CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena 4, California

1. Location of blue-fluorescent-2 in chromosome 10.

The gene bf_2 has been placed in chromosome 10 by crossing to a series of chromosome 9 translocations involving waxy and testcrossing to wx fluorescent-2. The testcrosses using T9-10b showed clear-cut linkage of fluorescent-2 with wx. Comparison of the linkage data obtained with the previously known cytology and linkage relations of T9-10b gives some information on both the map location and the cytological position of bf_2.

The cytological positions of the breaks in T9-10b have been given by Dr. Longley as 9S.11 and 10S.28. These are fairly close to both centromeres. Precise determination of position is perhaps less reliable than for positions further removed from one or both centromeres. Linkage tests give the map order C-wx-T with 5.7 percent crossing-over between wx and T. In chromosome 10, the tests indicate the order T-g-R with 16.3 percent crossing-over between T and g. In the homozygous translocation, wx and g are linked with 17.3 percent crossing-over (62/359).

Two crosses involving T9-10b, wx and bf_2 have been test-crossed, and the testcross seed grown for seedling classification.

F_1	wx-bf_2 non-crossovers		wx-bf_2 crossovers		Total	cross-overs	percent
wx T/ bf_2	848	928	19	31	1876	50	2.7
stand/wx T bf_2	491	463	28	29	1021	57	5.6
Total					2897	107	3.7

The crossing-over between wx and bf_2 is essentially the sum of the wx-T and the T-bf_2 percentages. Checks of pollen on cross-overs indicate that the translocation is closer to bf_2 than to wx.

Tests of homozygous T9-10b plants which were heterozygous for both wx and bf_2 testcrossed to wx bf_2, gave 50 wx-bf_2 crossovers in a total of 1032 seedlings or 4.8 percent. Thus the two genes are in the same translocated chromosome, just as in the case of wx, g, and R. But bf_2 is closer to the locus of the translocation than is g, and therefore further to the left. The distances indicated are:

C ——— wx ——— 4.8 ——— bf_2 ——— R

C ——— wx ——— 17.3 ——— g ——— R

These data suggest a map position in the general neighborhood of lineate but they do not tell which side of the centromere.

E. G. Anderson
Ron Burkholder

2. Blue fluorescence.

Blue fluorescence under ultraviolet light is due to the accumulation of anthranilic acid or very closely allied substances in the seedlings and in the anther walls and filaments. The two blue fluorescent genes which have been isolated both lead to the accumulation of anthranilic acid or related compounds but otherwise differ markedly.

Blue fluorescent-1, when homozygous gives fluorescent seedlings which increase in fluorescence until about the third or fourth leaf, after which there is a gradual weakening or fading out. The plants increase in size very rapidly, and there is little, if any, further accumulation of anthranilic acid until anther development. The anther walls and filaments fluoresce brilliantly although the pollen itself shows no fluorescence.

Paper chromatograms of fresh material show three closely associated fluorescent spots, one of which is anthranilic acid. From extracts, all the fluorescent material appears as a single spot of anthranilic acid. When the gene is heterozygous the seedlings do not fluoresce, but the anther walls and filaments show a strong fluorescence as in the homozygote. Thus the gene can be handled as a recessive in the seedlings, as a dominant in the anthers. In most of the linkage tests and stock building, it has been convenient to use it as a dominant. Thus it is perhaps more appropriate to list the gene as a dominant for which the symbol $\underline{Bf}_1$ can be used. This gene has been located in the distal portion of the long arm of chromosome 9. It shows about 45 or 46 percent recombination with wx. By linkage tests with translocations, it has been placed at or near 9L.9.

Blue fluorescent-2, when homozygous gives a brilliant fluorescent in the early seedling stage with its maximum brilliance immediately after germination. The coleoptile tip is brilliant, and the first seedling leaf has its maximum fluorescence as soon as unfolded. The succeeding leaves show decreasing fluorescence. The chromatographic picture shows most of the fluorescent substance concentrated in a single spot which is identical with one of the three spots shown by fluorescent-1. The fluorescence of anthers and filament is less pronounced. In the heterozygote, the seedlings do not fluoresce, and the anther fluorescence is somewhat weaker than in the homozygote. For most purposes, it is most conveniently handled as a seedling character. So we prefer to list this gene as a recessive, with the symbol $\underline{bf}_2$.

E. G. Anderson