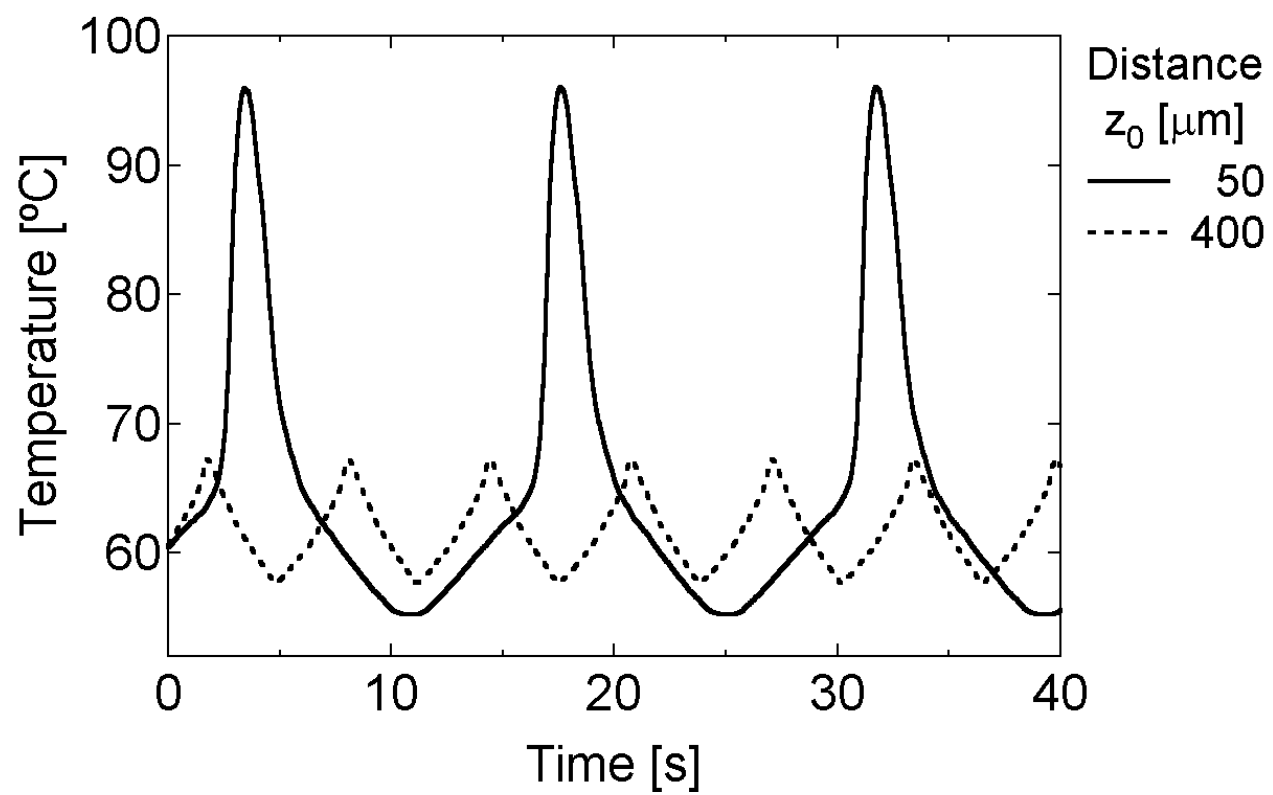
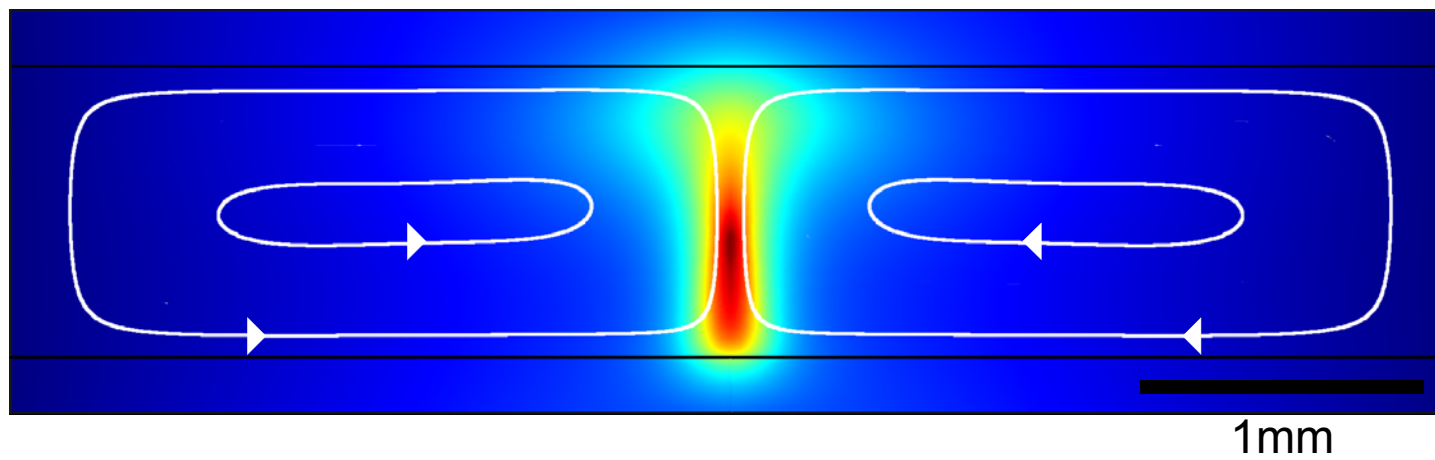


