

labeled puff section the changed conditions in comparison to the non-puffed state have an increasing effect on the silver grain numbers. In the transcriptionally active, puffed situation there is a greater area of chromosome contact with autoradiographic emulsion, a decreased clustering of the precursors incorporated and, presumably, a lowered self-absorption of β -particles on the basis of the changed DNA histone (nucleosome) configuration.

References: Berendes, H.D. 1966, *Chromosoma* 20:32; Hägele, K. and W.-E. Kalisch 1974, *Chromosoma* 47:403; _____ and _____, *Chromosoma* (in press); Holmquist, G. 1972, *Chromosoma* 36:413; Kalisch, W.-E. and K. Hägele 1973, *Chromosoma* 44:265; _____ and _____ 1977, *DIS* 52:127; Zhimulev, I.F. and E.S. Belyaeva 1975, *Chromosoma* 49:219.

Hankins, G.R. and A.F. Sherald. George Mason University, Fairfax, Virginia. Hydroypyrimidine hydrase in *D. melanogaster*.

The black mutation (2-48.5) of *Drosophila* is the result of a partial deficiency in beta-alanine synthesis (Hodgetts and Choi 1974); however, the specific enzymatic lesion is still unknown. Beta-alanine can be synthesized via a number of pathways including direct decarboxylation of aspartate, or by synthesis and degradation of uracil. In *Musca*, the major biosynthetic pathway proceeds through uracil (Ross and Monroe 1972), and in *Drosophila*, Jacobs (1974) found that, like beta-alanine, exogenous uracil, dihydrouracil and beta-ureidopropionate promoted normal coloration in black adults; and label from both orotate and uracil was incorporated more strongly into black than wild type cuticles. These data would suggest that black causes a partial metabolic lesion in the pathway via uracil, possibly prior to orotate. However, studies of several gene-

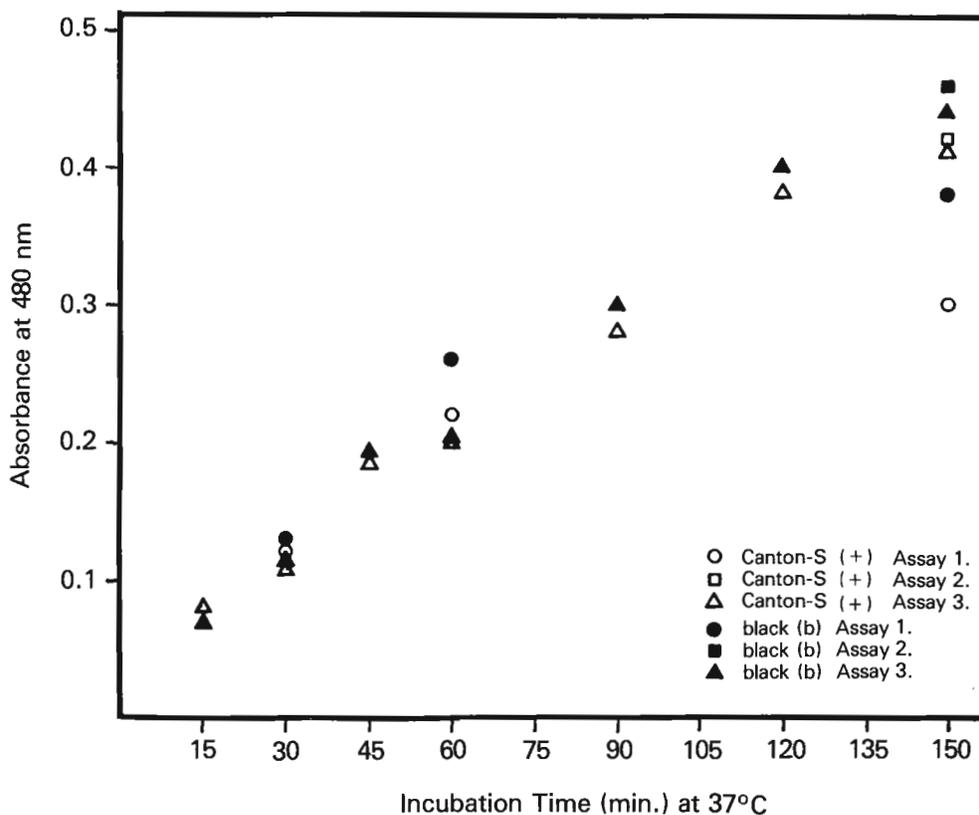


FIGURE 1. Hydroypyrimidine Hydrase Activity in Canton-S and black *Drosophila*.

