Ouweneel, W.J. Hubrecht Laboratory, Utrecht, Netherlands. Effect of colchicine on the development of homoeotic wing tissue.

Because it is known that homoeosis and transdetermination strongly depend on altered proliferation dynamics, experiments to alter proliferation and to study the consequent effects on these phenomena may be useful. In the present study the homoeotic mutant ld-opht was used, which produces wing outgrowths in the eyes.[1,2] Late 2nd-instar eye discs of this strain were bathed for 30 min in 9 - 100 ug/ml colchicine solutions made up in Ringer (control discs were bathed in Ringer only), then transplanted into larvae of the same age. Higher concentrations proved to be toxic. At the lower concentrations used (17 - 9 ug/ml) 124 (61%) of the transplanted discs were recovered (controls: 52%), 93% of which had undergone complete differentiation (controls: 97%) with an average incidence of all normal eye-antennal disc derivatives of 80% (controls: 82%).

At a concentration of 17 ug/ml fewer facets, but sometimes more bristles (often arranged in a confusing, crowded pattern) were formed. The occiput region often was much more extensively developed than in untreated implants and strikingly approached that of the normal fly, both in spatial relationships and in number of occipital bristles. This suggests that in these implants colchicine induced the process of growing-out which normally occurs in situ but fails to take place in untreated implants (cf. ref. 2). Interestingly, the long period between transplantation and pupation both in the treated and untreated discs often led to a partial or complete reduplication of the antenna and palps. The distal segments of the antenna always reduplicated first. Many antennal segments and palps were strongly enlarged and apparently trapped in the process of splitting-up (cf. ref. 3).

Homoeotic wing outgrowths were encountered in 10 (34%) of the implants treated with 17 ug/ml, in 25 (35%) of those treated with 11 ug/ml, and in 10 (67%) of those treated with 9 ug/ml. In the controls the penetrance was 33% (out of 72 implants). Therefore, a strong increase of penetrance was only observed at the lowest concentration tested; the X^2 for the difference was 5.68 (significant at the one-sided 2.50% level). The expressivity of the wing-like outgrowths is markedly increased by the colchicine treatment, but here also most strongly at 9 ug/ml, the surface of the outgrowths being 2.1 times as large as in the controls; this difference is significant (p=1.80, Wilcoxon test). At a concentration of 11 ug/ml the outgrowths were 1.9 times as large (p=2.74). At 9 ug/ml the total amount of wing tissue produced was more than 4 1/4 times as much as that produced in the controls; at 11 ug/ml twice; at 17 ug/ml 1 1/2 times as much. Colchicine given in the food in low concentrations during the larval period also significantly increased the expressivity of the wing-like outgrowths. We may therefore conclude that treatment with lower colchicine concentrations increases the production of homoeotic wing tissue in the eye of ld-opht, which is direct evidence for my earlier view[1] that the homoeotic effect is a consequence of changed proliferation dynamics.

Colchicine, which is best known for its ability to arrest mitosis, may thus, under certain circumstances, exert mitosis-enhancing effects, as found by many other authors (see ref. 4 and 5 for further literature). It seems to be capable of enhancing prophase progression and the cells' entrance into metaphase if they are in a state of "high mitotic tendency" (Lüscher), as is the case in proliferating imaginal discs. It is interesting that proliferation-enhancing effects could also be suggested for other colchicine experiments on imaginal discs. Treatment of genital discs often produced many more spermathecae than normally.[6] Tobler[7] adduced several arguments (particularly a markedly increased transdetermination frequency) for a stimulation of proliferation in treated foreleg discs; he assumed a similar effect in the experiments of Vogt[8] on aristapedia eye-antennal discs.

References: 1. Ouweneel, W.J. 1969 Roux' Arch. 164:1-36; 2. Ouweneel, W.J. 1970 Roux' Arch. 166:76-88; 3. Ouweneel, W.J. 1972 Acta Biotheor. (in press); 4. Eigsti, O.J. and P. Dustin 1955 Colchicine (Ames: Iowa St. Coll. Press); 5. Mueller, G.A. et al. 1971 J. Cell Biol. 48:253-265; 6. Hadorn, E. 1952 Zool. Anz. 16, Suppl.:29-42; 7. Tobler, H. 1970 Roux' Arch. 165:217-225; 8. Vogt, M. 1947 Experientia 3:156-157.