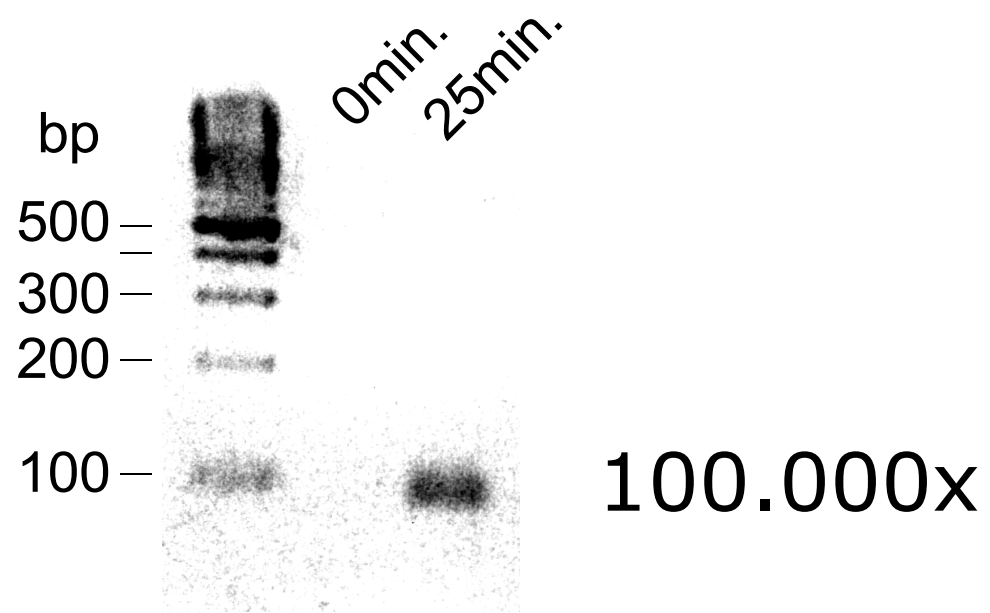
Convective PCR and Thermophoretic Trapping: Physical Approaches to the Origin of Life.

