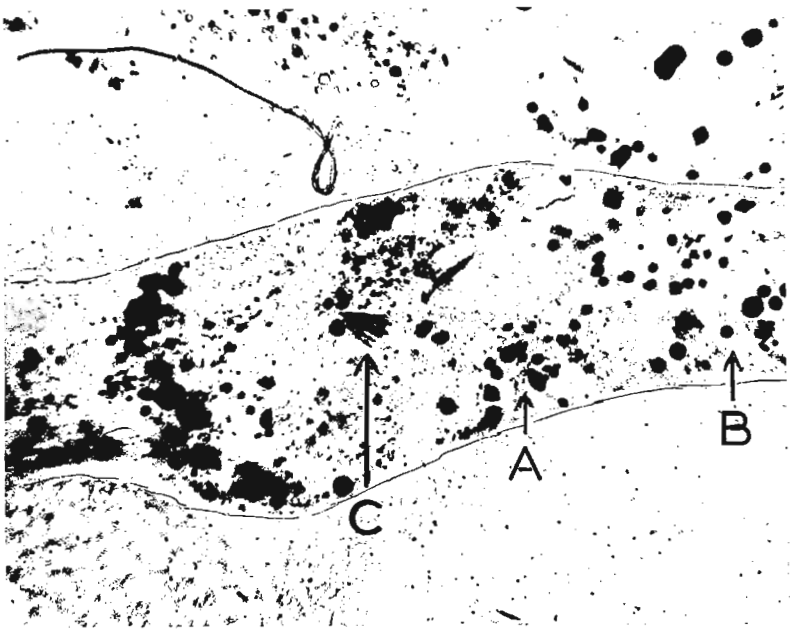
Clancy, C. W., Ann Sullivan, and Wm. H. Vandling. University of Oregon. Ommochrome-like pigment in the Malpighian tubule cells of the eye color mutant, cho.

The Malpighian tubules of the recessive, X-linked, eye color mutant, chocolate (cho) are strikingly colored by a purplish to brown pigment(s) located in the cytoplasm of the tubule cells (See DIS 29:75 for original report and description of cho^1 and cho^2). The accompanying photograph shows the several forms in which the pigment exists in a single cell. The letter (A) designates the irregularly shaped, dark purple granules, (B) the spherules of various size ranging in color from pale yellow to dark brown, and (C) the large, purple, fan-shaped crystals.



Since the original report states that the color of the tubules is "bright yellow like +," it was at first imagined that the trait might be due to some infectious agent contaminating our strains. Genetic tests eliminated this possibility and defined the tubule trait as a pleiotropic effect (additional phene) of the mutation.

A developmental study by one of us (A. S.) determined that about 40% of late first instar larvae of cho^1 are separable from wild type by the bright orange color of their tubules. By the latter part of the second instar, all of the cho larvae have tubules containing the anomalous pigment elements mentioned above, and are easily separated from wild type. The peak development of the pigment seems to occur during the mid-pupal period.

Quantitative fluorometry of the pteridine components of the tubules reveals no significant differences from wild type, but genetic and solubility tests assign the anomalous pigment to the ommochromes. An attempt to induce formation of the pigment in the tubules of the compound, cho^1v, by injecting ommochrome precursors, kynurenine, and hydroxy-kynurenine, into late third instar larvae was unsuccessful, although the bright-orange eye color of the hosts was transformed to cho indicating effectiveness of the solutions in producing (as expected) ommochrome pigment in the eye tissues. Similarly, transplantation of cho v tubules into wild type gave a negative result, as did an experiment in which ovaries were allowed to develop in wild type and the tubules of the recovered cho v offspring studied microscopically.

Systematic comparisons with respect to the pteridine pigments of the eyes by means of paper chromatography and fluorometry (W. H. V.) enable one to distinguish cho^1 from cho^2, the latter having about three times as much of the drosopterin complex as the former. Both mutant alleles have reduced amounts of the drosopterins and of iso-xanthopterin as compared to wild type, and both accumulate excess amounts of the Hb pterins.

In retrospective summary, it appears that the cho mutants mimic the third chromosome recessive, "red" (red Malpighian tubules, 3 - 55.5±) reported by Oster in DIS 28:77, and investigated by Aslaksen and Hadorn in 1957 (Archiv J. Klaus-Stiftung 32:464).

Research supported by PHS Grant GM 09802, and NSF URP program in Summer of 1964.