Table 2

Lines	Method (1)	(2)	(3)
A1H	7	4	4
A2H	10	4	4
A1L	10	6	6
A2L	4	2	2

From the two-way anova without replication, we obtain the results summarized in Table 2 that show during how many generations the expected response estimated by the three methods is in agreement with the observed values. It is clear that the parent-offspring regression gives us the best estimate.

References: Clayton, G.A., J.A. Morris and A. Robertson 1957, J. Genet. 55:131-151; Falconer, D.S. 1960, Introduction to Quantitative Genetics, Ronald Press Co., New York; Sheldon, B.L. 1963, Aust. J. Biol. Sci. 16:490-515.

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The ultrastructure of normal and "rotated" prepupal muscles of D. melanogaster.

The mutation abdomen rotatum (ar) of D. melanogaster was discovered and named by Beliajeff (1931). The effect of this gene on development was described by the writer and Howland (1942). It was then suggested that the symmetrical abnormalities of the mutant puparium as well as the sudden rotation of the imaginal abdomen at the end of the prepupal period were both due to abnormally strong contractions of the persisting larval muscles, which bring about the shortening of the puparium as well as the movements of the imago as it separates from the puparium.

It appears to be of interest to determine whether or not there might be an ultrastructural difference between the heterozygous normal prepupal muscles and the homozygous "rotated" muscles in individuals in the balanced lethal stock ar/ey^D.

Muscle fibers of normal prepupae and genetically "rotated" prepupae were dissected out in glutaraldehyde, routinely fixed and post-fixed in osmium tetroxide, embedded in epon, sectioned with a diamond knife, stained with uranyl acetate and lead citrate and examined with an Hitachi HU-11A EM. There appear to be consistent differences between the prepupal muscles of the normal and genetically "rotated" individuals. An account of these follows.

The ultrastructure of the normal prepupal muscles appears identical to the intersegmented abdominal muscle of the insect Rhodnius prolixus (Toselli and Pepe 1968). These are described as typical "slow-acting" muscles, lacking the "H" zone and the "M" line (Fig. 1).

The "rotated" prepupal muscles show a number of consistent differences from the normal muscles. First, there appears to be an exaggerated irregularity in the "Z" bands (Fig. 1, 2;Z). Second, the "I" bands show a markedly increased width, with the resultant decrease in the width of the "A" bands (Fig. 1,2,I,A). Third, the myofibrillae of the "rotated" muscles show a disorganization in the regions where they impinge upon the "I" bands (Fig. 2,D). It would seem that the combination of these three apparent muscle pathologies is the ultrastructural basis for the abnormally strong contractions which bring about the phenotypic abnormalities of the "rotated" puparium and imago.

References: Beliajeff, N.K. 1931, Biol. Zbl. 51:701-709; Marengo, N.P. and R.B. Howland 1942, Genetics 27:604-611; Toselli, P.H. and F.A. Pepe 1968, J. Cell Biol. 37:445-461.

