

Research Notes

**Room light decreases rhodopsin in *Drosophila* rhabdomeres.**

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This laboratory's long-lived interest in turnover of rhodopsin in *Drosophila* visual receptors (Stark *et al.*, 1988) has been rejuvenated in recent years with modern techniques and new insights into relevant gene involvements. The accompanying figure (top) shows visualization of photoreceptor organelles (rhabdomeres) using optical neutralization of the cornea, comparing live white-eyed flies maintained in the dark vs. light; a transgene with the normal rhodopsin promoter (*ninaE*) drove green fluorescent protein (GFP) labeled Rh1 into R1-6 rhabdomeres. Lower rhabdomere fluorescence in flies kept in the light suggests that light forces rhodopsin turnover, and a

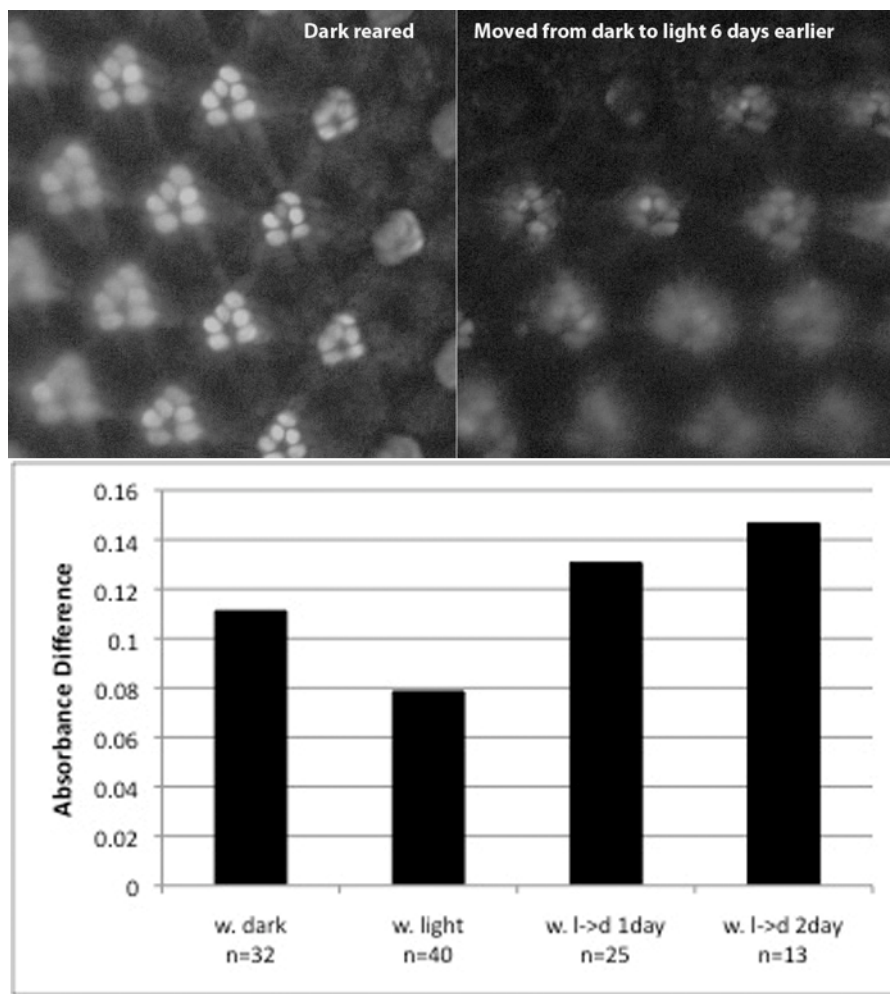


Figure 1.

haze of fluorescence surrounding these rhabdomeres suggests that we are also visualizing rhodopsin-containing endosomes in the cytoplasm.

We quickly realized that this finding was not new to our lab. Decades ago, we had quantified a 2-fold dark-light difference in rhabdomeric Rh1 using microscope photometry of rhodopsin-metarhodopsin conversions in the deep pseudopupil (Zinkl *et al.*, 1990). At that time, we presented this finding but did not emphasize it, since our purpose was to extend the findings of Ostroy and coworkers that *norpA* mutants had a light-induced retinal degeneration (Ostroy, 1978; Meyertholen *et al.*, 1987).

Additionally, a recent study coincidentally offered an explanation of the mechanism of the *norpA*

mutant's retinal degeneration as well as light's involvement in the give-and-take between rhabdomeres and endosomes (Chinchore *et al.*, 2009). Using immunocytochemistry, they found that light exposure moves rhodopsin from rhabdomeres to Rab7-positive endosomes; an overload in endosomes caused by tenacious arrestin binding was offered as the explanation for degeneration in the *norpA* mutant. They also found that 13 hours of darkness allowed rhodopsin to be cleared from endosomes while newly synthesized rhodopsin transport into the rhabdomere continued.

We quantified rhodopsin using photometry of the deep pseudopupil in live white-eyed flies to replicate our earlier finding (Zinkl *et al.*, 1990) and to confirm Chinchore *et al.*'s (2009) finding that a return to dark re-establishes rhodopsin in the rhabdomere. The accompanying figure (bottom) shows a substantial rhodopsin decrease for light-reared flies when compared with dark-reared flies. We further show a higher rhodopsin level in light-reared flies that had been returned to the dark for 1 day and for 2 days.

In summary, we used confocal microscopy and microscope photometry, both based on photoreceptor imaging in living flies, to confirm that room light levels of illumination cause rhodopsin to move from rhabdomeres into endosomes and that a return to darkness re-establishes the full amount of rhodopsin in rhabdomeres.

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References: Chinchore, Y., *et al.*, 2009, PLoS Genet. 5(2): e1000377; Meyertholen, E.P., *et al.*, 1987, J. Comp. Phys. 161: 793-798; Ostroy, S.E., 1978, J. Gen. Physiol. 72: 717-732; Stark, W.S., *et al.*, 1988, J. Neurocytol. 17: 499-509; Zinkl, G., *et al.*, 1990, Vis. Neurosc. 5: 429-439.



Review of reported *Drosophila* species (Diptera: Drosophilidae) in montane habitats in Colombia.

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Introduction

Even with the advances in biology the total number of the world's insect species remains unknown. With only 20% of the insects known globally, it is clear that there is much yet to be learned about insect communities. Furthermore, gaining knowledge about more of the remaining 80% to effectively determine real biodiversity will help entomologists and other biologists better understand insect evolution (Grimaldi and Engel, 2005). One of the most advanced fauna inventories are the insects of the order Diptera, because they are disease vectors and other species used as biological models like *Drosophila*. There are descriptions of sister species that are morphologically identical but divergent at the DNA level. The Drosophilidae family represent the 3% of the species assuming that the order Diptera have 120,000 species approximately.

Of the 3,800 species described in the Drosophilidae family, 1,600 belong to the *Drosophila* genus (Grimaldi and Engel, 2005; Wheeler, 1981; Bachli *et al.*, 2004). As in other taxonomic groups, new discoveries have contributed to the evolutionary reconstruction of the family and the