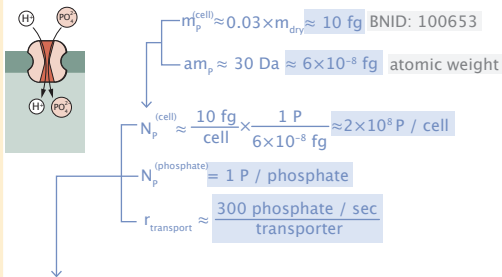
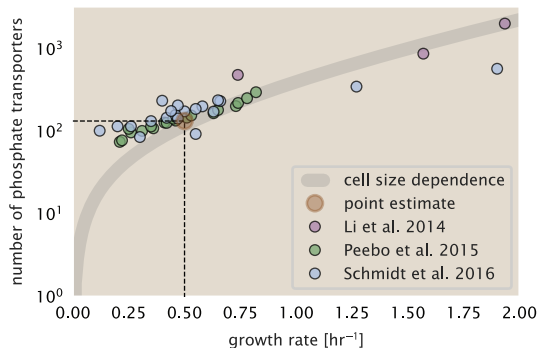


(A)

phosphorus transport

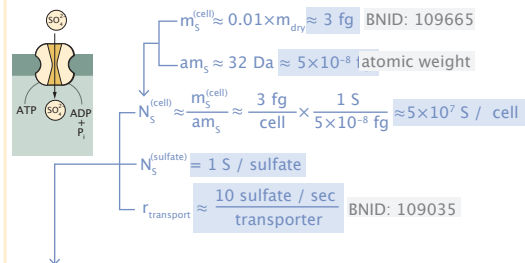


$$N_{\text{transporters}} \approx \frac{N_P^{(\text{cell})}}{N_P^{(\text{phosphate})} \times r_{\text{transport}} \times t_{\text{division}}} \approx \frac{2 \times 10^8 \frac{\text{P}}{\text{cell}}}{1 \frac{\text{P}}{\text{phosphate}} \times 300 \frac{\text{phosphate}}{\text{sec} \times \text{transporter}} \times 5000 \frac{\text{sec}}{\text{cell}}} \approx 150 \text{ transporters}$$



(B)

sulfur transport



$$N_{\text{transporters}} \approx \frac{N_S^{(\text{cell})}}{N_S^{(\text{sulfate})} \times r_{\text{transport}} \times t_{\text{division}}} \approx \frac{5 \times 10^7 \frac{\text{S}}{\text{cell}}}{1 \frac{\text{S}}{\text{sulfate}} \times 10 \frac{\text{sulfate}}{\text{sec} \times \text{transporter}} \times 5000 \frac{\text{sec}}{\text{cell}}} \approx 1000 \text{ transporters}$$

