All seed was planted ear-to-row in 1960. Of the approximately 30 small 'inbred-appearing' plants, 26 were successfully selfed. The seeds from these 26 ears were planted in 1961 for a between plants within ears uniformity test. On the basis of segregation for cob color, kernel color, kernel flintiness, and kernel degree of dent 16 entries were eliminated. During 1961 several selfs of each entry were also made.

The 10 remaining stocks will be more carefully screened in 1962. This will mainly be based on variances within and variances between ears of entries. The lines W D, Co 106, Co 109, Co 110, and W 59E (important components of the original synthetic), the original synthetic, and four single crosses will be used for comparison.

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2. A computer method of double cross prediction.

A new program has been devised at the Pennsylvania State University Computation Center to predict the results of double cross hybrids. The program was written in FORTRAN and compiled on the IBM 7074 but is adaptable to any computer for which a FORTRAN compiler is available. The program can accommodate the single cross data of twenty inbred lines for eighteen or fewer variables. It features adjustable limits for each variable so that only prediction values above a chosen limit are included in the output. The table or card output includes a program title, experiment identification, designation of the inbreds and variable designation in addition to the prediction values. The computation time is too brief to estimate. This program is available on request.

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1. Segregation for a cyclic hydroxamate in maize seedlings.

Maize contains high concentrations of a phenol-like sweet substance (R. J. Suhadolnik, Ph.D. Thesis, Penn. State Univ. 1957; R. H. Hamilton, Ph.D. Thesis Mich. State Univ. 1960). The structure is now established to be 2,4-dihydroxy-3-keto-7-methoxybenzoxazine [A. I. Virtanen, P. Hietala, and E. Honkanen, Acta Chem. Scand. 114:502-507 (1960); R. H. Hamilton, R. S. Bandurski and W. R. Reusch, Cereal Chem. (in press).]. This cyclic hydroxamate may be a factor in resistance of maize to 2-chloro-s-triazine herbicides. [W. Roth and E. Knüsli, Experienta 17:312 (1961); R. H. Hamilton, and D. E. Moreland, Science 135:373 (1962)]. Also 6-methoxybenzoxazolinone (implicated in resistance to disease and corn borer) is a degradation product of this substance.

Seedlings of twenty inbred lines were examined qualitatively for the presence of the cyclic hydroxamate or its 2-glucoside; all were found to contain it. Selections by Dr. George Gorsline of an open pollinated synthetic, Gehn Yellow Dent, were inbred in 1959 and 1960 at Pennsylvania State University. One 1959 ear was found to be segregating (208 + to 59 -) for presence and absence (a trace present if pooled seedlings were extracted) of the cyclic hydroxamate. The open pollinated variety contained the cyclic hydroxamate (36+). One ear of the segregating 1959 population was selfed in 1960 and two ears were selected. One was all minus (33-) while the other ear was segregating (37+ to 8-).

R. H. Hamilton

2. Genetic iron-deficiency chlorosis in maize.

A. The yellow-stripe phenotype displayed by $\underline{ys}_3/\underline{ys}_3$ plants (MNL 35:111) is another iron-deficiency chlorosis. Plants of genotype $\underline{ys}_3/\underline{ys}_3$ have been grown in nutrient-solution, sand and soil cultures for a physiological comparison with $\underline{ys}_1/\underline{ys}_1$ plants similarly cultured. Seedlings of either genotype produced completely green leaves when sprayed with aqueous solutions of ferrous or ferric salts or when iron chelated as Fe-HEDTA (ferric chelate of N-hydroxyethylethylenediaminetriacetic acid) was incorporated into the rooting medium.

The metabolic lesion associated with the $\underline{ys}_1$ locus appears to be localized to the absorbing areas of the roots. (Bot. Gaz. in press). When phosphate was deleted from the nutrient medium, $\underline{ys}_1/\underline{ys}_1$ plants produced fully green leaves. Chlorotic $\underline{ys}_1/\underline{ys}_1$ plants showed noticeable greening within 48 hours following an iron spray treatment, the addition of Fe-HEDTA to the culture medium, root tip removal in solution culture where iron was available to $+/\underline{ys}_1$ but not to $\underline{ys}_1/\underline{ys}_1$ plants, or phosphate deletion.

In contrast, $\underline{ys}_3/\underline{ys}_3$ plants did not green rapidly when treated to correct the $\underline{ys}_1$-type chlorosis. A period of approximately six days elapsed following a foliar spray of aqueous $FeSO_4$ before correction of the $\underline{ys}_3$-type chlorosis was detected. When grown adjacently in a greenhouse soil bed of pH 5.5, $\underline{ys}_1/\underline{ys}_1$ plants remained yellow-striped whereas $\underline{ys}_3/\underline{ys}_3$ seedlings gradually greened. The metabolic lesion associated with the $\underline{ys}_3$ locus appears to be more in the translocation or utilization of iron than in uptake. These alleles are being converted to a common background for a more definitive evaluation of these responses.

B. Approximately ten new selections of iron-deficiency chlorosis in maize have been observed and collected this past season; leaves of these yellow-striped plants responded by greening locally following spraying with an aqueous solution of $FeSO_4$ in the field or in the greenhouse. Of four selections grown in sand culture, all responded as did $\underline{ys}_1/\underline{ys}_1$ seedlings; Fe-HEDTA supplied in the applied nutrient solution educed full leaf greening. Seedlots yielding plants displaying this chlorosis were found in plant introductions grown by Dr. Roy Creech (P.I. 177591, 179561, 196127, 200296, 217461, and 231738), two inbred lines of Dr. C. C. Wernham and in an Italian flint inbred selected and supplied by Dr. Angelo Bianchi.