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1. Location of the modifier gene of the cl_1 locus confirmed.

In last year's News Letter (M.G.C.N.L. 46:93-95, 1972) I reported results that indicated the Cl_M locus is located on chromosome 8. The Cl_M locus has a series of dominant alleles (Cl_M^2, Cl_M^3, Cl_M^4, Cl_M^5, Cl_M^{Ml4g}, and Cl_M^{W22}) that modify the albino seedling phenotype in plants homozygous for one of the recessive alleles (cl_1, cl_p or w_{7716}) at the cl_1 locus (white-albino mutant) on chromosome three. In the presence of the modifiers, the albino phenotype can range from pale green to green depending on the modifier present and whether it is homozygous or heterozygous. The endosperm phenotype remains unaltered (i.e., white or pale yellow).

The tests reported last year involved an F_2 generation in the cross between a w_{7716} line without a Cl_M allele and the $wxT8\text{-}9_{6673}$ translocation in an Ml4 background which carried Cl_M^{Ml4p} (a pale green modifier). When the white or pale yellow seeds from this F_2 generation were separated for starchy and waxy and planted, there was a definite surplus of albino seedlings in the starchy class (219 pale green : 102 albino) and a deficiency of albinos in the waxy class (68 pale green : 6 albino). These results indicated that Cl_M^{Ml4p} was located on chromosome 8. However, the Cl_M^{Ml4p} gene has not as yet been tested for allelism with the other modifiers, so the possibility remained that we were dealing with a second modifier locus. This seemed unlikely since it had been shown previously that six independently occurring modifiers were all allelic.

Tests completed this year have confirmed that the Cl_M locus is on chromosome 8. In these tests, a $wxT8\text{-}9_{6673}$ line that had been crossed two times to the inbred OH43 was used. This inbred is known not to contain any dominant alleles at the Cl_M locus. The translocation line was crossed to a $cl_1\ cl_1\ Cl_M^3\ Cl_M^3$ stock (white or pale yellow endosperm; green seedlings and plants). The F_2 segregated for yellow and pale yellow seeds and the waxy alleles. The pale yellow seeds were separated into starchy and waxy classes and planted. If the modifier is carried on chromosome 8, the starchy seeds should show a deficiency for the albino seedling and the

waxy seeds should produce a surplus of albino seedlings. The results shown in Table 1 agree with these expectations and confirm the location of $\underline{Cl}_M$ on chromosome 8. As was the case with last year's linkage data with $\underline{wx}T8\text{-}9_{6673}$, there is a deficiency in the waxy class in the data reported in Table 1. The reason for this deficiency of waxy seeds is not known. However, the deficiency does not in any way obscure the linkage between $\underline{wx}$ and $\underline{Cl}^3_M$ since there are marked deviations in the expected directions from a 3:1 ratio in both the starchy and waxy classes. Chi square tests of the deviations from a 3:1 ratio in both classes give chi square values so large that their expected probabilities are considerably less than 0.01.

Table 1

Types of seedlings arising from pale yellow seeds in the F_2 from a cross between $\underline{wx}T8\text{-}9_{6673}$ (OH43) and $\underline{cl}_1\ \underline{cl}_1\ \underline{Cl}^3_M\ \underline{Cl}^3_M$.

Plant	Wx		wx	
	green	albino	green	albino
71-5185-1	20	1	4	5
-2	20	3	3	6
-3	22	3	6	3
-4	15	2	3	4
-5	23	6	4	5
-6	22	4	5	1
-7	31	5	2	7
-8	24	3	0	4
-9	14	1	4	3
-10	18	5	4	3
-11	34	4	2	1
-12	23	3	0	3
-13	25	4	3	8
-14	19	2	2	1
-15	26	6	5	5
-18	14	1	4	2
-19	28	5	2	8
-20	14	2	1	1
Total	392	60	54	70

That this linkage with waxy is due to the presence of the translocation is shown by the absence of any indication of linkage when the translocation is not present. Although not reported last year, an F_2 population from a cross between waxy-M14 and $\underline{w}_{7716}$ did not give any indication of linkage between the waxy locus and $\underline{Cl}_M^{M14p}$. An F_2 involving waxy-OH43 and $\underline{cl}_1$ $\underline{cl}_1$ $\underline{Cl}_M^3$ $\underline{Cl}_M^3$ also did not give any indication of linkage between waxy and $\underline{Cl}_M^3$ in tests completed this year. Since linkage with waxy only occurs in the presence of the 8-9 translocation and does not occur when the translocation is absent or in the presence of other wx-9 translocations involving chromosomes other than 8, the $\underline{Cl}_M$ locus must be located on chromosome 8.

Since $\underline{Cl}_M^3$ and $\underline{Cl}_M^{M14p}$ are both located on chromosome 8, it is very likely that $\underline{Cl}_M^{M14p}$ is indeed an allele at the $\underline{Cl}_M$ locus. Allele tests confirming this should be completed this year.

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2. The ordering of $\underline{y}_9$ and $\underline{bf}_2$ on the linkage map of chromosome 10.

The $\underline{y}_9$ mutant has a pale yellow endosperm and seedlings that vary from yellow green to green. In the M.G.C.N.L. 44:81-83, 1970, I reported linkage of $\underline{y}_9$ with $\underline{g}_1$ and $\underline{bf}_2$ but the genes could not be ordered at that time. Tests with TB-10a (breakpoint 10L.35) (M.G.C.N.L. 44:84-91, 1970) showed that $\underline{y}_9$ was not uncovered by this translocation. Hypoploid tests indicated that $\underline{y}_9$ was about 22.8 or 15.2 units from the TB-10a breakpoint depending upon whether the hypoploid plant was used as a male or female, respectively, in the testcrosses.

Crosses were made in which plants carrying $\underline{y}_9$ and $\underline{bf}_2$ in coupling were pollinated by TB-10a plants. No $\underline{bf}_2$ seedlings were seen in the progeny of this cross, indicating that this locus is also proximal to the TB-10a breakpoint. Hypoploid plants from the above tests were in turn crossed to homozygous $\underline{y}_9$ $\underline{bf}_2$ plants. The results of these crosses are summarized in Table 1.