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1. Non-disjunction of knobbed chromosome 10.

It has been reported that the presence of a terminal knob on the long arm of chromosome 10 increases the frequency of chromosome 10 non-disjunction (Emmerling, 1958 Jour. Hered. 49:203). The test described below was not made for the specific purpose of testing for non-disjunction; however, the data clearly corroborate the findings in the published report cited above.

A major modifier (\underline{M}^{st}) of stippled aleurone is located six units distal to the \underline{R} locus. The frequency of colored aleurone spots is increased when \underline{M}^{st} is present. Data had indicated that \underline{M}^{st} may be transposable and in the course of subsequent tests to verify the transposability of \underline{M}^{st} the following cross was made:

$$\frac{r^r \ + \ K}{R^{st} \ M^{st} \ +} \times \frac{R^{st} \ + \ +}{+ \ + \ +}$$

The endosperm phenotypes resulting from the mating are two well defined classes: dark stippled kernels or those with the higher frequency of colored spots ($\underline{R}^{st} \underline{M}^{st} \ + / \underline{R}^{st} \underline{M}^{st} \ + / \underline{R}^{st} \ + \ +$), and light stippled kernels or those with the lower frequency of colored spots ($\underline{r}^r \ + \ K / \underline{r}^r \ + \ K / \underline{R}^{st} \ + \ +$). The frequency of kernels in the two classes was not equal because of preferential segregation of the knobbed chromosome; 16,798 kernels from 68 ears were scored and 12,962 were classified as light stippled (77%) and 3,836 as dark stippled (23%).

The dark stippled kernels were germinated in a sand bench and the seedlings scored for the presence of anthocyanin pigment. Such seedlings were exceptional since they would have had to receive \underline{r}^r from the female but still be associated with a dark stippled phenotype. The original basis for the experiment was that such exceptional seedlings would carry \underline{r}^r and \underline{M}^{st} either in linked positions because of a crossover, or independent because of a transposed \underline{M}^{st} . The sole purpose of introducing \underline{K} into the matings was to reduce the number of such exceptions attributable to crossing over, since \underline{K} strongly suppresses crossing over in the region distal to \underline{R} .

A total of 3,211 seedlings were scored and 16 with anthocyanin pigment were found. The pigmented seedlings were transplanted to pots in the greenhouse and the ears were pollinated with \underline{r}^g pollen. Ears from only seven plants set seed and these all segregated three classes of kernels: dark stippled, light stippled, and colorless. Breeding tests from the three kernel classes from the seven ears were made in the next field season, and the tests showed that the seven exceptional plants were trisomic for chromosome 10. The plants carried both chromosomes 10 from the female parent, $\underline{r}^r \ + \ K$ and $\underline{R}^{st} \underline{M}^{st} \ +$, and one chromosome 10 from the male parent, $\underline{R}^{st} \ + \ +$.

If the total population of kernels (16,798) is adjusted for the proportion of dark stippled kernels scored for seedling color, 3211/3836, and for the proportion of red seedlings verified, 7/16, the frequency of female gametes carrying both chromosomes 10 was seven in 6,152 gametes tested, a rate of 11.4×10^{-4} .

R. B. Ashman

2. The regulatory nature of the waxy locus.

Evidence accumulated over the past year makes it probable that the waxy locus is regulatory in nature and not the structural locus for the nucleotide transferase. The most important evidence is the finding that starch granule preparations from the embryos of developing waxy seeds (16 day) have as high or higher transferase activity than similar preparations from non-waxy seeds. The low level of activity shown by starch granule preparations from whole seeds of waxy stocks when ADPG is used as a substrate is not due entirely or even largely to the presence of starch granules from the embryo. Starch granule preparations from waxy endosperms alone still have low activity. Comparative activities are given in Table 1. At 16 days, the embryos were 1.5 and 1.1 percent of the wet weight of the waxy and non-waxy seeds, respectively.

Table 1
 μM ADP Released Per Mg. of Starch Under Standard Assay Conditions.*
 All Preparations from Developing Seeds Frozen 16 Days After Pollination.
 1962 Collections.

	\pm	<u>WX</u>
Starch granules from embryos alone	114	142
Starch granules from endosperms alone	30	3.3
Starch granules from whole seeds	35	3.7

*To 2.5 mg. of starch granule preparations (1 mg. if embryo is source) is added 25 microliters of a solution that contains $0.31 \mu\text{M}$ ADPG, $0.17 \mu\text{M}$ EDTA, $6.85 \mu\text{M}$ glycine, and is buffered at pH 8.4. After 15 minutes at 37°C , 25 microliters of 0.01M phosphoenolpyruvate solution and 25 microliters of a pyruvate kinase solution containing about 26 enzyme units per ml. are added, and reaction allowed to proceed for 15 minutes more before being stopped by the addition of dinitrophenyl hydrazine. Thus total reaction time is 30 minutes at 37°C .

It is clear from Table 1 that the low nucleotide transferase activity of the waxy endosperms is not characteristic of waxy embryos. Yet the evidence at hand points clearly to the dependence of endosperm transferase activity on the allelic state at the waxy locus. Thus it is improbable that the waxy locus is the structural locus for transferase and likely that it is regulatory in nature.

Corroborative evidence for this conclusion comes from a study of the transferase activity of 17 waxy mutants that occurred as separate mutational events. The results are given in Table 2. All the mutants have