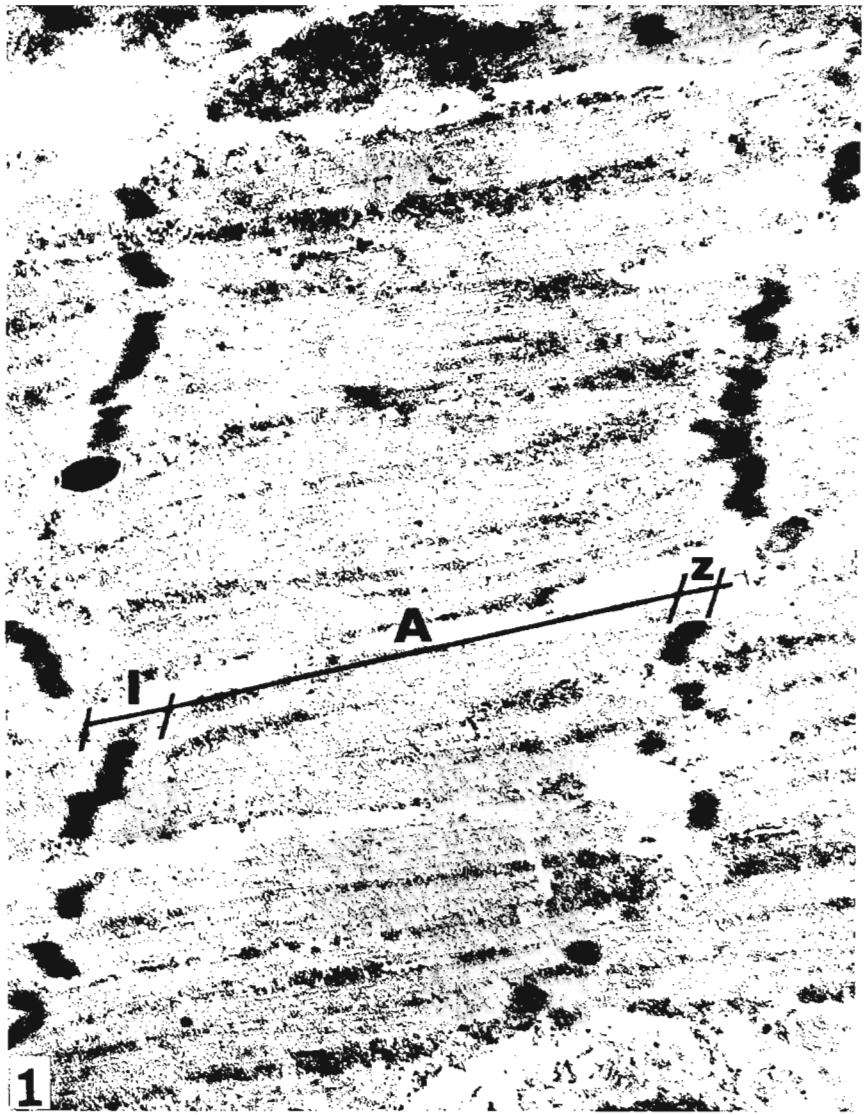

Fig. 1. Electron micrograph of a longitudinal section of prepupal muscle from a heterozygous normal prepupa of the ar/ey^{D} stock. The "I", "A" and "Z" bands are designated by letter. X2893.

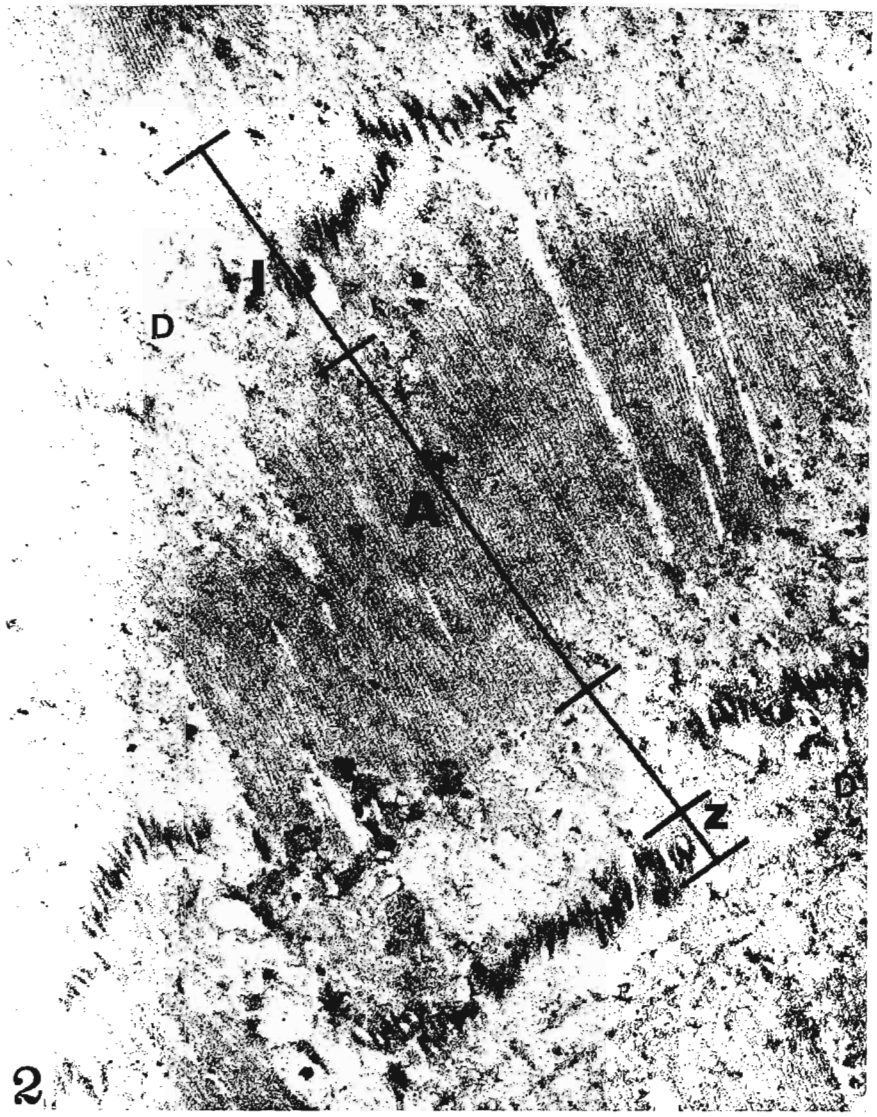

Fig. 2. Electron micrograph of a longitudinal section of prepupal muscle from a homozygous "rotated" prepupa of the ar/ey^{D} stock. The identified "I", "A" and "Z" bands are to be compared with equivalent bands in the normal muscle. Note the disruption of the "A" bands in the regions indicated (D). X2893.