Clancy, C. W. University of Oregon, Eugene, Oregon. Identification of ptm (pteridine modifier) as a wild type isoallele of the bw locus.

Under special genetic conditions, the gene, ptm, reported as a new mutant in DIS 39:65, gives a positive test for allelism with the mutant gene bw^1. As noted elsewhere in this issue (see under New Mutants), the original localization of ptm to the third chromosome is incorrect. The probable reason for this error will be suggested after the special conditions required to demonstrate the gene's existence, and its allelism to bw have been described.

In order to simplify presentation, the original symbol, ptm, will be used throughout this note. In addition, the symbol, +, when used opposite ptm or bw in a genotype will represent the allele, bw^+, as it occurs in the + Oregon-R wild type, the only standard strain against which comparisons have thus far been made.

The action of ptm on eye color is not detectable by ordinary methods of observation unless the fly is a compound of either of the two white alleles, w^{sat}, or w^{cf}, plus one of the genetic blocks to ommochrome (brown pigment) formation, v, cn, or st. For example, the genotypes, ptm/ptm, ptm/bw, ptm/+, and +/+ (+ Ore-R) are inseparable on the basis of eye color when observed one to five days after eclosion under a binocular microscope at ordinary magnifications. The same is true for corresponding arrays in which the brown pigment has been eliminated by the substitution of any one of the mutant genes, v, cn, or st. Corresponding compounds with w^{sat} or w^{cf} are likewise indistinguishable when the blocks to ommochrome formation are omitted. On the other hand, each member of the following two series of compounds is readily separable from any other within its group: w^{sat} v;ptm/ptm (white, tinged with brown, and inseparable in color from the compound, v^1;bw^1); w^{sat} v;ptm/+ (yellow, and clearly lighter than the medium orange of w^{sat} v;+/+). The corresponding compounds with w^{cf} are even more useful as indicators of the presence and dosage of ptm because the visible pigment differences are more striking, eg., w^{cf} v; ptm/ptm (pale yellow), w^{cf} v;ptm/+ (medium bright orange), and w^{cf} v;+/+ (dark reddish orange).

The relation of ptm to the bw locus can be shown in several ways but a comparison of the results of the following two crosses emphasizes the genetic conditions required to obtain a positive test for allelism with bw. If w^{sat} v;ptm ♀♀ are mated to v;bw ♂♂, the daughters (w^{sat} v;ptm/bw) are phenotypically inseparable from their parents, ie., their eye color is tinged white. The sons (v;ptm/bw) are vermilion in eye color. In contrast, when y v;bw ♀♀ are mated to v;ptm ♂♂, all offspring are vermilion in eye color.

These gross phenotypic results suggest that ptm is a wild type isoallele of bw slightly hypomorphic to the bw^+ allele of Oregon-R with respect to the visible eye pigments (drosopterines).

The assignment of ptm to a locus not significantly different from that of bw is also based on results of linkage studies utilizing the special genetic background required to follow it. The first of two recent experiments was a two-point in which the recombination fraction from a test cross of w^{cf} v;ptm sp/+ ♀♀ was 51/2089 = 2.44, a number not significantly different from 2.5, the published value for the bw--sp interval. The second experiment was a test cross of w^{cf} v;a px ptm sp/+. If the arc locus is ignored because of difficulties in classification, the results are: 0 = 2855 + 3844; 1 = 129 + 159; 2 = 83 + 75; N = 7145; R-1 = 4.03, and R-2 = 2.21. Although the values for the intervals, px--ptm, and ptm--sp, agree with what one might expect to obtain in a similar experiment involving bw, this experiment shows a significant shortage of the triple recessive non-crossovers.

An additional linkage experiment was performed in which a wild type recombinant chromosome for the bw locus was sought among the offspring of the cross: w^{cf} v;px bw sp/ptm X w^{cf} v;px bw sp. Such a recombinant, if it occurred, should be easily detected, since its carrier would have a bright orange eye color as opposed to the colorless eyes of its sibs. None was found among 12,860 offspring counted. Thus, if ptm is a pseudoallele of bw, the probability is less than 0.01 that recombination between them will exceed 0.05 map units.

It is now possible to understand how the original error of localizing ptm to the third chromosome occurred, for it is likely that the Cy chromosome of the tester stock carried either bw or ptm. This would account for the fact that from the test cross of w^{sat};Cy/-;D/st ♀♀ the critical class occurred with the Cy marker alone; not with Cy and D, or with D. (Supported by PHS grant GM-09802)