New insertions of the A^R4-24 element with variegated *white* gene expression.

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As a rule position effect variegation (PEV) is a consequence of the placement of a euchromatic gene into vicinity of the centromeric heterochromatin. With such rearrangements, the undamaged translocated locus is inactivated in some, but not all cells, thereby giving rise to a mosaic phenotype. Euchromatic genes show PEV when moved into the heterochromatin not only by chromosomal rearrangements but when inserted into the heterochromatin by P element transposition (for review see Zhimulev, 1997). The expression of the *Drosophila white* gene is necessary for deposition of pigments in the eye, the ocelli, the larval and adult Malpighian tubules, and the adult testes. In the case of the eye, the gene is expressed in all ommatidia, resulting in uniform pigmentation of the eye as a whole. Since *white* is expressed cell-autonomously, it can serve as a reporter gene for the detection of the genomic position effects. For induction of position effect variegation of the *white* gene we induced transposition of the A^R4-24 *P[white, rosy]* element, contained *white* and *rosy* genes, from the 24D1-2 region of the polytene chromosome, using *delta2-3* P element (Robertson *et al.*, 1988). The phenotype A^R4-24 insertion (Figure 1) suggests that *white* gene expression is being repressed in

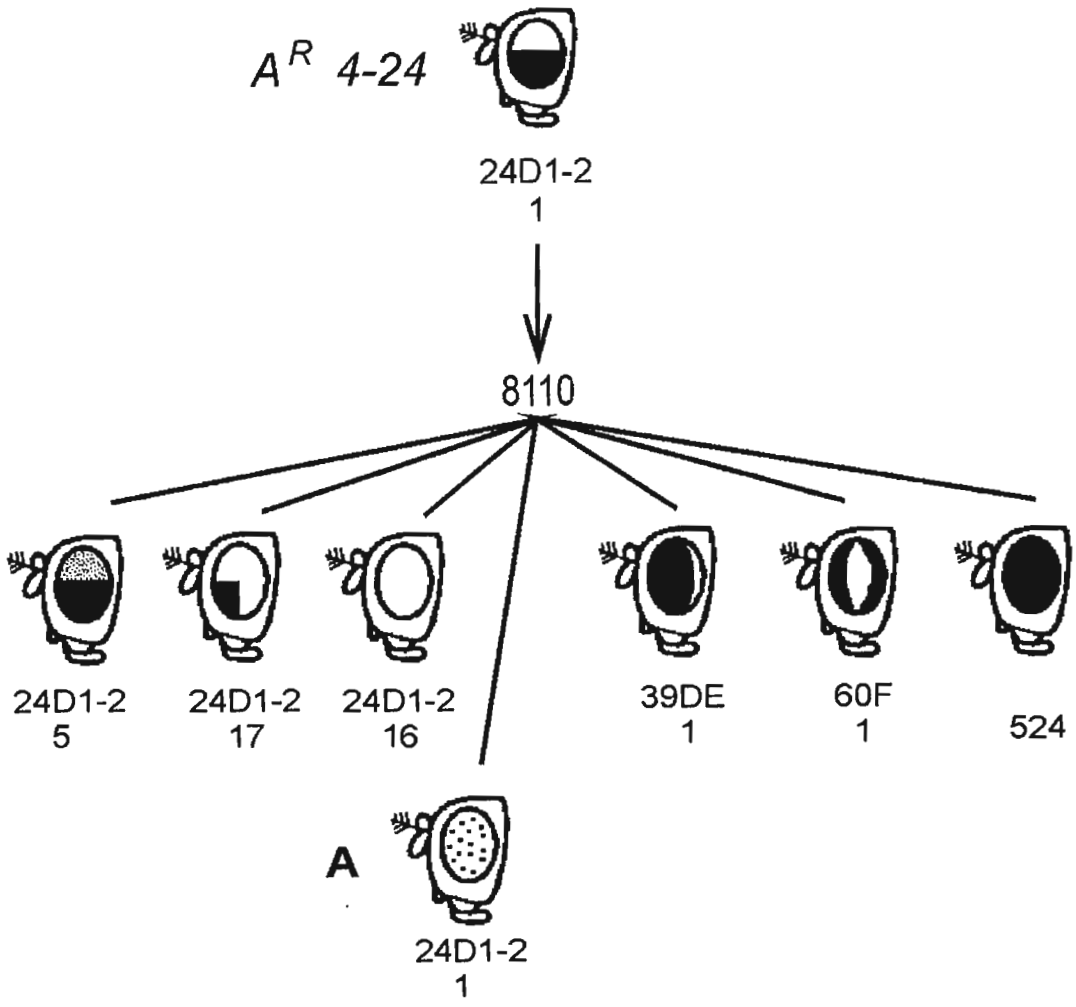

Figure 1. Phenotypes of eyes result from retransposition of the A^R4-24. The cytological position and the number of the lines are shown under the pigment patterns. The mosaic line A was used for generating new transpositions.

