Stark, W.S. University of Wisconsin, Madison, Wisconsin. Light-elicited wavelength-specific shifts in the ERG visual sensitivity of Drosophila.

Cosens and Briscoe have reported that in white-eyed Drosophila blue light causes a long-term decrease in visual (ERG) sensitivity accompanied by diminished transients and continuous receptor cell depolarization. Normal sensitivity returns following exposure to long-wavelength light.

Cosens and Briscoe performed their experiments using broad-band-pass color filters; a more precise description of the wavelengths responsible for setting the sensitivity up and down can be obtained using interference filters. Stimulation with ultraviolet (375 nm) is nearly as effective as stimulation with blue (475 nm) in lowering the sensitivity from the maximally sensitive state. While 500 nm lowers the sensitivity, 525 nm raises it. Only intense blue or ultraviolet light above a certain threshold intensity will cause the decreased sensitivity. Perhaps a summated stimulation of the whole eye is needed to decrease the sensitivity; this would explain the discovery of the decreased sensitivity phenomenon in white-eyed Drosophila which have no screening pigments.

Since Cosens and Briscoe excluded the possibility of extensive bleaching of a photopigment, it would seem necessary to explain the sensitivity changes in terms of neural interactions between photoreceptors with different peak sensitivities. Burkhardt's single cell spectral sensitivities from the blowfly Calliphora show that most cells have peaks at 350 nm and 490 nm with a small proportion of cells having peaks at 350 nm and either 450 nm or 520 nm. If Drosophila had similar single cell spectral sensitivities, it would seem probable that a 350-490 nm receptor could mediate the decreased sensitivity while a 350-520 nm receptor reinstates normal sensitivity. Ultraviolet would lower sensitivity since there would be many more 350-490 nm receptors than 350-520 nm receptors.

The altered ERG following blue light and the ERG's of the blind mutants tan and ebony are similar. Both have reduced transients. The receptor cell polarization of normal white-eyed flies' eyes is altered following blue light; Hotta and Benzer suggested that the physiological lesion in the nonphototactic mutants may be altered polarization of receptor cells. However, both tan and ebony (made white-eyed with w-1) show shifts in sensitivity similar to those described by Cosens and Briscoe for normal white-eyed flies. Changes in DC level indicate continuous receptor cell depolarization while there is a smaller ERG receptor component in both blind mutants after intense blue light. The spectral parameters of the sensitivity changes are the same for the normal and blind white-eyed flies.

References: Burkhardt, D. 1962, Symp. Soc. Exp. Biol. 16:86-109; Cosens, D. and D. Briscoe 1972, J. Insect Physiol. 18:627-632; Hotta, Y. and S. Benzer 1969, Nature 222:354-356.

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Hunter, A.S. and L. Waterman. University of the Pacific, Stockton, California. Effects of delayed mating.

Although it has been established for D. melanogaster that the time of mating affects the productivity of females, there has been very little work done on other species with regard to such factors. In order to test the generalization that delayed mating decreases the productivity of Drosophila females, a variety of other species are being studied.

The data obtained from 60 D. immigrans females as controls and 60 each of 2 days of virginity, of 4 days etc. are shown in Table 1.

Table 1. Mean total productivity.

Days of virginity	Mean S. D.
0	431 ± 53
2	371 ± 43
4	360 ± 26
6	233 ± 61
8	149 ± 30
10	100 ± 42
12	87 ± 39
14	58 ± 42
16	56 ± 28
18	41 ± 23
20	38 ± 22

It is obvious that a delay in mating of only a few days markedly decreases productivity in this species. At present we are testing D. virilis and D. busckii.