Ouweneel, W.J. Hubrecht Laboratory, Utrecht, Netherlands. Replacement patterns of homoeotic wing structures in halteres.

It is known that the mutation bithorax alters the anterior parts of the metathorax (i.e., notum III and haltere sclerite)[1] and of the haltere into the anterior parts of the mesothorax and of the wing, whereas postbithorax (pbx) effectuates an analogous alteration in the posterior parts. A number of homoeotic halteres were closely analysed in order to establish which cells of the haltere discs are determined to follow a homoeotic pathway, and which structures in the wing and haltere are homologous (cf. ref. 1). As a bithorax allele halteroptera (hl) was used, while for the posterior alteration pbx +/+ Ubx (Ultrabithorax) flies gave excellent results. The pbx halteres exhibited a very consistent pattern. The two sensilla groups in both the pedicel and the scabellum are unaffected; only the posterior parts of these segments are replaced: the scabellum carries an alula, and the pedicel an alar lobe. Usually parts of the cubitus and the 1st vannal vein are seen. The distal segment is much enlarged. Anteriorly it carries a patch of capitellar tissue, but the main part is wing spread. Posteriorly always the "posterior row" of wing border hairs was observed. Usually a pattern of mediae and in one case the medial cross-vein was encountered. The metathoracic bristles, stigma, and papillae[1] are normal; the only homoeotic mesothoracic structure is the postnotum.

The hl halteres are more varying in the expression of the homoeotic effect. Here, the anterior, yellow-haired parts on the scabellum and pedicel usually are partly or entirely replaced by proximal and medial costa, respectively, while the distal segment anteriorly carries the distal costa, and the "triple row" and "double row" of wing border bristles and hairs. The bulk of this segment consists of wing spread. At high degrees of expressivity a clear veinous pattern, comprising the radius and its ramifications, can be seen; in these cases the remaining capitellar tissue is always posteriorly split off from the segment as a small spheroid appendage. The dorsal and ventral sensilla groups on scabellum and pedicel appear to correspond to similar sensilla groups on the proximal and medial wing radius. Further study of the varying replacement patterns suggests that the two "metathoracic papillae" correspond to a similar group of three papillae on the mesothorax (scutum), the metathoracic stigma to the mesopleura with its stigma, the area of the "metathoracic bristle group" probably to the pteropleura, and the scutum to the dorsal notum III.

These alteration patterns and the known organ map of the haltere disc[1] enable, by way of inference, the constitution of an organ map for the wing disc which, however tentative, is more detailed than any wing map so far. It appears that pbx affects a medioposterior segment of the haltere disc, and hl a more irregular, latero-anterior part of the disc. Interestingly, because of the large size difference between the two discs, the homoeotic wing structures in the halteres are produced on a much smaller scale than in situ. It is obvious to assume that in the wing and haltere disc an identical set of positional information is specified (only on different scales, or, if we think of linear morphogenetic gradients, with different slopes). The interpretation of this positional information would then depend on the genome: homoeotic mutations are able to alter this interpretation locally and to produce allotypic, but site-specific, structures. A similar explanation has been given for the leg and antennal disc[2].

References: 1. Ouweneel, W.J. and J.M. van der Meer 1973, Wilhelm Roux' Arch. 172:149-161; 2. Postlethwait, J.H. and H.A. Schneiderman 1971, Devel. Biol. 25:606-640.

Williamson, J.H. University of Calgary, Calgary, Alberta, Canada. Y66d: A Y-chromosome with two nucleolar regions.

Y66d (Y^S y^+ $Y^L.Y^S$) arose spontaneously in an attached-XY/0 male (129-16/0; Parker, DIS 1968). Attached-XY 129-16 (X y^+ $Y^L.Y^S$) was recovered as a detachment of C(1)RM involving the sc^8 Y. Genetic analysis of a series of detachments verified that, genetically, Y66d is KS y^+ KL·KS. Cytological observations of larval neuroblasts have revealed that Y66d has two NO regions. Usually both Y^S elements of Y66d are found to be associated with one nucleolus. In particularly good preparations two nucleoli were clearly visible and separate from each other in each of two cells. Each nucleolus was closely associated with heterochromatic elements presumed to be a short arm of the Y. In both cases heterochromatic elements presumed to be Y^L connected the two nucleoli. Y66d must be KS NO y^+ KL·NO KS.