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1. Selection for resistance of pollen to ultraviolet light.

Pollen grains that survive exposure to ultraviolet light should, on average, be richer in factors that confer increased resistance to ultraviolet light. Resistance could be due to changes in repair mechanisms or in protective systems such as the UV-absorbing constituents of the cytoplasm. Experiments designed to test for selection for level of resistance were carried out with a C Sh Wx R^r line. For two successive generations plants of this line were self-pollinated with UV-treated pollen, the first treatment consisting of a 30-second exposure and the second of a 45-second exposure to two-sided radiation. Control lineages were carried forward within the same background material. In addition, lineages posited to carry increased sensitivity to UV were derived by holding the treated pollen for a 30-minute delay in aqueous medium following a short (10-second) exposure. The test generation consisted of exposing samples of pollen of the three lineages to 60 seconds of UV before pollinating c sh wx R^g ears. The resulting ears were coded at random; events were identified and verified by progeny testing where necessary, and the ears were decoded for tabulation. The event classes were (1) whole-endosperm loss of C Sh Wx; (2) whole-endosperm loss with one or more small "recovery" areas; (3) breakage fusion bridge cycles over the whole endosperm; (4) cycles over half the endosperm; (5) cycles over a quarter of the endosperm; (6) loss in one half of the endosperm; and (7) loss in one quarter of the endosperm.

The data in Table 1 show few substantial differences between the selected lineages and the control. In the control, absence of whole losses must be due to chance, since events of this type are commonly found in similar experiments. The highly significant decrease in cycles of the whole-endosperm type may be valid, but it will require further testing. If it is valid, this decrease is an interesting and unanticipated change.

Table 1

Mutational losses of C induced by ultraviolet light in pollen grains from ultraviolet-selected (UV2), unselected (Control), and delay-selected (UVD) lineages

	UV2		Control		UVD	
	Events	Freq. per 10^3	Events	Freq. per 10^3	Events	Freq. per 10^3
Total kernels obs.	2527	-	948	-	1323	-
Whole losses	14	5.54	0	0.00	3	2.27
Loss-recovery	13	5.14	5	5.27	5	3.78
Cycles whole endosp.	50	19.79**	38	40.08	42	31.75
Cycles half	20	7.91	9	9.49	6	4.54
Cycles quarter	8	3.17	1	1.05	3	2.27
Fractionals half	71	28.10	25	26.37	30	22.68
Fractionals quarter	40	15.83	18	18.99	20	15.12

**Highly significant (1% level) decrease in events relative to control.

A number of visible mutants have been identified in the selection experiments. Pollen from heterozygous plants was either treated with UV for 60 seconds or untreated, in parallel, and crossed onto c sh wx. By self-pollination of the hybrid plants, transmission data were derived for each of the mutants, with and without UV exposure. The data (Table 2) test for selective advantage of the mutant in the pollen grain. Three of the mutants showed significant increases in transmission of the mutant following UV treatment. All three are deviant to a limited extent only, but it is possible that one or more of these mutants confers on the pollen grain a degree of resistance to UV exposure.

Table 2

Transmission of mutants under ultraviolet selection[1]

Pedigree	Mutant	Treated		Control		X_h^2	X_C^2
		Nor.	Mut.	Nor.	Mut.		
7453	White seedling	23	31	38	26	2.67	6.31*
"	Pale green	18	4	29	9	0.03	0.37
7456-57	Luteus	6	6	6	8	-	0.12
"	Virescent	92	30	65	23	0.01	0.15
"	Pale Aleurone	54	75	40	56	0.03	0.00
7458-59	Virescent	24	16	46	15	2.03	5.12*
"	Viviparous	20	18	35	15	2.09	5.46*
"	Etched	30	8	37	13	0.08	0.48

*Significantly higher (5% level) transmission of mutant in the treated than in the control.

[1] X_h^2, Chi-square for heterogeneity; X_C^2, Chi-square for the control ratio.

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2. Genetic analysis of effects of an electrostatic field.

A pilot experiment was reported in the 1966 Newsletter (40:108). Fractional events (losses of A Sh_2) were more frequent in kernels from pollen that had been exposed to an intermittent field than in controls. A subsequent test by S. F. Starling (M. S. thesis, University of Missouri) indicated that fractional losses of C^I Sh Bz Wx were increased by exposure to either a steady or intermittent field; unfortunately, his analysis of the data showed very wide variations among families of tester females, and the event data were confounded with this effect. A large-scale test with a uniform tester was conducted in 1969, and progeny tests of cases have been completed. The new data do not support a substantial effect of treatment, either with steady or intermittent fields.

Treatments were carried out on tassels of C Sh Wx R^r plants ranging in development from meiosis to nearly mature pollen stages. The tassel region of the plant (wrapped and taped into a cylinder) was placed