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2. The effect of gibberellins on the frequency of mitotic figures in a dwarf mutant of maize.

The parenchyma cells of the mature first leaf sheath of d-1 seedlings are both shorter and fewer in number than those of normals. Treatment of seedlings with gibberellins results in an increase in both length and number of these parenchyma cells. At a time when the first leaf blade has unfolded (8 days following soaking of seed), there are some 60% fewer mitotic figures in d-1 leaf sheaths than in normals. However, if d-1 seedlings have been treated with 10 micrograms/plant twenty hours prior to this period, the basal meristem of the first leaf sheath shows a frequency of mitotic figures very similar to normals (non-treated d-1 = 27 mitotic figures/leaf sheath; treated d-1 = 70 mitotic figures/leaf sheath; non-treated normals = 71 mitotic figures/leaf sheath.)

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1. A new (?) gene affecting the structure of the endosperm.

In the flint inbred MR 368 the action of a recessive gene has been revealed, the effects of which on the structure of the endosperm are analogous to those described in connection with the genes h (soft starch, Mumm 1929), o1 and o2 (opaque endosperm, Singleton and Jones). This gene appearing in inbred MR 368 has proved different from the genes h, o1, o2, fl1, fl2 deriving from Dr. H. H. Kramer's gene stocks; the F₁ seeds from crosses of stock 368 with Kramer's stocks have all been quite normal.

Pending a possible further identification, it is proposed to call this gene h2, while reserving the term h1 for the first gene of this type found by Mumm in 1929.

With regard to the factor h_2 , it has been possible to make the following observations:

- (1) - The selfing of heterozygous plants produces normal and starchy kernels in the ratio 3:1. Consequently the endosperm must be, just as for h , trebly recessive to show the starchy character.
- (2) - Apart from its action on the structure of the endosperm (entirely starchy and slightly reduced), the factor h_2 has, at least within strain MR 368, an effect on the germination of the kernels: their germinating capacity is reduced (20-80% on filter-paper in the laboratory at 20°C., 1-30% in the field); germination is slower and the root system of the seedlings very rudimentary.
- (3) - The h_2/h_2 plants that survive till flowering mature normally and their height, ear size and leaf number are similar or slightly inferior to those of normal plants. The various specific characters of the strain, the flowering and maturity dates are unaffected.
- (4) - Hybrids between MR 368 h_2/h_2 and other inbreds (flint or dent) with normal kernels have been obtained as well as back-crosses of this hybrid to the original doubly recessive stock. In the ears from these back-crosses starchy kernels have been observed but always in a ratio inferior to 50% and sometimes very low (5%); on the other hand the germinating capacity and the weight of the starchy kernels proceeding from these back-crosses are equal or slightly inferior to those of the normal kernels of the same ears.

Consequently, in the inbreds used for the hybridizations there are dominant factors (in the recessive state with inbred MR 368) which, even in the presence of genotype h_2/h_2 , mask the phenotype h_2 , and other ones that weaken the effects of the gene.

A study of the descendants of these back-crosses, now in progress, should lead to more accurate information about the number and the mode of action of these inhibiting or modifying factors.

2. Distribution of the effect of heterosis on some vegetative or agronomic characters of maize.

A series of 34 single hybrids created with flint or dent inbreds have been studied from the viewpoint of the effect of heterosis. On 40 plants for each hybrid and on 15 plants for each inbred, the following characters have been measured: interval from emergence to flowering (number of days from emergence date to male flowering date), ear height and total plant height (in centimeters), total leaf number, ear length (in cm.), relative ear height (percentage of total plant height), number of rows, average weight of kernel, and yield (quintals/hectare at 12% moisture). In each case the "heterotic deviation" has