equal quantities of pollen from different genetic sources, marked for the presence of the normal or mutant allele of the opaque-2 gene, were used to pollinate two different hybrid female plants, homozygous o2 o2, (OH43/B14 and Rosman/RVa36). Thus, the experiment comprised four controls (opaque and normal versions of the same line) and six comparisons (each in two reciprocal combinations), repeated on two genetically different female plants.

The character studied--pollen competitive ability--was measured as the increase of the relative frequency of one of the two kernel types from the apex to the base of the ear resulting from mixed pollination. The ears of the two female plants were divided transversely into five segments of the same dimensions (number of kernels on row). In the absence of competition, no differences in the frequency of normal and opaque kernels in the different segments are to be expected, whereas greater fertilization ability of one of the two pollen types will be revealed by an increase of the frequency of that type from the apex to the base of the ear, where the styles are longest.

The results with regard to the control combinations are shown in Table 1. Here the opaque kernel frequencies in the five segments of the ear following mixed pollination with pollen from the two versions of the same line are reported. In these cases, the frequency of the two kernel types is not statistically different from the first to the fifth segment, irrespective of the female plant used; this is to be expected when the two pollen types in the mixture have the same growth rate.

Table 2 shows the results of the competition between lines. For each comparison, the proportion of kernels of one of the two lines (the one which revealed greater competitive ability) obtained from the two reciprocal combinations is indicated. For example, in the WF9-C123 comparison, the frequencies reported were obtained by adding the opaque kernels from the pollen mixture WF9o2-C123O2 to the normal kernels from the WF9O2-C123o2 mixture. Here a significant increase of the relative frequencies of the kernels of one genotype from the first to the fifth segment is revealed. The lines reveal different competitive abilities: WF9 has the greatest competitive ability, followed by C123, M14 and finally B37. Some of the comparisons, made last year, confirm the line characteristics previously observed. In each line pair, the relative frequency trend had the same direction in both females. But the slope of the trend, that is, the extent of the increase from one segment to