TABLE IV

*Experimental measurements of the rate of activation of catalytic subunits of PDE per Rh**

Species	T (°C)	[GTP] (μM)	f_Φ	ν_{RP} (PDE* s^{-1} per Rh*)	Reference
1. Frog	21	130	$< 10^{-5}$	155	[203]
2. Frog, Toad	21	125	$< 10^{-5}$	140	[120]
3. Toad	24	1000	$< 10^{-5}$	135	[11]

Each of these investigations employed pH-electrode measurements of proton production by the PDE-catalysed cyclic GMP hydrolysis reaction, cyclic GMP $\leftrightarrow$ 5′GMP + H^+ ($pK_a = 6.5$), in a suspension of rod disc membranes; the basic methodology is described in Ref. 203. In these experiments flashes isomerizing fractions f_Φ of the rhodopsin, such that $f_\Phi < 10^{-5}$ (in frog and toad disc membrane suspensions) produce cyclic GMP hydrolysis curves whose steady-state rates are a linear function of f_Φ. Specifically, the time course of the rate of proton production is well described by the general form $V = V_p[1 - \exp(-t/\tau)]$, where $\tau = 2$–5 s when only GTP is present, and V_p is the peak hydrolytic velocity for a flash isomerizing a fraction f_Φ of the rhodopsin, and the peak hydrolytic velocity obeys the relation $V_p = V_{max}\,[1 - \exp(-f_\Phi N_D)]$, where f_Φ is the fraction of rhodopsin isomerized, N_D is the 'domain size' (typically 50000 to 90000 rhodopsins), and at room temperature V_{max} is typically 8–12 mol cGMP s^{-1} per mol total Rh in the reaction cuvette. This value of V_{max} (per mol total rhodopsin in the reaction volume) may be converted to $2k_{cat}$, the value per holo-PDE by dividing by the ratio of PDE/rhodopsin approx. 1/150 in amphibia (Table I), to give about 2000 s^{-1} (see Table V). From the two relations above, the rate ν_{RP} of PDE catalytic subunit activation at early times and for dim flashes is found to be $2(1/150)(N_D/\tau)$ *PDE** subunits s^{-1} per Rh*; this formula was used to derive the values in Table IV.