Table 1. List of mosaic insertions of the transposon $A^R4\text{-}24$.

Line number	Localization	Comments
A	second chromosome	"salt and pepper"
1	"	"
2	"	"
3	40C	close to wild type
4	second chromosome	"salt and pepper"
5	"	"
6	"	close to wild type
8	"	"salt and pepper"
9	"	"salt and pepper"
11	"	close to wild type
12	"	"salt and pepper"
13	Y-chromosome	"colored sectors"
1-14	tip of the IV-chromosome	"salt and pepper"
15	base of 2L-chromosome	"
16	25F	"
18	102AB	"
19	second chromosome	"salt and pepper" one or two colored facets per eye
20	"	"salt and pepper"
21	"	only ocelli are colored
22	third chromosome	only ocelli are colored
24	second chromosome	"salt and pepper"
25	"	"
26	"	"salt and pepper" one or two colored facets per eye
27	"	"
28	Y-chromosome	colored sectors
1-D	second chromosome	"salt and pepper"
1-B	"	"
29-2	"	"salt and pepper" one or two colored facets per eye
29	Y-chromosome	colored sectors
31	second chromosome	"salt and pepper"
34	second chromosome	close to wild type
35	"	"salt and pepper" one or two colored facets per eye
36	"	"salt and pepper"
38	tip of 2R-chromosome	only ocelli are colored
39	second chromosome	"salt and pepper"
41	"	"
42	"	"
44	"	"salt and pepper", lethal
45	"	closed to wild type
47	"	"
49	"	"salt and pepper", lethal
51	"	close to wild type
52	"	"salt and pepper"
53	40DF	close to wild type
55	75D	"salt and pepper"
56	39A	"
60	second chromosome	"
61	41AB	"
63	second chromosome	"
XX	41F1-2	close to wild type
65	second chromosome	"salt and pepper"
66	"	only ocelli are colored
70	tip of 2R-chromosome	"
71	second chromosome	"salt and pepper"
2-A	"	"
1-F	102A	close to wild type

Figure 2. "Salt and pepper" pigment pattern of the $A^R4\text{-}24$ in the 24D1-2 region (line A).

the dorsal part of the eye rather than being activated in the ventral eye, since the $A^R4\text{-}24$ element contains *white* regulatory sequences rendering it competent to be expressed in all regions of the eye (Levis *et al.*, 1985). This unique dorso–ventral pattern of the *white* expression depends on pairing of a flanking DNA regulatory elements (Hazelrigg and Petersen, 1992), so any removing the $A^R4\text{-}24$ from flanking DNA should change pattern of the eye pigmentation.

To generate transpositions, *CyO/Sp;*ry^{506}*P[*ry^+*delta2-3]*99B,*Sb/TM6* males were crossed to homozygous w^{1118}, $A^R4\text{-}24$ females. Single male progeny of the genotype w^{1118}*/Y;* A^R4*-24/CyO;* ry^{506}*P[*ry^+*delta2-3]*99B, *Sb/+* was then crossed to w^{1118}/w^{1118} virgin females and mosaic non *Cy* and *Sb* males were selected. These males were crossed singly to w^{1118}/w^{1118}*;CyO/+* virgin females and then homozygous stocks were set up by crossing *Curly* progeny. 524 wild-type revertants were isolated from 8110 screened males. 40 extreme derivatives of $A^R4\text{-}24$ were also isolated. They were similar to those obtained by X-ray mutagenesis of the $A^R4\text{-}24$ chromosome (Hazelrigg and Petersen, 1992). All extreme derivatives had reduced pigmentation of the eye in ventral regions as well as dorsally. Most of them were localized in the polytene band 24D1-2 (Figure 1) as a parental insertion $A^R4\text{-}24$ and demonstrated pairing-

