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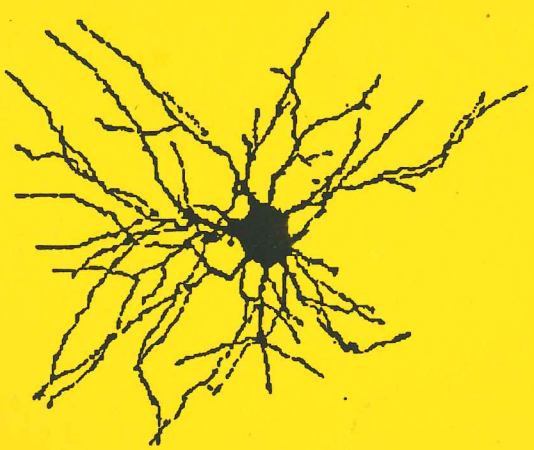

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CHRISTIANSON, J. S., STARK, W. S., SAPP, R., MAIER, L., and STUDER, K.

Immunocytochemistry & Morphometry of Carotenoid Replacement in *Drosophila.*

Division of Biological Sciences, University of Missouri, Columbia, MO 65211.

Carotenoids control expression of invertebrate opsin genes: deprivation blocks opsin synthesis (deCouet & Tanimura, *Eur. J. Cell Biol . 44*, 50-56, 1987) and deployment (Harris *et al., Nature 266*, 648-650, 1977). Rhabdomeric P-face particles (opsin) and spectrophotometrically measured visual pigment are reduced without disrupting microvilli (Harris *et al.*). Rhabdomeres are substantially smaller in flies reared from egg to adult on deprivation medium. Rhabdomeres enlarge and microspectrophotometrically determined visual pigment increases when adults are sustained on carrot juice. We used a monoclonal antibody to the opsin (Rh1) in the R1-6 receptors in the compound eye (deCouet & Tanimura) (also another to the opsin [Rh2] in simple eyes, ocelli, Shieh *et al., Nature 338*, 67-78, 1989) to study the cytoarchitecture of recovery in carotenoid replacement. A secondary antibody conjugated with 10 nm colloidal gold permitted opsin identification and quantification of its increase. R1-6 rhabdomeres, but not rhabdomere caps, stain fairly selectively with Rh1 antibody. Though opsin may be sequestered in structures of turnover - breakdown (autophagy of plasmalemma and rhabdomere, Stark *et al. J. Neurocytol. 17*, 499-509, 1988), two facts argue against this: (1) Rh1 staining is low in multivesicular bodies; and (2) there is substantial turnover in carotenoid deficient animals. Density of Rh1 immunogold, specific to R1-6 (vs. R7), increases between days 1 and 3 of replacement as rhodopsin and rhabdomeres recover. After one day's replacement, as opsin begins to recover in rhabdomeres, gold labeling is high in rough ER. Witnessing this early biosynthetic step suggests that the opsin gene has been activated. **In summary,** rhodopsin, opsin & the opsin-containing organelle recover during carotenoid replacement. **Support:** NSF BNS 88 11062, UM's Graduate Research Council & NIH EY07192.

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