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Low aqueous solubility of 11-cis-retinal limits the rate of pigment formation and dark adaptation in salamander rods

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The values for ψ on page 504 should be roughly 1,000-fold higher than reported. The correct calculation is as follows:

$\psi = D\, 2\, \pi\, r\, l\, C_{pm}/d$, where

$D = 5 \times 10^{-6}$ cm^2 s^{-1} = 5×10^{-10} m^2 s^{-1}

$r = 5.7$ μm = 5.7×10^{-6} m

$l = 29.8$ μm = 29.8×10^{-6} m

$d = 50$ nm = 50×10^{-9} m

C_{pm} for 11-cis retinal = 3.5 μM = 3.5×10^{-3} mol m^{-3}

C_{pm} for 11-cis 4-OH retinal = 10 μM = 10×10^{-3} mol m^{-3}

This gives $\psi_{11\text{-cis}} = 3.7 \times 10^{-14}$ mol s^{-1}, and $\psi_{4\text{-OH}} = 1.1 \times 10^{-13}$ mol s^{-1}, which is roughly 1,000-fold greater than originally reported. Thus, the values of ψ are roughly 2,700 times greater than the experimentally measured *K* for 11-*cis* retinal ($K_{11\text{-cis}} = 1.4 \times 10^{-17}$ mol s^{-1}) and 1,600 times greater than *K* for 11-*cis* 4-OH retinal ($K_{4\text{-OH}} = 6.8 \times 10^{-17}$ mol s^{-1}). This indicates that the simple model presented on page 503 for diffusional translocation of 11-*cis* retinal is not sufficient to explain the slowness of the rate of regeneration that the authors observed.

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