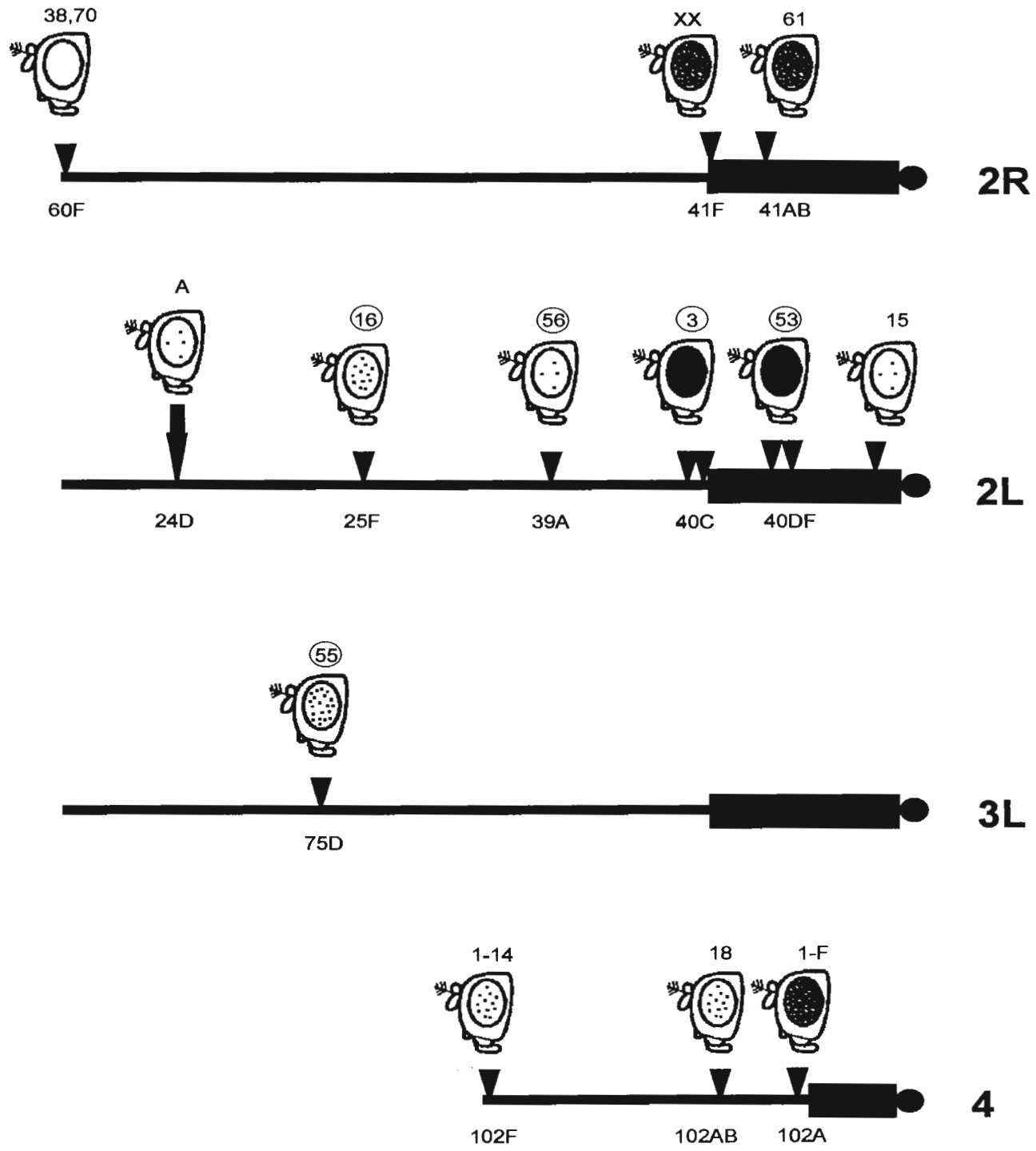

Figure 3. The scheme of *in situ* localization some of the A^R*4-24* derivatives. The euchromatic portions of the chromosome arms are represented by horizontal lines, the heterochromatic - black bars. New sites are marked along the lines with black triangles. The cytological position of each insertion is noted under chromosomes. The original location of the A^R*4-24* is indicated by the heavy arrow. The pigment patterns and line numbers are shown above the chromosomes. Encircled lines contain more than one insertion.

