

6. Peculiar Mutational Behavior at the A_1 Locus

When a_1 mutates in the presence of Dt it may give rise in a single step to any one of a graded series of A_1 alleles, which differ from each other in a simple linear fashion. This series ranges in strength of pigmentation from the full purple, recessive red pericarp (A^r) type down to the dilute purple, recessive brown pericarp (A^{lt}) type. The native North American A^r alleles fit into this series. There is, however, a group of alleles derived from or related to the complex allele A^b from South America that are non linear and differ from the previously mentioned group in that they express a dominant brown pericarp. One of this group, an allele designated a^{pm} , and described as having pale aleurone, red-brown plant and a dominant brown pericarp color, has proved to be mutable. It mutates in somatic and germ cells to the full colored dominant (A) form. A test of 15 of these A mutants showed that 14 were of the full color pericarp A^r type and one was a full color, red dominant brown pericarp type. Several were unstable in that they frequently reverted back to the a^{pm} type.

The surprising thing about this behavior is the apparent single step change of the recessive pale, dominant brown pericarp allele (a^{pm}) to the dominant purple, recessive red pericarp allele (A^r). This is actually a simultaneous change of dominant to recessive in one aspect of the expression of the locus and recessive to dominant in the other. Such behavior is not consistent with conventional ideas about mutation of single genic units either as separate loci or as members of a compound locus.

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