Dieter Braun

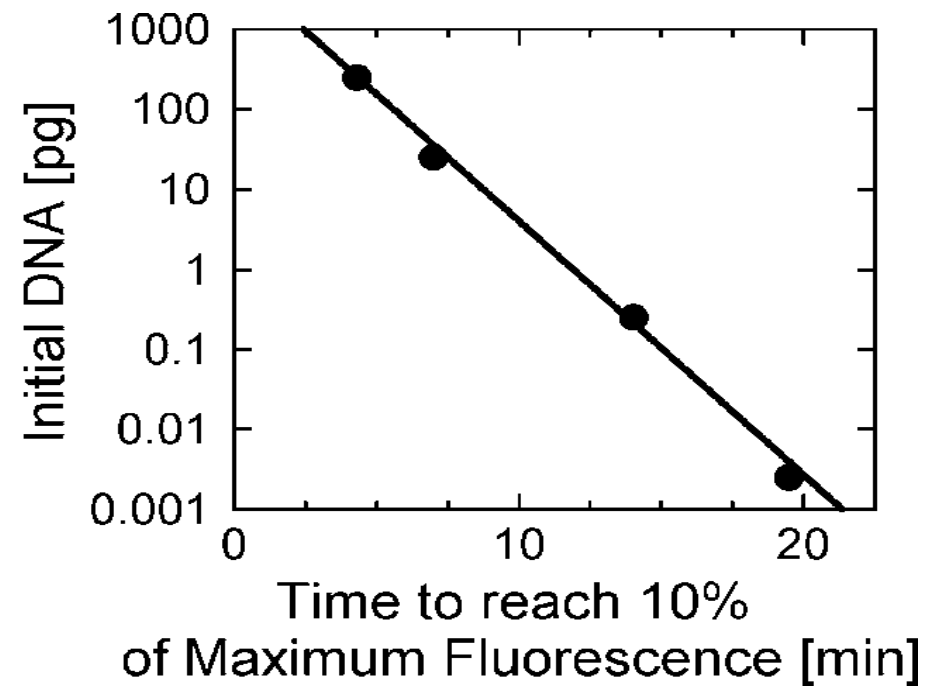
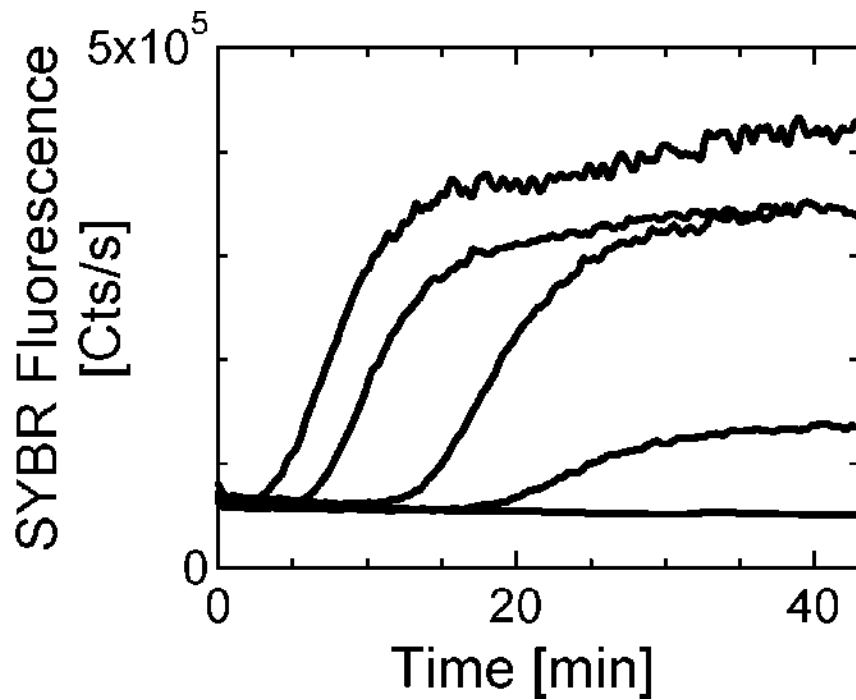
Laminar Flow Movie



