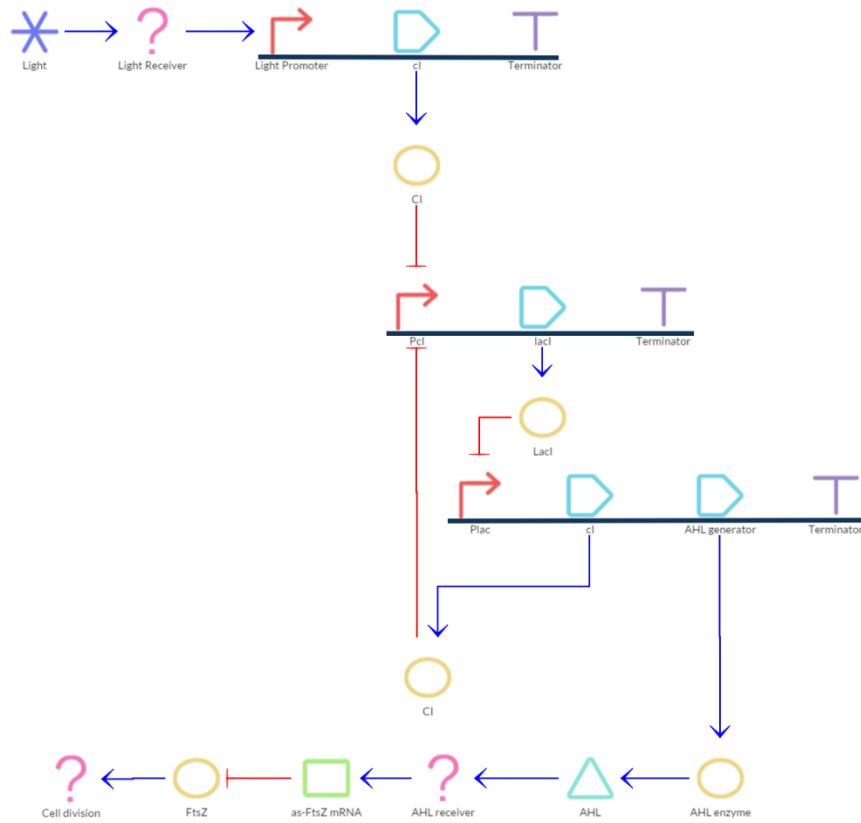


Light induced system



Formulae for two certain parts

CI_1 and cI_2

$$\frac{d[CI_1]}{dt} = \alpha_1 \chi_1 \chi_2 \chi_3 [cI_1] + \alpha_1 \chi_4 [cI_1] - d[CI_1]$$

LacI

$$\frac{d[LacI]}{dt} = \alpha_2 [lacI^F] \chi_4 - d[LacI]$$

$$[lacI^F] = [lacI] \frac{1}{1 + \left(\frac{[CI]}{\beta_{CI}} \right)^{\mu_{CI}}}$$

CI_2:

$$\frac{d[CI_2]}{dt} = \alpha_1 \chi_5 [cI_2^F] - d[CI_2]$$

$$[cI_2^F] = [cI_2] \frac{1}{1 + \left(\frac{[LacI]}{\beta_{LacI}} \right)^{\mu_{LacI}}}$$

Note that $CI=CI_1+CI_2$

AHL enzyme and AHL generator

$$\frac{d[AHLenzyme]}{dt} = \alpha_3 \chi_5 [AHLgenerator] - d[AHLenzyme]$$

AHL and AHL enzyme

$$\frac{d[AHL]}{dt} = \alpha_4 \frac{[AHLenzyme]^n}{h_0^n + [AHLenzyme]^n} - d[AHL]$$

As-Tsz mRNA and AHL generator

$$\frac{d[as-TszmRNA]}{dt} = \alpha_3 \chi_5 [AHLgenerator] - d[as-TszmRNA]$$

Ftsz1 and as-TszmRNA

$$\frac{d[Ftsz_1]}{dt} = \alpha_5 \frac{1}{1 + \left(\frac{[as-TszmRNA]}{\beta_{as-TszmRNA}} \right)^{\mu_{as-TszmRNA}}} - d[Ftsz_1]$$

Eigen Functions

Functions	Symbols	Notifications
χ_{light}	χ_1	$\chi_1 = 1$ when light exists $\chi_1 = 0$ otherwise
$\chi_{lightreceiver}$	χ_2	$\chi_2 = 1$ when light receiver exists $\chi_2 = 0$ otherwise
$\chi_{lightpromoter}$	χ_3	$\chi_3 = 1$ when light promoter exists $\chi_3 = 0$ otherwise
$\chi_{Cipromoter1}$	χ_4	$\chi_4 = 1$ when CI Promoter exists $\chi_4 = 0$ otherwise
$\chi_{LacIpromoter1}$	χ_5	$\chi_5 = 1$ when LacI Promoter exists $\chi_5 = 0$ otherwise
$\chi_{AHLgenerator}$	χ_6	$\chi_6 = 1$ when AHL generator exists

		$\chi_6 = 0$ otherwise
$\chi_{AHLreiver}$	χ_7	$\chi_7 = 1$ when AHL receiver exists $\chi_7 = 0$ otherwise

Parameter Table

Symbols	Parameters	Values and Units
Alpha_1	Translation rate of CI protein	5.59um*min ⁻¹
Alpha_2	Translation rate of LacI protein	9.12um*min ⁻¹
Alpha_3	Translation rate of AHL enzyme	2.28um*min ⁻¹
Alpha_4	Translation rate of AHL	0.60um*min ⁻¹
Alpha_5	Translation rate of Ftsz	3.78um*min ⁻¹
Alpha_6	Translation rate of CheZ protein	2.60um*min ⁻¹
Beta_CI	CI repression coefficient	0.008um
Mju_CI	CI cooperativity coefficient	2
Beta_LacI	LacI repression coefficient	0.8um
Mju_LacI	LacI cooperativity coefficient	2
Beta_as_TtszmRNA	as-TtszmRNA repression coefficient	0.75um
Mju_as_TtszmRNA	as-TtszmRNA cooperativity coefficient	1
Beta_AHL	AHL repression coefficient	0.1um
Mju_AHL	AHL cooperativity coefficient	2
d	Degradation rate	0.034min ⁻¹
h_0	Constant	1.8
n	Hill constant	2

Reference: http://2012.igem.org/Team:SEU_O_China