3. Location of Dt_2, Dt_3, and bz_2: Xray deficiency method.

The genes Dt_2, Dt_3, and bz_2 (pa), all reported in the 1953 News Letter, have been placed on the chromosome map by the use of Xray induced deficiencies. Any new mutant can be placed on the correct chromosome by the treating of pollen carrying its dominant allele and crossing it on silks that are homozygous recessive, by finding among the progeny plants deficient for the dominant allele, and finally, by examining these plants cytologically to determine which chromosome has lost a segment. This segment will include the locus of the mutant in question. Such a method works very well for locating mutants affecting seedling or plant characters, but for endosperm characters a modification of the above method had to be developed because deficient endosperms induced by pollen treatment are associated with normal embryos. To overcome this, treatment of the pollen was made early in the development of the microsporocytes, before the second microspore division which separates the nuclei that fertilize that endosperm and embryo. The best stage was found to be that just following the first microscope division, since treatment at this stage produces many deficient endosperms, which are associated in more than 60% of the cases with deficient embryos (corresponding cases). The stage of treatment is quite important as microspores treated before the first division yield very few deficiencies, while those treated after the mid-point between the first and second division produce many deficiencies but they are almost always the non-corresponding type. That is, the deficient endosperm is associated with normal embryo and vice versa. Deficiencies produced by this method have been simple ones involving only one chromosome, but ranging in size from that expressed by a small buckle on a pachytene chromosome to that which included almost all the long arm of another one.

Using the above method bz^m_2 has been located on the long arm of chromosome #1 about 0.6 of the distance out from the centromere. Three plants that were deficient for Bz_2 and also for portions of the long arm of #1 were examined, but the diagnostic case was one that had a small deficiency buckle at the position mentioned above.

The Dt_2 gene was previously reported as being linked to with 22.5% recombination. By using the above mentioned deficiency method, a plant deficient for Dt_2 was obtained and found to have lost all but the two dark staining proximal chromomeres of the long arm of chromosome #6. Therefore, since Dt_2 is in the long arm of 6, and since Y is very near the centromere, this must mean that Dt_2 is about 23 units distal to Y or in the neighborhood of Pl.

In a similar fashion a plant deficient for Dt_3 was produced and found to have lost the segment of the long arm of #7 distal to the common interstitial knob. The break appeared to be immediately adjoining or possibly within the knob itself, though the knob was not visibly diminished in size. Appropriate crosses have in one way supported this in that they have clearly shown that Dt_3 was not allelic to either Dt_1 or Dt_2.

The three locations of Dt activity are as follows: Dt_1, near the end of the short arm of chromosome #9; Dt_2, on the long arm of #6 near Pl and 23 units from Y; Dt_3, on the terminal fourth of the long arm of chromosome #7.