PCR Amplification Movie

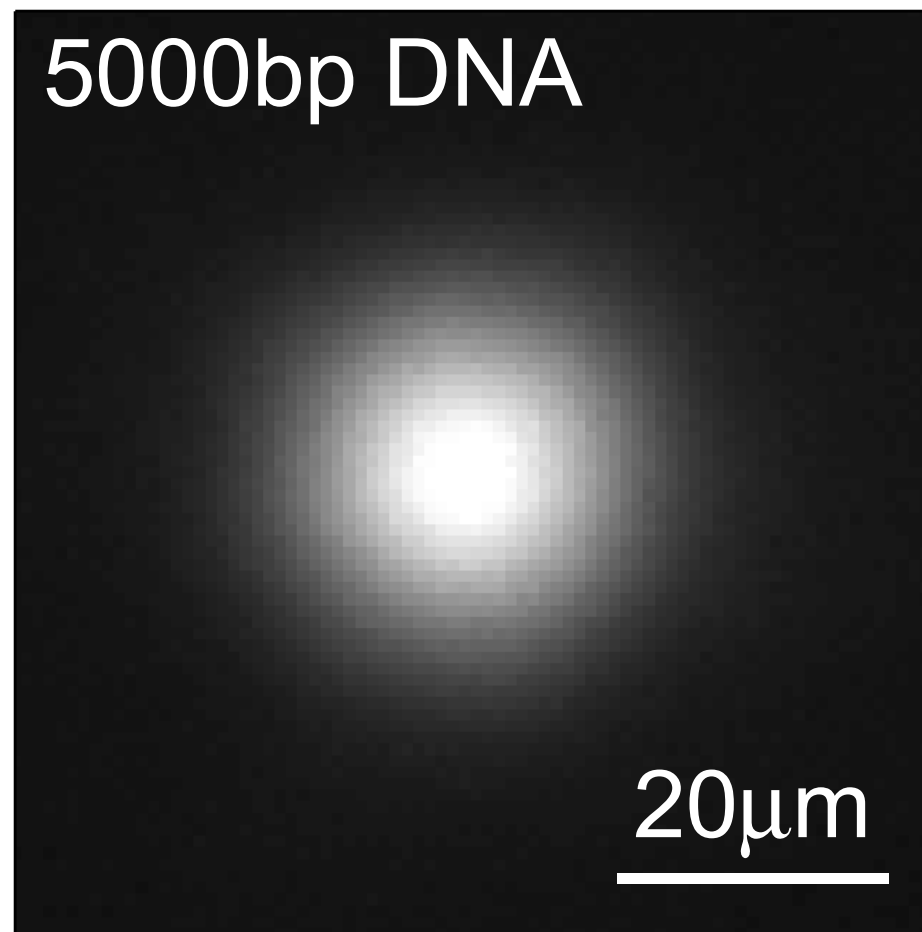


Convective Quantitative PCR



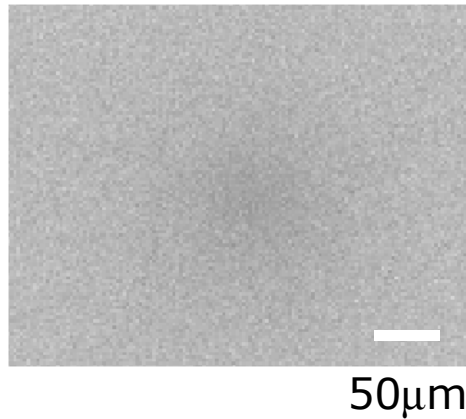
Thermophoretic Trapping of DNA

Braun & Libchaber, PRL 89:188103 (2002)

