Tobler, H.* and S. Huber. Zoological Institute, University of Zürich, Switzerland. Effect of nitrogen mustard (HN-2) on the development of the male foreleg of Drosophila melanogaster.

Injection of nitrogen mustard into the body cavity of late third instar larvae or treatment of foreleg disks with this drug in vitro and subsequent implantation into larval hosts results in the following effects: differentiation of bristles without sockets and bracts, alteration of normal bristle patterns, reduction in size of leg parts, and formation of fewer bristles and hairs (Tobler and Maier, 1970). From these observations the question arose, as to whether or not administration of nitrogen mustard to the food would have the same effects.

10 mg of 2.2'-Dichlor-N-methyldiaethylamine (HN-2, Schuchardt, Munich) were dissolved in 1 ml of distilled water, diluted, and mixed with yeast to give appropriate concentrations of 0.05, 0.2, 0.5, 1.0 and 2.0 mg HN-2 per gr yeast. This mixture was poured in excess over standard Drosophila food (corn, sugar, agar, yeast) in a culture vial. 72 hour old larvae were either left on the drug until emergence as adults; or removed after 24 hours, rinsed with fresh water, and transferred to media without HN-2. Control flies were raised on food and yeast alone.

A concentration of 1 mg HN-2 per gr of yeast had the most significant effect on the

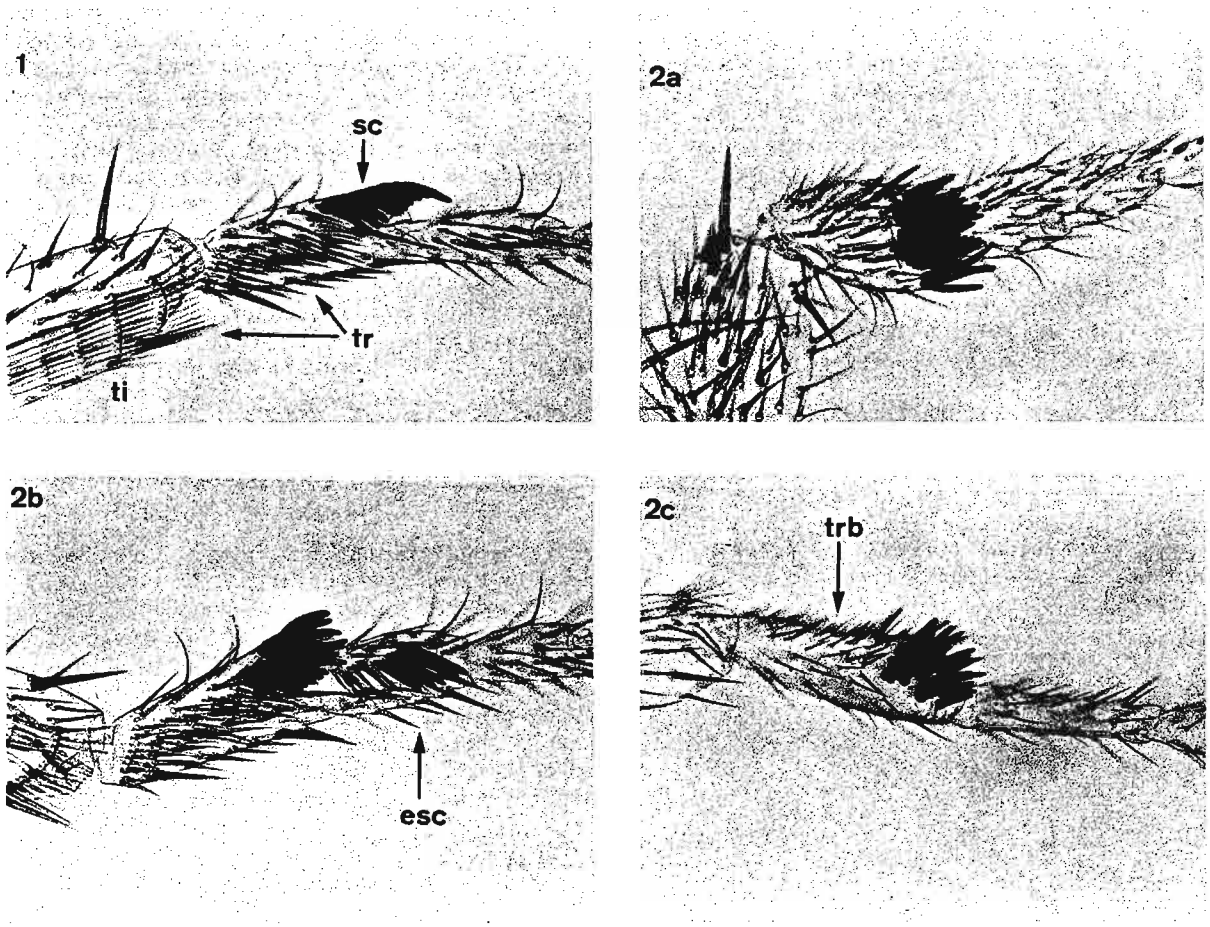

Fig. 1. Distal part of the left male foreleg of wildtype Drosophila melanogaster flies (ti = tibia, tr = transversal rows, sc = sex comb).

