The details of chlorophyll fluorescence transient curve parameter calculation (according to Strasser *et al.* 2000)

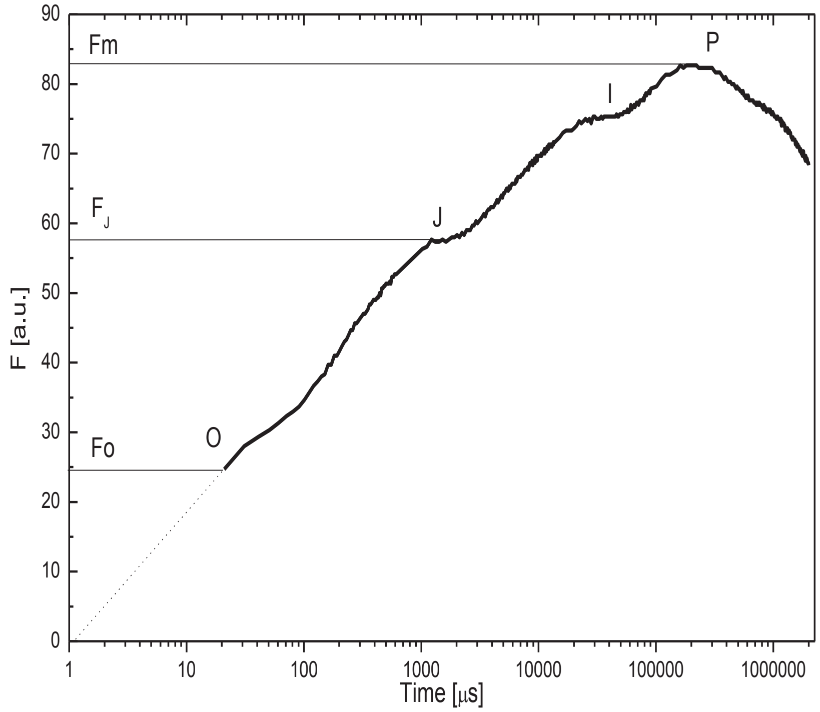

Fig. 1S. A typical curve of chlorophyll fluorescence (CF) transient of *Haematococcus pluvialis* dark-adapted cells (recorded under vegetative growth conditions). CF intensity, F, plotted as a function of time, τ. It is characterized by the presence of the minimal and maximal CF intensity points (O and P respectively) and two inflections, J and I. a.u. – arbitrary units of CF intensity.

- F_0 is the CF at point O.
- F_m is the CF point P.
- t_m is the time at point P.
- F_J is the CF intensity at point J.
- The variable fluorescence:

$$F_V \equiv F_m - F_0.$$

- The relative height of O-J step:

$$V_J \equiv \frac{F_J - F_0}{F_V}.$$

- The first derivate of CF transient curve in the initial point:

$$M_0 = \left(\frac{dF}{d\tau}\right)_{\tau=0\ \mu s} \approx \frac{F(300\ \mu s) - F(50\ \mu s)}{250\ \mu s}.$$

- Normalized area above the curve:

$$S_m = \frac{1}{F_V} \int_{25\ \mu s}^{t_m} \left(F_m - F(\tau)\right) d\tau.$$

- The maximal photochemical photosystem II (PSII) of dark adapted cells:

$$\varphi_{Po} = \frac{F_V}{F_m}.$$

- The quantum yield of energy dissipation of dark-adapted cells:

$$\varphi_{\mathrm{Do}} = 1 - \varphi_{\mathrm{Po}} = \frac{\mathrm{F_0}}{\mathrm{F_m}}.$$

- The probability of electron transport beyond PSII primary quinone acceptor (Q_A):

$$\Psi_0 = 1 - \mathrm{V_J}.$$

- The quantum yield of electron transport:

$$\varphi_{\mathrm{Eo}} = \Psi_0 \times \varphi_{\mathrm{Po}}.$$

- Q_A turnover number at time of CF increasing from $\mathrm{F_0}$ to$\mathrm{F_m}$:

$$N = \frac{\mathrm{M_0 S_m}}{\mathrm{V_J}}.$$