Lefevre, G., Jr. and J. Kelley. San Fernando Valley State College, Northridge California. Strawberry vs. facet-glossy, a locus correction.

In 1958, Fahmy (DIS 34:49) reported a chemically induced mutant with roughened, glazed, bright red but "patchy" eyes, which, because of their remarkable resemblance to overripe strawberries, he named strawberry (swb), and which he localized at 1-2.2 (between w and N). An X-ray induced allele, swb^{62b}, was obtained from Amherst. P.T. Ives (personal communication) informed

me that swb^{62b} had been tested for allelism with Fahmy's original swb allele.

The swb^{62b} phenotype is not expressed when made heterozygous with a deficiency, Df(1) w^{67k30}, that lacks bands 3C2 through 3C6. However, when made heterozygous with either cytologically normal or deficient Notch mutants or with facet-glossy (fa^g), the swb phenotype is exhibited. In fact, the eyes of swb^{62b} cannot be distinguished from those of fa^g. In heterozygous combination with fa, swb^{62b} produces a fa phenotype; with spl, the eyes are completely +. A new X-ray induced allele, swb^{71b}, behaves exactly like swb^{62b}, although its eyes are rougher and appear mottled, but with a more nearly normal color.

It is clear the "swb" was the incorrect symbol. The mutant should have been symbolized fa^{swb} as a male-viable member of the N locus complex of mutants located at 1-3.0. As a symbol fa^{swb} perhaps deserves priority over fa^g, the symbol given to the allele found in 1962. In appearance, the eyes of both swb^{62b} and fa^g are much more aptly described by the term "strawberry" than by "glossy".

Mittler, S. Northern Illinois University, DeKalb, Ill. Failure of Dimethyl sulfoxide to protect against radiation-induced sex-linked lethals.

Dimethyl sulfoxide (DMSO) has been found to protect mice[1], tissue culture[2], pseudomonas[3], and catalase[4] from radiation. In an attempt to protect cells in spermatogenesis from radiation-induced recessive sex-linked lethals, 0.1 µl of 3.5% DMSO was injected into one-day-old adult Oregon R males. These males were irradiated with 2000 R γ rays from Cs^{137} Gammator 50 at 500 R/min. and mated to M-5 females at a ratio of one male to two females. The males were presented with new harems every two days until six days after irradiation. The control males were injected with saline solution and irradiated at the same time and were also transferred to new females every two days.

Brood	Injection	Lethals	Total Chromosomes Tested	% Lethals
0-2 day	Control	26	517	5.03
0-2	DMSO	24	414	5.8
2-4	Control	26	591	4.4
2-4	DMSO	23	469	4.9
4-6	Control	21	328	6.4
4-6	DMSO	19	290	6.55

DMSO did not protect post-meiotic cells in spermatogenesis from radiation-induced recessive sex-linked lethals.

References: 1. Ashwood-Smith, M.J. 1961, Int. J. Radiat. Biol. 3:41; 2. Vos, O. and M.C.A. Kallen 1966, Int. J. Radiat. Biol. 5:609; 3. Bridges, B.A. 1962, Int. J. Radiat. Biol. 5:101; 4. Lohmann, W., A.J. Moss, Dr. and W.H. Perkins 1965, J. Nuclear Med. 6:519.

Charlesworth, B. and D. Charlesworth. University of Liverpool, England. Linkage disequilibrium in populations of Drosophila melanogaster.

We have carried out an experiment to detect possible linkage disequilibrium between five polymorphic loci located in the middle of chromosome 3 of D. melanogaster. The loci studied, their map positions, and the alleles present in sufficiently high frequency to be useful in this study, are shown in the first table.

Locus	Map Position	Alleles (Relative electrophoretic mobilities)
1. Esterase-6	36.8	1.00, 1.10
2. Phosphoglucomutase	43.4	1.00, 1.20, 1.30*
3. Larval alkaline phosphatase	46.3	1.00, 1.30
4. Xanthine dehydrogenase	52.0	1.00, 1.04
5. Aldehyde oxidase	56.6	1.00, 1.04

* This allele was present only in population S.

For references, see O'Brien, S.J. and R.J. MacIntyre 1971 DIS 46:89-93.

Sets of chromosomes were extracted from male flies by a balancer technique, and maintained either homozygous or as balanced stocks. We studied flies from three population