dependence *white* expression as was described by Hazelrigg and Petersen (1992). So, we concluded that the same regulatory flanking elements could be responsible for *white* repression in our case. The only new insertion (A) had the classical "salt and pepper" phenotype (Figure 2), modified by lower temperature and removing Y chromosome such as a classical heterochromatin-induced PEV. Its cytological position is 24D1-2. To be sure that "salt and pepper" phenotype in 24D1-2 region is not a result of *white* gene damage or mutation we have generated new transpositions of the A^R*4-24* element from 24D1-2, using this mosaic line, by analogy with outline described before. Relocating the gene should result in a wild-type eye color at most new positions if its mutant phenotype is due to a position effect, but not if it is due to a mutation intrinsic to the gene. 44280 males were screened, 2323 wild-type revertants, 2 stable repression of *white* expression were registered and 54 "salt and pepper" lines with different extent of mosaicism were isolated (Table 1). Thus, position effect in the 24D1-2 regions is very probably caused by adjacent to A^R*4-24* element genomic DNA, since transposon is placed in a distance of 15 cytological division from nearest heterochromatin and there are no visible reasons for *cis-* or *trans-* interactions (Figure 3).

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References: Hazelrigg, T., and S. Petersen 1992, Genetics 130: 125-138; Levis, R., T. Hazelrigg, and G.M. Rubin 1985, Science 229: 558- 561; Robertson, H.M., C.R. Preston, R.W. Phillis, D.M. Johnson- Schitz, W.K. Benz, and W.R. Engels 1988, Genetics 118: 461-470; I.F. Zhimulev 1997, Adv. Genet. 37: 1-555.

Proportions of *Drosophila melanogaster* and *D. simulans* in eastern Australian populations.

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Conventional wisdom among drosophilists states that typical relative abundances of *Drosophila melanogaster* and *D. simulans* vary with latitude and with indoor vs outdoor feeding/breeding site, as well as with season and temperature. In March and April of 1997, I collected *Drosophila* flies at 40 localities near the coast of eastern Australia, in New South Wales, Victoria and Tasmania. Data were recorded on the numbers of both sexes of *D. melanogaster* and *D. simulans* captured at each site, and on characteristics of the site itself. The data and some analyses are presented here to contribute to the literature on the ecology of these species.

The collections were intended to sample *D. melanogaster* populations in order to determine the state of the previously described clinal pattern in P-M hybrid dysgenesis (Boussy, 1987; Boussy and Kidwell, 1987; Boussy *et al.*, 1988). Latitudes of collection sites were determined using a hand-held global positioning satellite receiver (Garmin GPS XL 45). Flies were collected by sweeping at sites attractive to *Drosophila* flies (*e.g.*, discarded fruit in orchards or vineyards, waste bins in fruit-processing sheds, displays and discard bins in fruit and vegetable shops, pomace heaps at wineries, a home compost heap), or from buckets containing chopped bananas and live yeast as bait. I used an insect net with a tubular trap in the bottom ("Drosophila Net," Wards, cat. No. 10W0495; modified by stitching the trap smaller to snugly fit a 25 mm vial). The net was fitted to a standard insect net frame ("Collapsible Net," BioQuip, cat. No. 7115CP), used with a 24 inch extension handle. Flies were swept over sites or bait buckets, and collected from the net into 25 mm vials containing previously prepared standard yeast-agar-treacle-maize meal *Drosophila* food. The vials were kept cool until sorting (within a few hours) in a *ca.* 0.1 m^3 styrofoam container with ice or cold water in containers. Flies were anesthetized with ether and

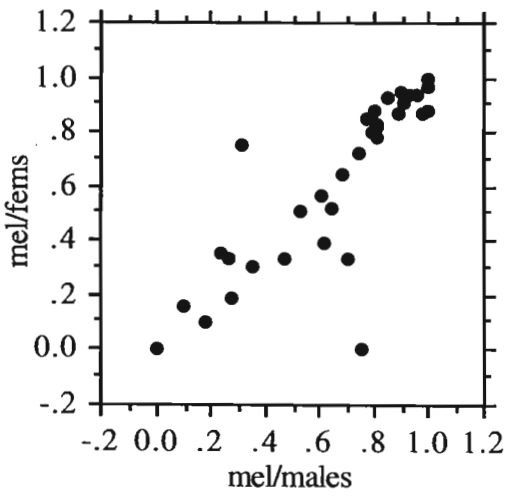

Figure 1. Proportion of *D. melanogaster* in samples of males *vs.* samples of females.