diffuse in the form tested, the highly unstable state, does not reduce recombination between the outside markers. Thus, C2 and diffuse are situated at the same chromosomal site. Are they alleles? Operationally, since there has been no observed recombination between C2 and diffuse they must be at least very close to each other in a physical sense. However, functionally they are quite different. For one, diffuse in the active state suppresses pigment in every tissue of the corn plant including the pith and roots, while c2 has so far been found to stop pigment formation in the aleurone only. On the other hand, there are those states of diffuse which apparently suppress pigment formation in the aleurone but not detectably in the pericarp. This latter grouping at first looks like a c2 effect but with one important difference. When this form of diffuse, called very dark diffuse, is in three doses in the aleurone, the aleurone is not colorless but rather exhibits modest levels of aleurone pigment. Since pigment suppression

Table 2. Recombination between glossy-3, diffuse and reciprocal translocations T1-4b and T4-9b.

$$gl3 \xrightarrow{\quad 18.49 \quad} T4\text{-}9b \ (N = 173)$$

$$gl3 \xrightarrow{\quad 5.43 \quad} C2\text{-}Idf \xrightarrow{\quad 15.6 \quad} T4\text{-}9b \ (N=423)$$

$$gl3 \xrightarrow{\quad 11.01 \quad} T1\text{-}4b \ (N=218)$$

$$gl3 \xrightarrow{\quad 4.25 \quad} C2\text{-}Idf \xrightarrow{\quad 5.23 \quad} T1\text{-}4b \ (N=306)$$

in a clear dominant fashion is a constant characteristic of diffuse, it is suggested that the symbol C2-Idf be used. The nondiffuse situation would then by symbolized C2 or C2-idf. With such a symbol the individual characteristics will be noted while expressing the zero recombination result.

Irwin M. Greenblatt

A major modifier of diffuse instability — The somatic sectoring rate conditioned in the pericarp by C2-Idf, while variable in different pedigrees, exhibits a rather repeatable average number of stripes in a specific line. The heterozygote produces, on the average, one-half as many stripes as the homozygote. In one pedigree, Inbred W22R C2-Idf heterozygotes averaged 32 stripes on an area of 50 kernels, and the homozygote averaged 64 stripes in the same area.

A discrete variant of the above rates has also been found. It is known as very dark diffuse and in the same W22R background produced only 0.10 stripes per 50 kernels. The single stripe found in the entire pericarp of an individual of this

variant phenotype is typically of the diffuse type, i.e., a diffuse border of pigment is present along the somatic sector in the pericarp (A/A, P-RR/P-RR, C2-Idf/C2-Idf.

During the linkage studies conducted with C2-Idf and glossy-3 it was noted that almost all new cases of the very dark diffuse phenotype were associated with recombination between glossy-3 and diffuse. When an exchange occurred between gl3 and C2-Idf, the phenotype of diffuse altered from the standard high rate to the very dark diffuse level. Therefore, it seems highly likely that a major modifier of diffuse striping exists and is located just the other side of gl3 from C2-Idf. The relevant data using T4-9b and T1-4b are given in Table 1. From the data in

Table 1. Linkage estimates for markers on chromosome 4 in which a modifier of diffuse instability is recognized.

Sample size	Translocation	Percent recombination		
		Mod —— gl3 ——	C2-Idf ——	T
306	T1-4b	0.68	4.25	3.92
212	T1-4b	0.94	1.89	1.89
Average		0.77	3.28	3.09
579	T4-9b	0.34	7.94	12.09
423	T4-9b	0.48	6.15	15.60
Average		0.40	7.19	12.97

Table 1 it can be seen that the modifier is less than one unit from gl3. Since it also appears that the translocation breaks are affecting the exchange rate, these values are only to be viewed as relative and not as absolute values. Apropos, from an additional recombinational test utilizing Tu as the proximal marker in a population of 3197 plants, the modifier was located 11.21 units proximal to C2-Idf and 16.44 units distal to Tu. The modifier-to-C2-Idf interval in this latter test without translocation interference is significantly higher than those calculated from the values in Table 1.

The modifier is much like the one found by B. Ashman on chromosome 10 modifying R-st action. It is definitely not any of the elements involved in the Ac Ds, Spm or Dt systems. Test of interaction with each system has given negative results.

A study of the modifier in stocks homozygous for the C2-Idf chromosome — and thus the modifier — has produced the notion that the modifier is transposable. The very dark diffuse types occur in the homozygotes at a rate of 0.5 percent.

But when phenotypic selection is made for strong aleurone pigment reduction due to C2-Idf action among the homozygotes that are unstable, the rate of very dark diffuse types was 11 percent. It thus appears that the modifier is transposing and in addition that the very dark diffuse refers to pericarp striping only. In the aleurone it may be more active. These latter studies are in progress.

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Resistance to European corn borers and sugarcane borers in maize — Resistance to the European corn borer, Ostrinia nubilalis (Hubner), and the sugarcane borer, Diatrea saccharalis (F.), has been confirmed in exotic maize varieties from the world maize germplasm collection of CIMMYT. Advancement in levels of resistance and adaptability to New York growing conditions has been obtained using full sib recurrent selection with alternate cycles in New York and Mexico. Promising lines with resistance to first and second generation O. nubilalis are being developed.

The mechanism for first-generation leaf-feeding resistance appears different from the antibiosis mechanism due to DIMBOA, which is responsible for resistance in most U.S. lines. DIMBOA content was analyzed by a combination of thin-layer chromatography and colorimetric techniques. The exotic lines had DIMBOA levels as low as or lower than susceptible U.S. lines and far below that of resistant U.S. lines, yet their resistance to the borer in the field under conditions of artificial infestation was as high as or higher than the most resistant U.S. lines.

Larvae were reared on artificial diets into which were incorporated ground freeze-dried corn leaves of the various lines to determine if any other antibiosis factor was present in the exotic lines. Larvae reared on exotic lines had lower mortality, higher pupation and equal or faster rates of development than larvae reared on a susceptible, low-DIMBOA line, while larvae reared on a resistant, high-DIMBOA line had greater mortality, lower pupation and a delayed development. This suggests, but does not prove, that there is no other toxic component present in freeze-dried leaves of these exotic maize lines that accounts for their resistance.

Larval feeding preference was tested by giving newly-hatched larvae a choice of feeding on agar discs of freeze-dried leaves of two corn lines. The exotic lines and the resistant, high-DIMBOA line were tested against the susceptible, low-DIMBOA line. In general, larvae did not show any non-preference toward the exotic lines. However, extreme non-preference was evident toward the high-DIMBOA line, with the degree of non-preference roughly proportional to the DIMBOA level in the tissue. This supports the suggestion that resistance in the exotic lines is not conditioned