Fig. 2. Effects of HN-2 treatment on the bristle pattern of the male foreleg. a) Increase in the number of sex comb teeth on the first tarsal segment. b) Formation of an extra sex comb on the second tarsal segment (esc = extra sex comb). c) Alteration of the sex comb and transversal row pattern on the first tarsal segment (trb = transversal row bristles).

development of the adult foreleg. Higher concentrations proved lethal. Out of 90 treated larvae, only 2 flies were able to hatch. 31 larvae differentiated into adult flies but were unable to emerge from the pupal case and had to be dissected free. The remaining 57 larvae died during pupation. 62% of the examined flies showed typical alterations of patterns; these included the following types: 1. The number of sex comb teeth was considerably increased. Instead of the 8-13 teeth normally formed in our "Sevelen" control stock (Fig. 1), up to 35 teeth were found in the HN-2 treated animals (Fig. 2a). 2. Concomitant with the increase in the number of sex comb teeth, a striking change in the pattern was observed; the teeth are no longer arranged in an orderly row, but rather are spread over a large area of the distal part of the first tarsal segment. 3. Additional sex comb teeth may be found on the second tarsal segment (Fig. 2b). 4. The pattern of the transversal rows may also be disturbed (Fig. 2c). This is often accompanied by a reduction in the number of bristle organs.

The formation of bristles without sockets and bracts has never been observed during the present studies. The sensitive phase for the formation of socket-less bristles after injection of Mitomycin C falls between early third larval instar and 16 hours after puparium formation (Tobler and Burckhardt, 1971). It appears likely that the sensitive phase for the HN-2 and Mitomycin C effects are the same. It is not known whether or not HN-2 is metabolized to an inactive form. Alternatively it is possible that the drug does not reach the socket-forming cells ever or during the sensitive phase.

Bodenstein and Abdel-Malek (1949) treated Drosophila virilis larvae with nitrogen mustard and found that up to 50% of the exposed animals formed tarsal segments instead of aristae, thus phenocopying the mutant aristapedia. The formation of a large number of extra sex comb teeth on the distal part of the first tarsal segment may well be regarded as a phenocopy of the mutant eyeless-Dominant (ey^D, 4 - 2.0, Lindsley and Grell, 1968), which shows, as a pleiotropic effect, an enormous increase in the number of formed sex comb teeth. Extra sex comb teeth on the second tarsal segment of the foreleg, as is shown in Fig. 2b, are also found occasionally in the mutant combgap (cg, 2 - 71.1), which has recently been described by Datta and Mukherjee (1971).

References: Bodenstein, D. and A. Abdel-Malek 1949, J. Exp. Zool. 111:95-115; Datta, R.K. and A.S. Mukherjee 1971, Genetics 68:269-286; Lindsley, D.L. and E.H. Grell 1968, Carn. Inst. Wash. Publ. 627; Tobler, H. and H. Burckhardt 1971, Experientia 27:189-191; Tobler, H. and V. Maier 1970, Wilhelm Roux' Archiv 164:303-312.

We would like to thank Drs. E. Hadorn, H. Lebherz, and R. Nöthiger for critically reading this manuscript.

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Baimai, V. Mahidol University, Bangkok, Thailand. A spontaneous triploid in D. birchii.

Natural populations of D. birchii exhibit remarkable karyotype variation (Baimai, 1969). The "Standard" metaphase karyotype of D. birchii consists of two pairs of V-shaped, one pair of dot-shaped, and one pair of J-shaped chromosomes (the latter the sex-chromosomes). During the course of cytogenetic investigations on this species from New Guinea, a triploid was detected in a third instar larva from a cultured stock. Figure 1 shows two X-chromosomes, one Y-chromosome, six V-shaped chromosomes, and the three dots. Although not unusual in plants, polyploidy is rare in animals; this is an example of a spontaneous triploidy in Drosophila.

Fig. 1. A triploid in D. birchii.

Reference: Baimai, V. 1969, Chromosoma 27: 381-394.