

TABLE I. Comparison of light detection by rod photoreceptors, cone photoreceptors, photomultiplier tubes (PMT), and charge-coupled devices (CCD). Quantum efficiency refers to the probability that a photon incident on the surface of the retina or detector will produce a response. Dark noise refers to the equivalent rate of photonlike noise events. The integration time refers to the duration of a square pulse with area equal to that of the detector's single-photon response; in the case of the CCD the integration time refers to the time required to read the CCD and extract the photon count from a given pixel. Specifications for the CCD are from a Kodak KAF1400 chip, operating at 10 °C and read out at 5 MHz. Specifications for the PMT are from a Hamamatsu photon-counting tube (R2371).

	Quantum efficiency	Dark noise	Integration time	Pixel area
Rod	0.25	0.012 sec ⁻¹	300 msec	3–4 μm ²
Cone	0.05	>1000 sec ⁻¹	50 msec	3–4 μm ²
PMT	0.25	5–10 sec ⁻¹	<10 ⁻⁵ msec	>10 ⁸ μm ²
CCD	0.75	1 sec ⁻¹	100 msec	~60 μm ²