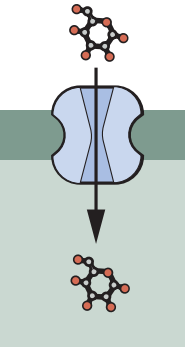
carbon transport



$m_C^{(cell)} \approx \frac{m_{dry}}{2} \approx 0.15\ pg$ BNID: 100649 — cellular carbon mass

$am_C \approx 12\ Da \approx 2\times10^{-11}\ pg\ /\ C$ — atomic mass

$N_C^{(cell)} \approx \frac{m_C^{(cell)}}{am_C} \approx \frac{0.15\ pg}{cell} \times \frac{1\ C}{2\times10^{-11}\ pg} \approx 1\times10^{10}\ C\ /\ cell$ — carbon atoms per cell

$N_C^{(sugar)} \approx 5\ C\ /\ sugar$ — carbon atoms per sugar

$r_{transport} \approx \frac{200\ sugars\ /\ sec}{transporter}$ BNID: 103693 — sugar transport rate

$$N_{transporters} \approx \frac{N_C^{(cell)}}{N_C^{(sugar)} \times r_{transport} \times t_{division}} \approx \frac{10^{10}\ \frac{C}{cell}}{5\ \frac{C}{sugar} \times 200\ \frac{sugars}{sec \times transporter} \times 5000\ \frac{sec}{cell}}$$

$$\approx 2000\ transporters$$

number of carbon transporter complexes