Assays were performed using crude *Drosophila* supernatant of 100 flies/ml. Protein determinations were performed for assay no. 3 and no significant difference was found between black and Canton-S supernatants. Flies were usually no older than 9 hours.

enzyme systems are in complete contradiction to this interpretation. The first three enzymes in orotate synthesis are reduced by various of the alleles of rudimentary (Rawls and Fristrom 1975) and the last two by rudimental (Lastowski, pers. comm.). None of these mutations show a black phenotype, nor does suppressor of rudimentary which blocks the first step in uracil catabolism (Stroman et al. 1973). Therefore, if the black lesion does occur in the pathway via uracil, it must affect either of the final enzymes; hydroxypyrimidine hydrase or beta-ureidopropionase.

We have assayed hydroxypyrimidine hydrase EC 3.5.2.2. which catalyzes the conversion of dihydrouracil to beta-ureidopropionate. The spectrophotometric method described by Dudley et al. (1974) was used except that buffer was substituted for ethanol to attain better solubility of the substrate. Protein was determined by the method of Lowry et al. (1951). Canton-S was used as the wild type control and the black strain was back bred to Canton 11 times prior to the assays.

The results given in Fig. 1 fail to show any difference in activity between black and wild type for this enzyme. While beta-ureidopropionase remains to be tested, it appears more likely that black is a lesion in aspartate decarboxylase. Jacobs (1974) found a slight but significant decrease in $^{14}\text{CO}_2$ excretion from black flies injected with labeled aspartate. Since a heterozygous deficiency of the wild allele also produces a black phenotype (Lindsley et al. 1972) suggesting that black homozygotes could have enzyme levels as high as 50% or more than wild type; and the available black alleles are leaky, homozygotes producing as much as 50% of normal levels of beta-alanine (Hodgetts 1972); more definitive results might be obtained with a direct in vitro assay for aspartate decarboxylase using either stronger black alleles or flies that are heterozygous for black and a deficiency of the wild allele. While the pathway through uracil is capable of compensating for black when supplied with exogenous substrates, it appears that the increased amounts of beta-alanine needed during puparium formation and eclosion are normally supplied by aspartate decarboxylase.

This research was supported in part by George Mason University Research Grant to A.F.S. The authors wish to thank Dr. George Andrykovitch, Ms. Martha Corjay, Mr. Thomas Hundley and Ms. Nancy Meinecke for their expert advice and assistance.

References: Dudley, K.H. et al. 1974, *Drug. Metab. Disp.* 2:103; Hodgetts, R. 1972, *J. Insect Physiol.* 18:937; Hodgetts, R. and A. Choi 1974, *Nature* 252:710; Jacobs, M.E. 1974, *J. Insect Physiol.* 20:859; Lindsley, D.L. et al. 1972, *Genetics* 71:157; Lowry, O.H. et al. 1951, *J. Biol. Chem.* 193:265; Rawls, J. and W. Fristrom 1975, *Nature* 233:738; Ross, R. and R. Monroe 1972, *J. Insect Physiol.* 18:1593; Stroman, P. et al. 1973, *Hereditas* 73:239.

Hartmann-Goldstein, I.J. Sheffield University, England. DNA-content of Malpighian tubule nuclei from white-variegated larvae.

In *D. melanogaster* the main segment of larval Malpighian tubules consists of two readily distinguishable cell types (Wessing and Eichelberg 1978): the numerous type I cells are relatively large, yellow in w^+ tubules and in white-variegated strains may be colorless; the small and

flattened type II cells are colorless, generally occur singly, and tend to decrease in number towards the proximal end of the segment. To establish whether there are consistent differences in the degree of polyteny in these cell types, I used a Barr and Stroud GN2 integrating microdensitometer to measure the Feulgen-DNA content of formalin-fixed cells in one anterior tubule from each of four female $T(1;4)w^{m258-21}$ prepupae reared at 14°C . In the squash preparations used, the relative positions of the cells in the tubule were largely preserved. Of 384 nuclei measured (Fig. 1; Table 1) all but 12 fell into 3 discrete DNA classes, with mean values of approximately 9, 36 and 70 arbitrary units. Presumably the class with the smallest mean differed from the other two classes by two and three replication steps respectively. The remaining 12 nuclei (shown on the histogram as unshaded areas, and not included in the tables) were, with only one exception, grouped between the two smaller classes and had a mean value of 19.2; they may represent the "missing" replication step.

Nuclei falling into the lowest DNA class were usually distributed singly and were somewhat more numerous toward the distal end of the tubule. It seems probable, therefore, that they belong to type II cells. Nuclei in the highest class were most numerous in the proximal regions while those in the next lower class predominated near the distal end. In the intermediate regions these two classes were represented in approximately equal numbers, and nuclei