

phenotype. Addition of complementary genes via the Baldwin Effect to reinforce the changes conveying selective advantages would stabilize the admittedly variable id/id phenotype in whatever form most "fitted" in the new niche.

D. L. Shaver

6. Non-Mendelian inheritance at the P locus.

In attempting to produce maize hybrids specifically tailored to the needs of human-consumption as milled products of corn, cob color is a criterion of desirability. In all of our standard lines, if the line has a red cob, we convert the line to white cob. On the other hand, if the line is originally white-cobbed, we convert it to red. Neither conversion is easy to make, and in neither case does the inheritance of cob color behave as a simply inherited trait. However, the latter conversion of a white condition to a red state is the more instructive. Several such lines, instead of giving a simple 1:1 segregation in the advanced backcross generations, have something like a 2:1:1 wherein about ½ of the progeny are white cobbed, as expected, but the other half segregate for deeper and lighter colors of red in about equal numbers. This seems to vary widely from line to line, though we have never used sufficient progeny sizes within a line to adduce comprehensive data. However, if one backcrosses the progeny from a lightly colored cob, all may be found to have white cobs. In such a case, one would have to assume that the red cob was present as a maternal effect, rather than from an autogenous gene, since the trait was thus not passed on in heredity. In other cases, even though one selects a progeny from a deeper red cob to further backcross, all the progeny may have white, or only very pale, cobs.

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7. Apparent parahereditary transmission of infectious viruses in maize.

In conducting the first winter breeding nurseries in Hawaii, outbreaks of Hawaiian Corn Mosaic (described by Brewbaker, Crop Sci. 5:412-415, 1965) were sometimes suffered because of infestations of

plantings by the leafhopper vector. As with the California virus disease of corn, "Sugar Cane Mosaic Virus," if infections occur later in a plant's ontogeny, damage to the plant may be minimal or subliminal, and the plant will produce seed normally. Several times we have grown seed from Hawaii in which specific lots of seed germinate poorly and produce plants which have abnormal chlorophyll development, so that the leaves appear finely mottled or textured. Upon reproducing these plants sexually, normalcy is restored.

A much clearer case of apparently temporary inheritance of virus effects has occurred in plants infected with the Calif. SCMV virus. We placed the long-time inbred B37 in a disease nursery in California's San Joaquin Valley. By delaying the time of mechanical inoculation with the virus, we have been able to increase the SCMV resistance of this line by taking advantage of within-line variability and/or mutation. The progeny of such inoculated B37 was grown in the 1971 Hawaii winter nursery, where it segregated for frequent (11 of 308) plants having many degrees of chlorophyll striping, similar to the Io jap pattern. These plants were perfectly typical of B37, came from a continuous lineage of ear-to-row selfing, and had no known striped ancestors. Chlorophyll-deficient areas included whole plants or only portions thereof. Sectors sometimes included all or part of an ear or tassel or leaf. Sectors were white, yellow, pale green, and sometimes tinged with anthocyanin.

Sexual structures within normal and abnormal sectors were selfed, sibbed, and outcrossed to an unrelated line. Defective x defective sibs and/or crosses were never fertile, but normal x defective and defective x normal sibs and crosses did succeed, especially the former. However, upon selfing such plants having one defective parent, chlorophyll-deficient progeny were never obtained, again a case of heredity effective for only one generation.

These two non-Mendelian occurrences are tentatively explained as cases of transmission of viruses through the gamete(s) in an integrated form so that they influence the phenotype of derived cell lines in ontogeny, but are not effective in further transmission either in heredity or infection. In such a state, the virus must not be perfectly attuned

to equality of distribution of cellular components at mitosis, thus accounting for sectoring. Moreover, it would seem to have lost a primary quality of infectiveness in its failure to reproduce independently of cellular reproduction. Hence, its state might be described as imperfectly integrated.

D. L. Shaver

8. Another case of simple inheritance of highly variable partial pollen restoration.

The inbred line, K64 restores partial and seemingly complete fertility to T cytoplasm which is variable according to environment, dosage effects, and genetic background, similar to the behavior of the classical inbred line, M14. Shaver (MGCNL 30:159) showed that the seemingly complex restoring characteristics of that inbred were actually controlled by a single locus which could be converted to nonrestoring state by simple backcrossing techniques. This finding was later confirmed in extenso by Duvick. Likewise, in K64, all of the seemingly endless degrees of restoration are controlled by a factor that segregates as a single gene in backcross recovery progeny.

D. L. Shaver

9. The use of id/id in production of super early corn.

In maize, the physiological limit to earliness would seem to be the need for a sufficiently long vegetative period to develop a plant "factory" large enough to support ear and grain production. Galinat has hypothesized that very early New England sweetcorns are always highly tillered because selection pressures have produced main culms which flower so early that they have insufficient photosynthetic capability, without tillers, to produce a realistically sized ear of table corn. Brawn, and later Shaver, have shown that Gaspe is so early that the main culm is florally induced as a maternal effect embryonically, while the meristematic apex is still within the seed. If one wishes to inbreed and thus further reduce an already minimal size of plant, special difficulties are experienced in barrenness or very marginal yield performance in the seedfield.