A-2: A NEW LOCUS CONTROLLING ANTHOCYANIN PRODUCTION IN PISUM

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Blixt (1) has already pointed out that most of the lines used for induced mutation studies are recessive at the A locus. Only rarely have A lines been used. This imposes limits on the potential mutation spectrum that can be observed after mutagenic treatment. Recently, however, one of us (FJM) isolated a number of anthocyanin pigmentation variants from "Melrose", a variety of so-called Austrian Winter peas, the seeds of which had been exposed to a 0.5% solution of Ethylmethane sulfonate for 2 hours prior to washing and planting. The mutagen treated material used was kindly provided by D.L. Auld of the University of Idaho. Included among the mutants was one in which pigment was absent; thus, the phenotype appeared identical with that conferred by a.

More recently still, another of us (NFW) performed a small experiment which indicated that Muehlbauer's mutant was a separate and distinct mutation; i.e., involving a locus other than A. Further, characterization of the mutant confirmed its similarity to a. Flowers lack flavonoids, isoflavonoids and flavones as well as anthocyanins (N.F. Weeden and G. Hrazdina, unpublished), and seeds exhibit an increased susceptibility to Pythium infection relative to the wild type line (N.F. Weeden and G.E. Harman, unpublished) just as a plants are more susceptible than A plants.

Now additional evidence has been added to the story. When the Muehlbauer mutant was crossed with a line of genotype A the F_1 possessed anthocyanin and the F_2 segregated in accord with the ratio 3 anthocyanin present: 1 anthocyanin absent (Table 1A). When the new anthocyaninless mutant was crossed with a line of genotype a_ (anthocyaninless) the F_1 possessed anthocyanin and the F_2 segregated in accord with the ratio 9 anthocyanin present: 7 anthocyanin absent (Table 1B). These results indicate that the new mutant is monogenic recessive and non-allelic with a. We designate the new mutant a-2 and name as type line D85-9. The new mutant a-2 produces a phenotype morphologically identical wi'th a (i.e., a-1) but the two mutants reside at different loci.

Since the segregating populations in these experiments involved other loci, some requiring anthocyanin production for expression, and since these anthocyanin-dependent loci seem to be equally inhibited by a-1 and a-2, the two loci appear to have a similar function or be blocking the same biosynthetic pathway. Still, more refined experiments are required to demonstrate this conclusively.

1. Blixt, S. 1972. Agri Hortique Genetica 30:1-293 (pp. 7, 167-168).

Table 1. Monogenic (A) and digenic (B) segregation obtained by crossing the new anthocyaninless mutant (a-2) with lines of genotype A (anthocyanin present) and a_ (anthocyaninless), respectively.

	Progeny	Number of plants: With anthocyanin	Number of plants: Without anthocyanin		
(A)	B288-57	38	6		
	58	22	9		
	59	34	7		
	60	33	14		
	61	14	4		
	62	37	18		
	63	42	9		
	Totals	220	67	287	X^2 (3:1) = 0.42
(B)	B288-50	17	9		
	51	13	10		
	52	27	18		
	53	40	29		
	54	18	13		
	55	38	23		
	56	13	10		
	Totals	166	112	278	X^2 (9:7) = 1.35