The pupillary response of flies as an optical probe for determining spectral sensitivities of retinular cells in completely intact animals

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limiting value, Nh. The course of sperm attachment between these limits depends in a calculable way on the distribution of velocities and scattering conditions at the nonadsorbing air-suspension interface.

This work was stimulated by the summer Embryology Course, David Epel and Tom D. Humphreys, co-directors. The course was supported by NIH Training Grant HD-07098.

The pupillary response of flies as an optical probe for determining spectral sensitivities of retinular cells in completely intact animals. GARY D. BERNARD AND DOEKELE G. STAVENGA.

The spectral sensitivity of the peripheral retinular cells in six species of intact flies was determined using non-invasive, optical measurements of the pupillary response. This new approach to measuring sensitivity of retinular cells in compound eyes builds upon the work of N. Franceschini (1972, pp. 75–82 in R. Wehner, ed., *Information processing in the visual systems of arthropods*), who demonstrated the feasibility of measuring the action spectrum of pupillary scattering, and upon our previous studies of insect visual pigments and pupillary responses. Our technique is to chronically illuminate a localized region of the eye with a long-wavelength beam, adjusted to bring pupillary scattering above threshold, then, after stabilization, to stimulate with monochromatic flashes. A criterion increase in scattering is achieved by adjusting flash intensity. All spectral sensitivity curves exhibit a major peak at 360 nm or less, a minimum of at least 0.4 log-units at 400 nm, and a somewhat lower peak at 450 nm or greater. The curves fall into three groups based on the wavelength of the secondary peak; a) 490 to 500 nm—for a muscid fly and the dorsal region of a syrphid; b) 475 nm—for a chloropid and an ephydrid; c) 450 nm—for the ventral region of two syrphids and a bombyliid. The syrphid eye is globally non-uniform. The dorsal pole contains receptors which peak at 490 nm, whereas those in the ventral pole peak at 450 nm. We investigated the possibility of local non-uniformity by measuring single cell-types (R1 and R6, R2, R3, R5), but found no significant differences. Many invertebrates are suitable subjects for this method. For example, we find that the bumblebee retina contains receptors peaking at 525 nm which have a sensitivity curve typical of an invertebrate green-receptor.

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The effect of reduced salinity on respiration and heart rate in the Calico crab, Ovalipes ocellatus. GEOFFREY F. BIRCHARD, LAWRENCE DROLET AND LINDA H. MANTEL.

The portunid crab *Ovalipes ocellatus* was found to be a stenohaline osmoconformer. Mature male crabs could be acclimated down to 60% salinity by small steps; mortality reached 100% below this salinity. Crabs were isosmotic to the medium at all salinities.

Oxygen consumption in crabs acclimated to 100% sea water was measured successively at 100, 80, 60, and 100% sea water with 0.5 hr acclimation periods between each salinity. Individuals showed a significant depression in oxygen consumption at reduced salinities. A marked increase in oxygen consumption, to a level greater than the initial control, was observed upon return to 100% sea water after exposure to hyposmotic conditions.

Oxygen consumption was also measured in animals acclimated to 60% sea water for 6–8 days. Oxygen consumption remained depressed in these crabs when measured at 60% sea water. Maximum oxygen consumption occurred in 100% sea water, indicating a lack of metabolic acclimation. Behavioral observations on crabs acclimated to 100 and 60% sea water indicated that part of the reduction in oxygen consumption was due to a decrease in locomotor activity at low salinity.

Heart rate was measured in crabs acclimated to 100% sea water, exposed acutely to 60% sea water, and then returned to full sea water. No significant difference in rate was observed between control values and those measured when crabs were subjected to hyposmotic stress for 1.5–2 hr.

When observed in shallow water in the field, *O. ocellatus* is usually buried in the substrate. When presented with a container of sand in the laboratory, the crab burrows immediately,