Dt_1 cell line, ¼ of the gametes derived from the line would contain no Dt.

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3. Activation Cycles of Dt^{TB}_1.

Kernels sectored for dotted expression were first observed among the backcross progeny of a Dt_1 Yg_2/dt yg_2, Dt_1^{TB} dt^{TB}, a^m-1 a^m-1 plant. Several kernels had no dots at all in the aleurones but were heavily dotted in the scutella. Whereas three-fourths of the kernels were expected to have fully dotted aleurones, the ear contained 172 kernels with uniformly dotted aleurones, 117 completely dotless types, and 96 with dots found in sectors of the aleurone and/or dotted scutella. The aberrant types from the latter class were grown and crossed with tester strains to determine the cause of the altered dotted expression in these kernels.

Self-pollinations of plants grown from sectored kernels produced kernels having basically colorless aleurones, some of which had well-defined dotted sectors; the dotting in the scutella, when it occurred, was uniform (color in the scutellum requires additional genes which were not being followed here). A very few kernels were dotted throughout the aleurone. A plant arising from a kernel with reduced Dt activity was selected for intensive study and used as pollen parent in a variety of crosses. All the kernels on an ear from a cross between this plant and an a_1^s a_1^s Dt_1 Dt_1 stock (colorless aleurone) were uniformly and highly dotted. Since a_1^s does not respond to Dt, the only source of a mutable a_1 allele was the plant being tested; thus, the presence of two normally mutable a^m-1 genes in the pollen parent was established.

The activity of Dt was studied by crossing the test plant to an a_1^s a_1^s dt dt (colorless aleurone) female parent. The resultant ear showed that Dt was inactive in most of the aleurones but occasionally became active, producing sectors of a_1 mutability. The same behavior was observed in a similar cross to an a^m-1 a^m-1 dt dt plant.

An independent modifier of Dt activity could not have caused the sectoring since the Dt from the a_1^s Dt_1 stock was not affected. A modifier linked to Dt whose influence is restricted to genes in the same homologue might be postulated, but it seems more likely that induction of Dt activity and inactivity was autonomous.

Since the tested plant was homozygous for the highly mutable a^m-1, sectors of Dt reactivation were clearly defined. The reactivation sectors on self-pollinated ears were larger than on outcrossed ears, where only one Dt was present in the triploid endosperm. It is possible that Dt reactivation in these kernels was dose-dependent; i.e., the inactive Dt's acted synergistically to reactivate other inactive alleles. According to this explanation, the combined action of the Dt's caused earlier reactivation realized by larger sectors of Dt activity.

One ear from the cross a_1^s a_1^s dt dt X a^m-1 a^m-1 dt $Dt^{in\text{-}ac}$ ("Dotted, inactive-active") segregated 1:1 for kernels with dotted and colorless scutella (Table 3, No. 1). Kernels in the two classes were scored for

Table 3

Tissue dependence of $\underline{Dt}^{in\text{-}ac}$ phase reversals. Analysis of the crosses $\underline{a}_1^{s}\ \underline{a}_1^{s}\ \underline{dt}\ \underline{dt}$ (1191) ♀ or $\underline{a}^{m}\text{-}1\ \underline{a}^{m}\text{-}1\ \underline{dt}\ \underline{dt}$ (1183) ♀ X $\underline{a}^{m}\text{-}1\ \underline{a}^{m}\text{-}1\ \underline{Dt}^{in\text{-}ac}\ \underline{dt}$ (1179-1181) ♂. Both parents of Nos. 2-5 were probably heterozygous for a scutellar color factor

No.	Cross	Number of kernels: Dotted scutella; dotless endosperms	Dotted scutella; sectors of mutability in endosperm	Dotless scutella; dotless endosperms	Dotless scutella; sectors of mutability in endosperm
1	1191 X 1181-1	129	22	154	0
2	1183-8 X 1181-1	84	35	185	1
3	1183-10 X 1180-1	99	13	177	0
4	1183-3 X 1180-3	114	13	195	0
5	1191 X 1179-1	128	48	256	3

aleurone sectors showing Dt activity; sectors of Dt^{in-ac} reactivation were found only on kernels with dotted scutella. The 3 : 5 ratios for kernels with dotted: dotless scutella on the four remaining ears of Table 3 (Nos. 2-5) were attributed to the segregation of a scutellar color factor in both parents. Nevertheless, sectors of Dt^{in-ac} reactivations were found mainly on kernels with dotted scutella. The dotless scutella of the four exceptional kernels (last column, Nos. 2 and 5) were not unexpected since a scutellar factor was presumably segregating in addition to Dt^{in-ac}. It was concluded that inactivations of Dt^{in-ac} followed by occasional reactivations were tissue-dependent, occurring in the aleurone but not in the scutellum. Thus, kernels with colorless scutella (with the proper scutellar factor constitution) were assumed to be of dt dt dt constitution.

Preliminary crosses show independent inheritance of yg_2 and Dt^{in-ac} suggesting that Dt^{in-ac} was derived from Dt_1^{TB} rather than Dt_1. No tests of Dt_1^{TB} and Dt^{in-ac} allelism have been made, however.

Reversals of phases of activity were found for the regulatory element Spm (McClintock, B. 1961. Am. Nat. 95: 265-277). Alternations of phase occurred during any period of the life cycle and were interpreted to be autonomously controlled by Spm. The active and inactive phases of $En^{(crown)}$ or $En^{(flow)}$, however, were associated with specific areas of the aleurone (Peterson, P., 1966. Genetics 54: 249-266). Dt^{in-ac} has characteristics in common with both $En^{(crown)}$ or $En^{(flow)}$ and Spm. Random reversals of phase occurred in a single tissue (the endosperm), but such fluctuations were a property of the endosperm and not of the scutellum where Dt^{in-ac} was fully active.

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CENTRAL MAIZE RESEARCH STATION
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1. Survival of Maize Borer (Chilo partellus Swinhoe) Larvae and Varietal Resistance in Maize.

Maize borer is the most devastating insect pest of maize in West Pakistan. It is very active from March to July after which it starts to hibernate. Sporadic attack, however, continues till the end of November but damage done from August onwards is not very severe. It is due to the ravages of this pest that the growing period of maize in West Pakistan has been relegated to the fag end of the long summer season and the farmers are forced to plant short duration varieties because the crop planted earlier in the season is completely destroyed by this pest. A late sown crop often does not mature in time for planting wheat that is supposed to follow maize in the same field. Consequently, early maturing varieties are planted that in general give low yields. Recently high yielding composites containing Central and South American germ-plasm have been introduced in some parts of West Pakistan. These varieties are late maturing, therefore have to be planted early in the season with the result that very intensive plant protection measures are required to save them from borer attack. Obviously in a developing country like Pakistan,