

# Additional File 1

March 5, 2012

## Species

$y_1 = S. cerevisiae$  cells  
 $y_2 = E. coli$  cells  
 $y_3 = C4HSL$   
 $y_4 = 3oxoC6HSL$   
 $y_5 = preKanR1$   
 $y_6 = KanR1$   
 $y_7 = 3oxoC6HSL : LuxR$   
 $y_8 = C4HSL : RhlR$   
 $y_9 = KanR$

## Stochastic Differential Equations capturing the reaction network dynamics

$$dy_1 = \left( k_1 y_1 \left( 1 - \frac{y_1 + y_2}{c_{max}} \right) - \frac{k_3 \cdot Kan \cdot y_1}{1 + \alpha \cdot y_6} \right) dt + \sqrt{k_1 y_1} dw_1 - \sqrt{k_1 y_1 \frac{y_1 + y_2}{c_{max}}} dw_2 - \sqrt{\frac{k_3 \cdot Kan \cdot y_1}{1 + \alpha \cdot y_6}} dw_3$$

$$dy_2 = \left( k_2 y_2 \left( 1 - \frac{y_1 + y_2}{c_{max}} \right) - \frac{k_3 \cdot Kan \cdot y_2}{1 + \alpha \cdot y_9} \right) dt + \sqrt{k_2 y_2} dw_4 - \sqrt{k_2 y_2 \frac{y_1 + y_2}{c_{max}}} dw_5 - \sqrt{\frac{k_3 \cdot Kan \cdot y_2}{1 + \alpha \cdot y_9}} dw_6$$

$$dy_3 = \left( k_4 y_1 - \frac{k_9 \cdot RhlR^2 \cdot y_3^2}{Na \cdot V_2} - k_{11} y_3 \right) dt + \sqrt{k_4 y_1} dw_7 - \sqrt{\frac{k_9 \cdot RhlR^2 \cdot y_3^2}{Na \cdot V_2}} dw_8 - \sqrt{k_{11} y_3} dw_9$$

$$dy_4 = \left( k_5 y_2 - \frac{k_6 \cdot LuxR^2 \cdot y_4^2}{Na \cdot V_1} - k_{12} y_4 \right) dt + \sqrt{k_5 y_2} dw_{10} - \sqrt{\frac{k_6 \cdot LuxR^2 \cdot y_4^2}{Na \cdot V_1}} dw_{11} - \sqrt{k_{12} y_4} dw_{12}$$

$$dy_5 = \left( \frac{k_7 y_7^{n_1}}{k_{7b}^{n_1} + y_7^{n_1}} - k_8 y_5 \right) dt + \sqrt{\frac{k_7 y_7^{n_1}}{k_{7b}^{n_1} + y_7^{n_1}}} dw_{13} - \sqrt{k_8 y_5} dw_{14}$$

$$dy_6 = \left( k_8 y_5 - k_{15} y_6 \right) dt + \sqrt{k_8 y_5} dw_{14} - \sqrt{k_{15} y_6} dw_{15}$$

$$dy_7 = \left( \frac{k_6 \cdot LuxR^2 \cdot y_4^2}{Na \cdot V_1} - k_{14} y_7 \right) dt + \sqrt{\frac{k_6 \cdot LuxR^2 \cdot y_4^2}{Na \cdot V_1}} dw_{11} - \sqrt{k_{14} y_7} dw_{16}$$

$$dy_8 = \left( \frac{k_9 \cdot RhlR^2 \cdot y_3^2}{Na \cdot V_2} - k_{13}y_8 \right) dt + \sqrt{\frac{k_9 \cdot RhlR^2 \cdot y_3^2}{Na \cdot V_2}} dw_8 - \sqrt{k_{13}y_8} dw_{17}$$

$$dy_9 = \left( \frac{k_{10}y_8^{n_2}}{k_{10b}^{n_2} + y_8^{n_2}} - k_{16}y_9 \right) dt + \sqrt{\frac{k_{10}y_8^{n_2}}{k_{10b}^{n_2} + y_8^{n_2}}} dw_{18} - \sqrt{k_{16}y_9} dw_{19}$$

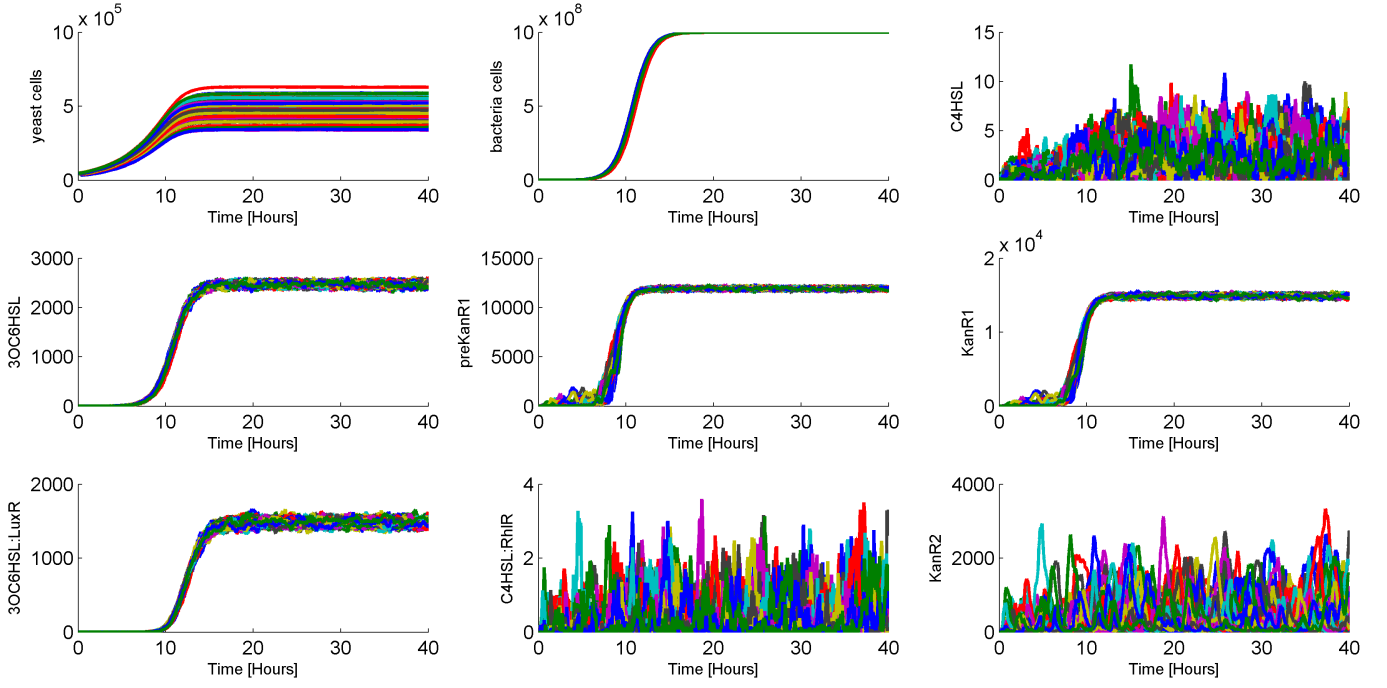


Figure 1: 100 trajectories of the evolution of all the species when yeast and bacteria coexist (In support of Figure 2).