

Consistent notation (updated note for L10) • mRNA dynamics: $\frac{d}{dt}[m_i] = \alpha_{m,i} - \beta_{m,i}[m_i]$ • transcriptional regulation: $\alpha_{m,i} = \alpha_{m,0} \cdot \mathcal{P}_i([RNAP]; [TF_1], [TF_2], ...)$ "regulatory function": $\mathcal{R}([TF_1], [TF_2], ...) \equiv \frac{\mathcal{P}_i([RNAP]; [TF_1], [TF_2], ...)}{\mathcal{P}_i([RNAP]; 0,0, ...)}$ $\mathcal{P}_i([RNAP]; 0,0, ...) \approx \frac{[RNAP]_{av}}{K_{P,i}} \Rightarrow \mathcal{P}_i \approx \frac{[RNAP]_{av}}{K_{P,i}} \cdot \mathcal{R}(...)$ $\Rightarrow \alpha_{m,i} = \alpha_{m,0} \frac{[RNAP]_{av}}{K_{P,i}} \cdot \mathcal{R}_i(...)$ • mRNA level: $[m]^* = \frac{\alpha_{m,i}}{\beta_{m,i}} = \frac{\alpha_{m,0}}{\beta_{m,i}} \frac{[RNAP]_{av}}{K_{P,i}} \cdot \mathcal{R}_i([TF_1], [TF_2], ...)$ • protein dynamics: $\frac{d}{dt}[P_i] = \alpha_{p,i}[m_i^*] - (\beta_{p,i} + \lambda) \cdot [P_i]$ $= \alpha_{p,i}m_{0,i} \cdot \mathcal{R}_i(...) - (\beta_{p,i} + \lambda) \cdot [P_i]$ $= \alpha_{p,i}m_{0,i} \cdot \mathcal{R}_i(...) - (\beta_{p,i} + \lambda) \cdot [P_i]$

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Schaechter, M., Maaløe, O.	& Kjeldgaard, N. O. (1958). J.	gen. Mic	robiol. 19,				
Dependency on Medium and Temperature of Cell Size and Chemical Composition during <u>Balanced Growth</u> of Salmonella typhimurium							
				Medium	Concentration	No. of expt.	doublings/
				Brain + heart infusion	Full strength	1	2.80
Nutrient broth	Meat extract + 1% pentone	â	2.75				
Yeast extract+glucose	Full strength $+0.2\%$ glucose	2	2.73				
Placenta broth	Full strength	ĩ	2.70				
Nutrient broth	Dil. 1:2 with medium no. 14	3	2.60				
Nutrient broth	Dil. 1:5 with medium no. 14	9	2.40				
Casamino acids(a)	1.5 % (Difco) + 0.01 % trypto- phan in medium no. 14	2	2.00				
199 Tissue-culture medium	See ^(b)	1	1.88				
20 amino acids	As in medium No. 8+salt solution ^(c)	1	1.83				
Amino acids pool 2 ^(d)	As in medium No. 8 + salt solution ^(c)	2	1.46				
Amino acids pool 3(e)	As in medium No. 8+salt solution ⁽⁰⁾	2	1.38				
Amino acids pool 4 ^(f)	As in medium No. 8+salt solution ^(c)	1	1.25				
Amino acids pool 1 ^(g)	As in medium No. 8+salt solution ^(c)	1	1.22				
Glucose salt (medium K)	0.2 % + Salt solution(6)	9	1.20				
Succinate salt	0.2 % + Salt solution(c)	2	0.94				
Lactate salt	0.2 % + Salt solution(c)	2	0.90				
Dulcitol salt	0.05 % + Salt solution(a)	1	0.88				
Aspartate salt	0.012 % + Salt solution()	1	0.89				

























