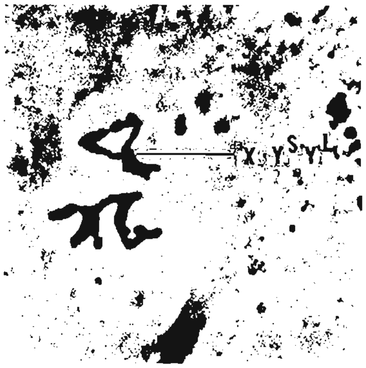

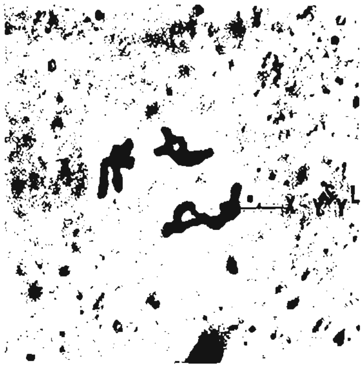

<u>Nash, David, and Effie Woloshyn.</u> University of Alberta, Edmonton, Alberta, Canada. Instability of Enhancer of Hairless.

Enhancer of Hairless (E-H, II, 50.3) arose spontaneously in a population in which expression of Hairless (H, III, 69.5) was under observation. Its effects and location close to Suppressor of Hairless (Su-H, II, 50.4) were described by Nash (1965). E-H was made homozygous in a background selected for suppression of H effect on head bristles. This background contained a balanced lethal system, H/LVM. The E-H/E-H;H/LVM stock was maintained in mass culture.

On at least three occasions in two years, flies with phenotypes characteristic of E-H/+ and +/+ genotypes appeared in the stock. After the second and third breakdowns the stock was re-established from single-pair cultures with both parents E-H/E-H, judged by the progeny. After the third breakdown the stock segregated a pair of alleles with the same phenotypic effects as E-H and its wild-type counterpart. These alleles segregate on the second chromosome and, although their map position has not been determined, we assume segregation is at the locus of E-H and that the original wild-type locus or the equivalent has somehow been reintroduced to the stock.

We have tested the possibility that the phenomenon results from reversion within the E-H/E-H stock by growing a number of lines and sampling each generation. Starting from twenty homozygous cultures we have observed three reversions in about one hundred twenty generations. Details of their appearance in the lines are shown in table 1.

Table 1

Average numbers of bristles missing and the scores of individual flies in four cultures which originated from E-H/E-H; H/LVM populations.

Generation	A		B		C		D	
1*	10.6	10,11,12,12,12	9.1	9,9,10,11,11	10.3	10,10,11,12,12	11.2	11,11,12,12,12
		9,9,10,10,11		7,7,10,10,11		9,9,10,10,10		10,10,11,12,12
2	11.3	10,11,11,12,12	6.6	8,9,9,10,11	10.6	10,11,11,11,12	10.8	10,11,11,11,12
		11,11,11,12,12		1,1,2,7,8		9,10,10,11,11		10,10,11,11,11
3	11.2	11,11,12,12,12	6.4	2,4,6,9,11	10.4	8,10,11,12,12	8.5	3,10,10,11,12
		9,10,11,12,12		3,5,7,8,9		7,10,10,12,12		2,2,11,12,12
4	10.7	10,10,12,12,12	7.7	3,8,8,9,12	9.3	7,8,11,12,12	8.2	9,9,9,11,12
		9,10,10,11,11		1,8,8,9,11		7,8,9,10,10		2,3,7,9,11
5	11.1	11,11,12,12,12	5.9	0,4,8,8,9	9.2	9,9,9,11,12	7.9	7,9,10,10,12
		10,10,10,11,12		2,4,8,8,8		2,9,9,11,11		2,2,8,9,10
6	11.1	10,11,12,12,12	5.7	2,3,4,6,10	7.7	7,9,9,10,12	5.6	4,5,9,11,11
		10,11,11,11,11		2,5,7,9,9		2,2,6,9,11		0,2,3,4,7
7	10.6	11,11,11,12,12	8.0	5,8,9,11,12	7.9	3,6,8,8,12	7.2	3,9,10,10,12
		**7,9,10,11,12		0,7,8,9,11		6,7,8,9,12		1,3,4,10,10

A is a line in which no reversion has spread in the population. B,C, and D show the three instances of reversion. 5 flies of each sex were scored: The average for all ten flies is shown, followed by scores for females. Males are shown below females.

Prior to generation 1 the cultures had been maintained for two unscored generations. The samples of flies shown were not included in the parents of the next generation.
*Larger samples of flies were checked in this generation. Only B showed possible revertants.
**This fly may have been a single revertant. However, the line has remained stable for several further generations.

The number of bristles missing from the dorsal surface of the head has been used to indicate genotype, since some classes of phenotype are typical of particular genotypes (see Table 2).

Table 2

Cross	Number	Number of head bristles missing													
		0	1	2	3	4	5	6	7	8	9	10	11	12	
+/+ x +/+	48	3	2	19	15	8	1								Nos. of flies falling into each class
E-H/E-H x +/+	53							2	12	21	13	5			
E-H/E-H x E-H/E-H	46										2	19	19	6	
E-H/+ x E-H/+	48	1	1	8	3	2	2	3	5	11	2	3	4	3	

All crosses carry Hairless balanced against LVM.

Two aspects of the finding require explanation: (a) What causes reversion? (b) Why do the revertants spread relatively rapidly in the cultures?

We prefer to explain the reversions as the result of unequal crossing-over, since their frequency is higher than the expected rate of mutation. This supposes that E-H is a duplication, but we have not been able to demonstrate this cytologically.

If this explanation is correct, then interpretation of recombination data between E-H and Su-H (Nash, 1965) needs revision, because wild type progeny from the cross E-H/Su-H; H/LVM ♀ X +/+; H/LVM ♂, supposed to be recombinants between two point mutations, could have arisen by events which remove the duplication or incorporate the Su-H allele into one of its duplicate parts.

We suggest that revertants spread through the population because of their superior fitness. E-H/E-H; H/LVM flies are less vigorous than +/+; H/LVM flies with otherwise comparable genetic backgrounds. The disadvantage of E-H probably depends on the presence of the H mutant, since E-H/E-H; $+^H/+^H$ mass cultures have been maintained apparently without revertants arising.

References:
Nash, David. 1965 The expression of 'Hairless' in Drosophila and the role of two closely linked modifiers of opposite effect. Genet. Res., Camb. 6: 175-189.

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Preliminary genetic tests with dimethyl sulphoxide.

Since dimethyl sulphoxide has been shown to act as a whole body protector against ionizing radiation (Ashwood-Smith, Int. J. Rad. Biol. 3, 1961, and Moos and Kim, Experientia 22, 1966), preliminary tests were carried out to investigate if this action could be extended to a chromosomal level as well.

Males of the Oregon R stock were injected with a 10% solution of the compound prior to X-irradiation with 800r at different intervals. At 24 hours after irradiation they were mass mated to "Basc" females, left for one day and then discarded. The females were allowed to oviposit for two additional days. Standard sex-linked recessive lethal tests were done with the F_1 females.

These preliminary results, as can be seen in the table, seem to indicate a certain effect. There is a drop in the frequencies of mutations, as compared with the irradiated controls, which is more pronounced as the intervals before irradiation increase.

	No. tested chrom.	No. lethals	% lethals
800r	2075	40	1.9
DMSO (30 min. int.)	1184	19	1.6
DMSO (5 hrs. int.)	1129	13	1.1
DMSO (20 hrs. int.)	2469	19	0.7