Table 1. Comparison between theoretical predictions and measurements of relative thermal-activation rate constants of visual pigments. For theoretical predictions, see text. For experimental measurements, *Bufo* red rods and green rods were at 23°C (this study), *Xenopus* rods [wild type (WT) and transgenics expressing human red cone pigment] were at 21° to 23°C (*11*), and mouse rods (WT and transgenics expressing human red cone pigment) were at 37°C (*14*) and 29°C (this study) and were extrap- olated to 23°C, as described in (*18*) and fig. S4. This extrapolation is not perfect because of margins of error in the measured thermal rates. This issue, together with the approximations in cell dimensions (table S5) and λ_{max} determinations, may explain the order-of-magnitude discrepancy between the rate constants for *Bufo* red rod and mouse rod (both with A_1-rhodopsin) at 23°C. In principle, the two values would be expected to be identical accord- ing to our theory.

Cell/pigment	λ_{max} (nm)	E_a^T (kcal mol^{-1})	$f_{\geq E_a^T}$	Predicted rate-constant ratio	Measured rate constant (s^{-1})	Measured rate-constant ratio
Bufo red rod/ A_1 *Bufo* rhodopsin	500	48.03	3.65×10^{-6}	$\dfrac{1}{4.6}$	4.18×10^{-12}	$\dfrac{1}{8.9}$
Xenopus rod/ A_2 *Xenopus* rhodopsin	521	46.10	1.67×10^{-5}		3.70×10^{-11}	
Transgenic mouse rod/ A_1 human red cone pigment	557	43.12	1.52×10^{-4}	$\dfrac{1}{16}$	4.14×10^{-8}	$\dfrac{1}{16}$
Transgenic *Xenopus* rod/ A_2 human red cone pigment	617	38.93	2.44×10^{-3}		6.70×10^{-7}	
Mouse rod/ A_1 mouse rhodopsin	500	48.03	3.65×10^{-6}	$\dfrac{1}{42}$	6.64×10^{-11}	$\dfrac{1}{623}$
Transgenic mouse rod/ A_1 human red cone pigment	557	43.12	1.52×10^{-4}		4.14×10^{-8}	
Xenopus rod/ A_2 *Xenopus* rhodopsin	521	46.10	1.67×10^{-5}	$\dfrac{1}{146}$	3.70×10^{-11}	$\dfrac{1}{18,000}$
Transgenic *Xenopus* rod/ A_2 human red cone pigment	617	38.93	2.44×10^{-3}		6.70×10^{-7}	
Bufo green rod/ A_1 *Bufo* blue cone pigment	432	55.59	5.17×10^{-9}	$\dfrac{1}{706}$	9.39×10^{-14}	$\dfrac{1}{45}$
Bufo red rod/ A_1 *Bufo* rhodopsin	500	48.03	3.65×10^{-6}		4.18×10^{-12}	