

$$\begin{array}{l}
 \text{D (densité cytosol)} \\
 \text{M (densité membrane)} \\
 \text{ATP maintenance} \\
 \text{Coût flagelles}
 \end{array}
 \begin{array}{c}
 \begin{array}{c} \text{nu} \quad \text{E} \quad \text{R} \quad \text{C} \end{array} \\
 \left[\begin{array}{c} \left[\begin{array}{c} I \\ -I \end{array} \right] \left[\begin{array}{c} -\text{diag} (a_{ke}) \\ -\text{diag} (a_{ke}) \end{array} \right] \\ \text{CD_E} \quad \text{CD_R} \quad \text{CD_C} \\ \text{CD_E} \\ \text{nu_ATP}=-1 \\ \text{nu_H}+=-1 \end{array} \right] + \mu
 \end{array}
 \begin{array}{c}
 \begin{array}{c} \text{nu} \quad \text{E} \quad \text{R} \quad \text{C} \end{array} \\
 \left[\begin{array}{c} \left[\begin{array}{c} -\text{diag} (b_{ke}) \\ -\text{diag} (b_{ke}) \end{array} \right] \\ \text{CM_E} \quad \text{CM_R} \quad \text{CM_C} \\ \text{CR_E} \quad \text{CR_R} \quad \text{CR_C} \\ \text{CC_E} \quad \text{CC_R} \quad \text{CC_C} \end{array} \right]
 \end{array}
 = \mathbf{A} \leq \mathbf{b} =
 \begin{array}{c}
 \begin{array}{c} \text{target} \quad \text{PG} \quad \text{Xc} \end{array} \\
 \left[\begin{array}{c} \text{Dc} \quad -\mathbf{CD_G.PGc} \\ \text{Dm} \quad -\mathbf{CD_G.PGm} \\ -\mathbf{ATP_cost} \\ -\mathbf{H_cost} \end{array} \right]
 \end{array}$$

$$\begin{array}{l}
 \text{Metabolites} \\
 \text{Ribosomes} \\
 \text{Chaperones}
 \end{array}
 \begin{array}{c}
 \begin{array}{c} \text{S} \quad \text{R} \quad \text{C} \end{array} \\
 \left[\begin{array}{c} \text{S} \\ -kT \end{array} \right] + \mu
 \end{array}
 \begin{array}{c}
 \begin{array}{c} \text{CM_E} \quad \text{CM_R} \quad \text{CM_C} \\ \text{CR_E} \quad \text{CR_R} \quad \text{CR_C} \\ \text{CC_E} \quad \text{CC_R} \quad \text{CC_C} \end{array}
 \end{array}$$

$$= \mathbf{Aeq} = \mathbf{beq} =
 \begin{array}{c}
 \begin{array}{c} \text{metab} \quad \text{PG} \quad \text{Xc} \quad \text{mRNA} \end{array} \\
 \left[\begin{array}{c} -a_{metab} \\ -a_{mrna} \end{array} \right] + \mu
 \end{array}
 \begin{array}{c}
 \begin{array}{c} \text{metab} \quad \text{PG} \quad \text{Xc} \quad \text{mRNA} \end{array} \\
 \left[\begin{array}{c} -b_{metab} \quad -\mathbf{CM_G} \quad -\text{Xc} \quad -b_{mrna} \\ -\mathbf{CR_G} \\ -\mathbf{Pch.CR_G} \end{array} \right]
 \end{array}$$