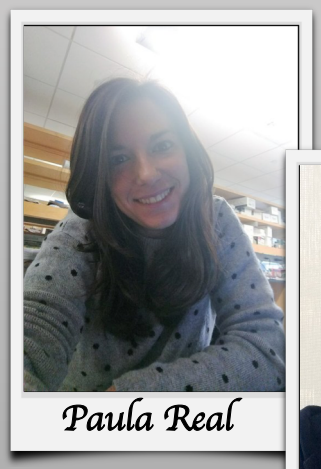
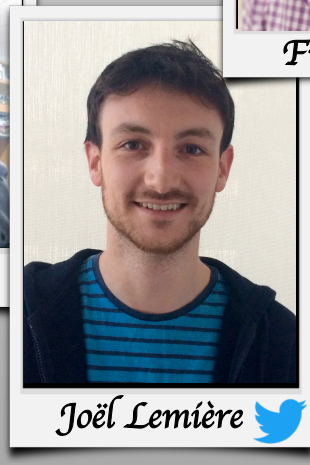
The role of colloid osmotic pressure in nuclear size control

UCSF

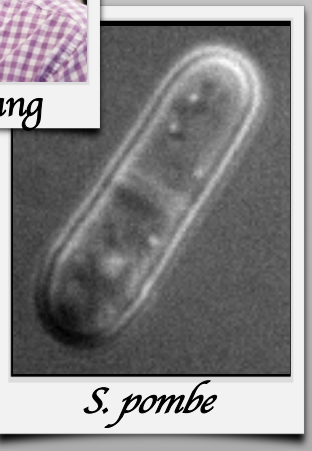


Paula Real

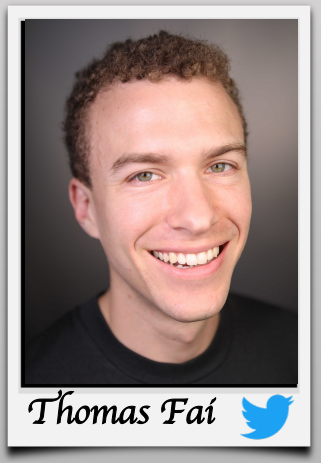
Fred Chang



Joël Lemière

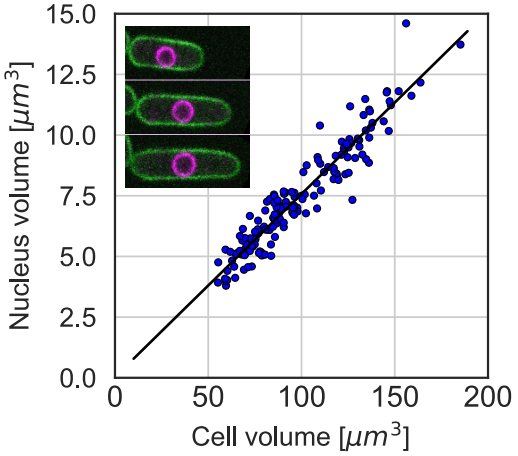


S. pombe

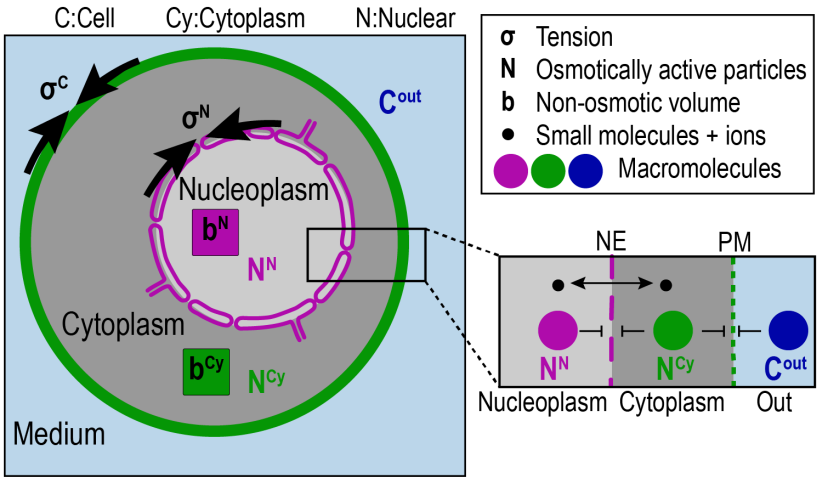


Thomas Faí

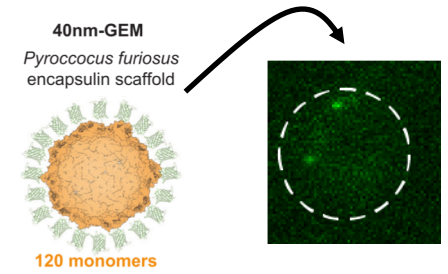
Brandeis



N/C ratio is constant in many organisms

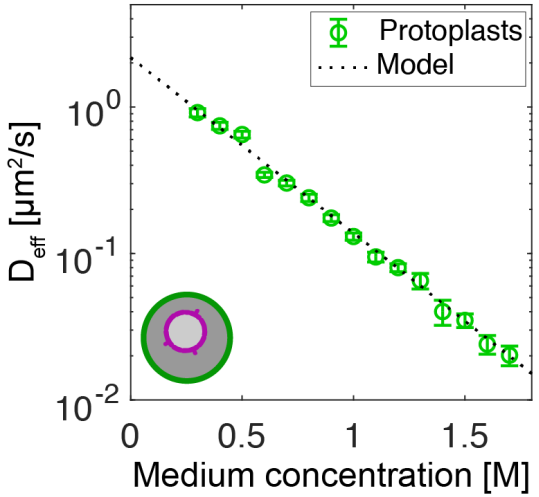


Developed an osmotic model for the cell and nucleus



[Delarue et al., 2018]

