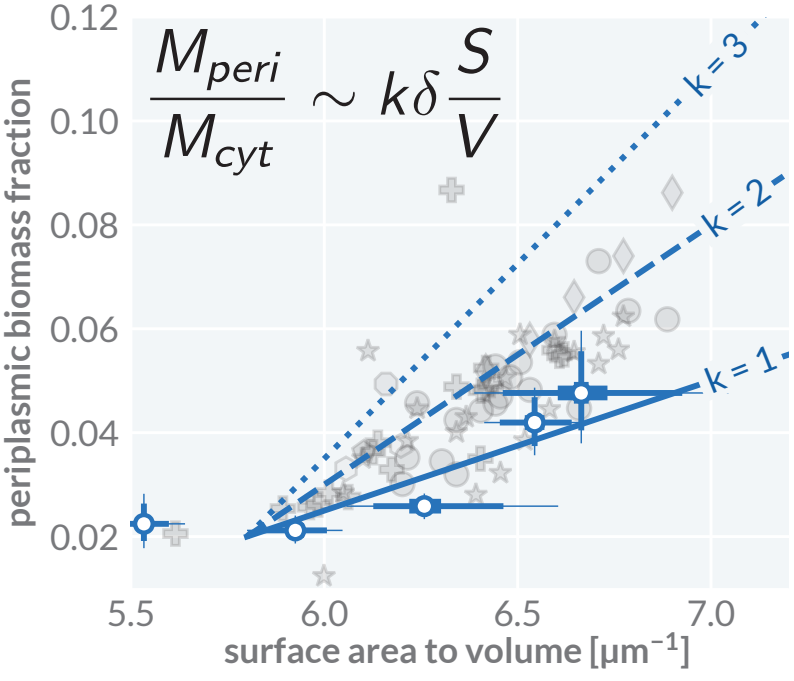
(A)

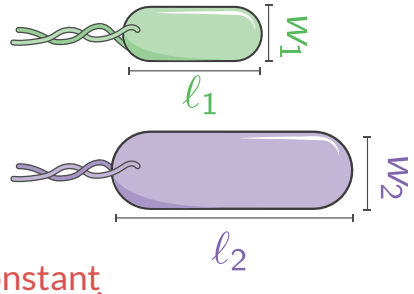
biomass density ratio / periplasmic biomass fraction

$$k \propto \frac{\rho_{peri}}{\rho_{cyt}} = \frac{M_{peri}/M_{cyt}}{\delta \frac{S}{V}}$$

$\frac{S}{V}$: surface area to volume



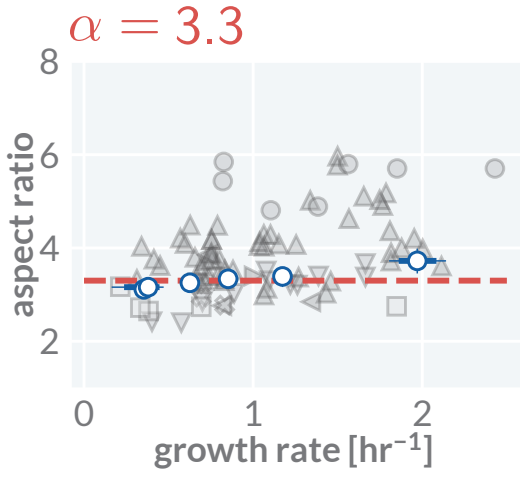
(B)



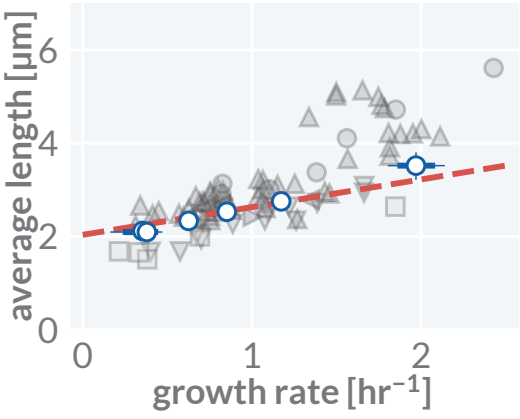
constant aspect ratio

$$\alpha = \frac{\ell_1}{w_1} = \frac{\ell_2}{w_2}$$

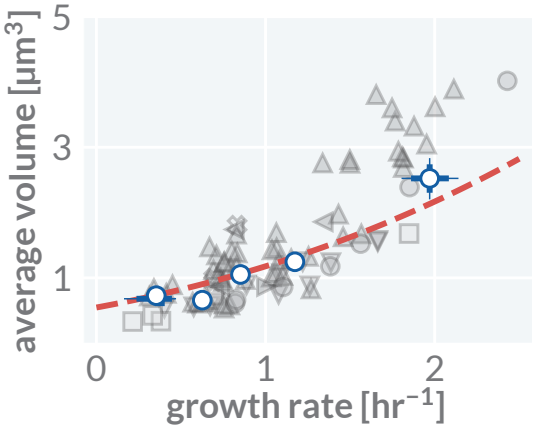
(C)



(D)



(E)



(F)

crowder model for cell width control

$$\phi_M \sim \frac{12\alpha\delta k}{3\alpha - 1}\frac{1}{w}$$

relative density coefficient

(G)