TABLE II

Variables and parameters of the activation model of phototransduction

In the definition of t_{eff}, t_R, t_G and t_P are delays associated with Rh*, G* and PDE* production respectively; t_r is a possible delay associated with radial cGMP equilibration; t_{chan} is a delay in cGMP channel closure. The symbol t_{eff} is defined somewhat differently in Ref. 112, where it is used to refer solely to the first three delay steps. In cases where the electrical recording technique does not voltage-clamp the photoreceptor, an additional delay, t_m is contributed by the membrane time constant.

Symbol	Description	Unit [b]	Typical value or range in rods	
			amphibian	mammalian (approximate)
Variables [a]				
Φ	Number of photoisomerizations produced by a brief flash (at $t = 0$)	–		
f_Φ	Fraction of photopigment isomerized by a brief flash	–		
$Rh^*(t)$	Number of photoactivated rhodopsin molecules per outer segment	–		
$G^*(t)$	Number of activated G-protein molecules per outer segment	–		
$PDE^*(t)$	Number of activated PDE catalytic *subunits* per outer segment	–		
$cG(t)$	Concentration of free cGMP in the outer segment	μM	0.5–4	0.5–4
$F(t)$	cGMP-activated current as fraction of resting (dark) level	–	0–1	0–1
$R(t)$	$1-F(t)$; normalized photoresponse			
Parameters				
ν_{RG}	Rate of production of G* by a single Rh*	s^{-1}	4000	12500
ν_{enc}	2-d diffusion limit to ν_{RG}; Eqn. 2	s^{-1}	7000	17000
c_{GP}	Coupling gain of the activation of PDE* by G*	–	0.8–0.9	0.8–0.9
ν_{RP}	$c_{GP}\nu_{RG}$; Rate of production of PDE* due to a single Rh*	s^{-1}	3500	10000
V_{cyto}	Volume of the outer segment cytoplasm	pl	1.0	0.04
$2k_{cat}$	turnover number of PDE with two fully activated catalytic subunits	s^{-1}	2000	4000
K_m	Michaelis constant of fully activated PDE	μM	150	100
BP	Buffering power of the cytoplasm for cGMP	–	1–2	1–2
β_{sub}	Rate constant of a single catalytic subunit of PDE in a well-stirred volume equal to V_{cyto}; Eqn. 12	s^{-1}	$6\cdot10^{-6}$	$4\cdot10^{-4}$
n	Hill coefficient of opening of the cGMP-activated channel	–	3	3
A	$\nu_{RP}\beta_{sub}n$; Amplification constant; eqns (20) and (21)	s^{-2}	0.08	12.0
t_{eff}	$t_R + t_G + t_P + t_r + t_{chan}$; Effective delay time	ms	15–25	2–5
t'_{eff}	$t_{eff} + t_m$ (unclamped cells) + uncorrected delay in signal processing	ms		

[a] Italicized symbols are used throughout to refer to *variables* or parameters specified by the model; Roman symbols (e.g., Rh*) refer to the individual protein entities.

[b] '–' as a table entry in this column indicates a dimensionless quantity.