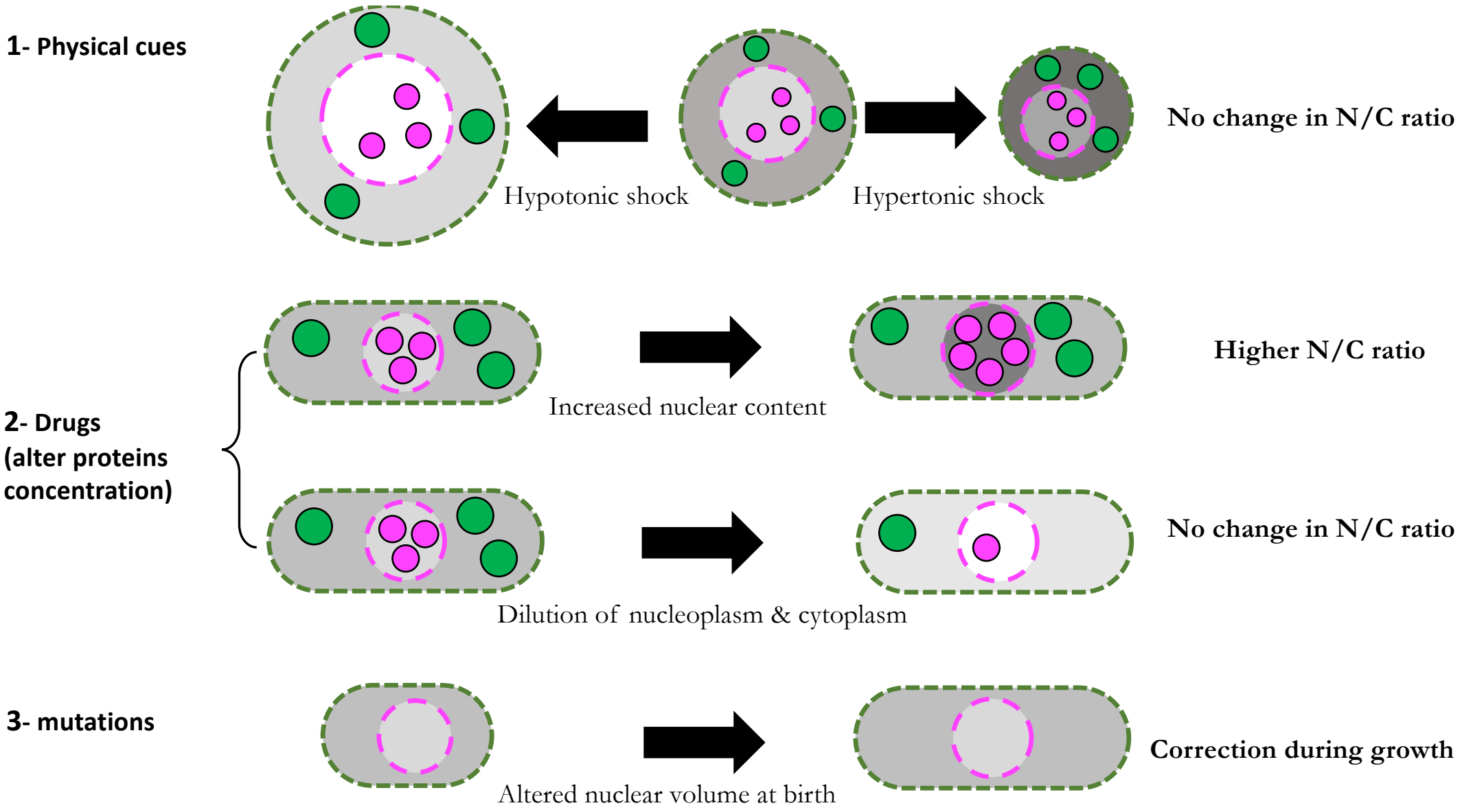
Phillies' model → $D_{eff} = D_0 \cdot e^{-\beta C^{\lambda}}$



GEMs diffusion follows a model of passive diffusion in polymer solution

- What are the osmotic properties of the nucleus?
- Is there a nuclear membrane tension?

- Can an osmotic based model explain how the N/C ratio is SET and MAINTAINED?


1- Physical cues
Hypotonic shock
Hypertonic shock
No change in N/C ratio
2- Drugs
(alter proteins
concentration)
Increased nuclear content
Higher N/C ratio
Dilution of nucleoplasm & cytoplasm
No change in N/C ratio
3- mutations
Altered nuclear volume at birth
Correction during growth