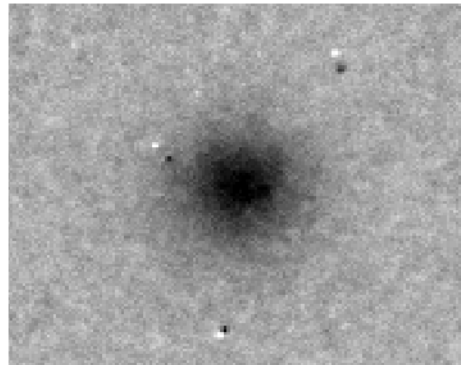


Thermophoresis

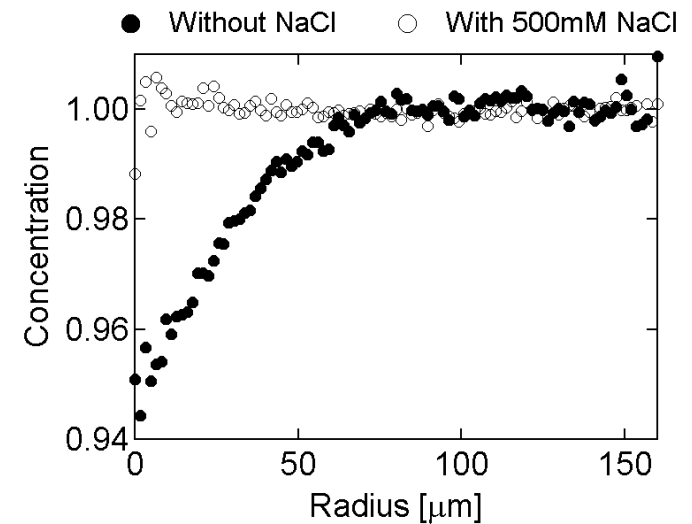
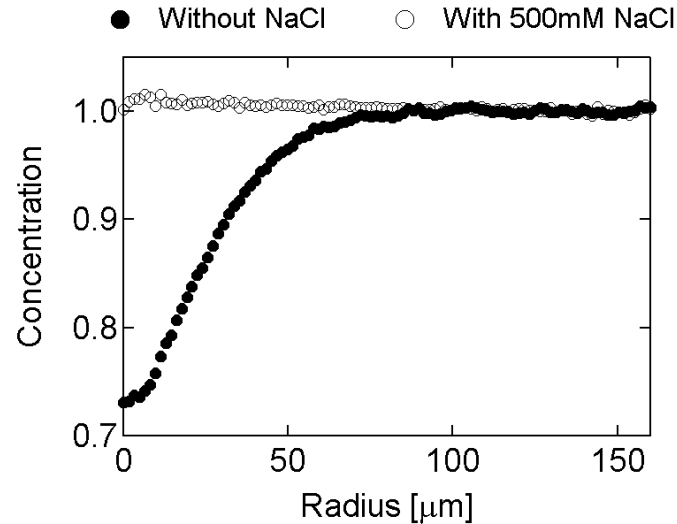
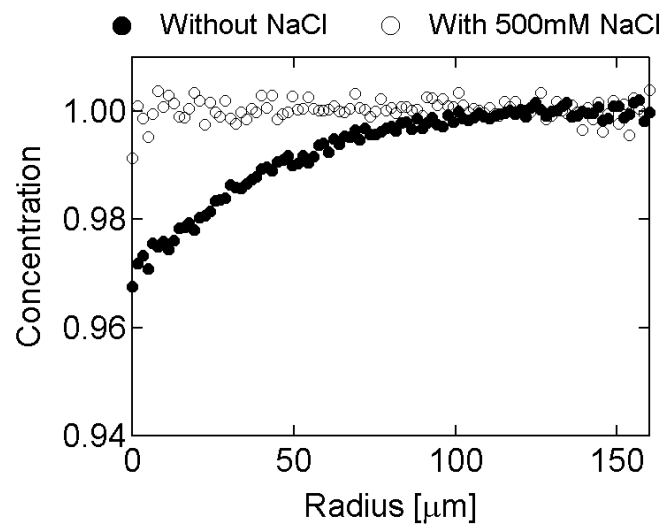
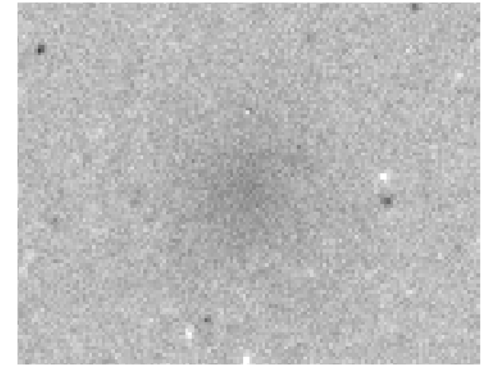
27bp DNA



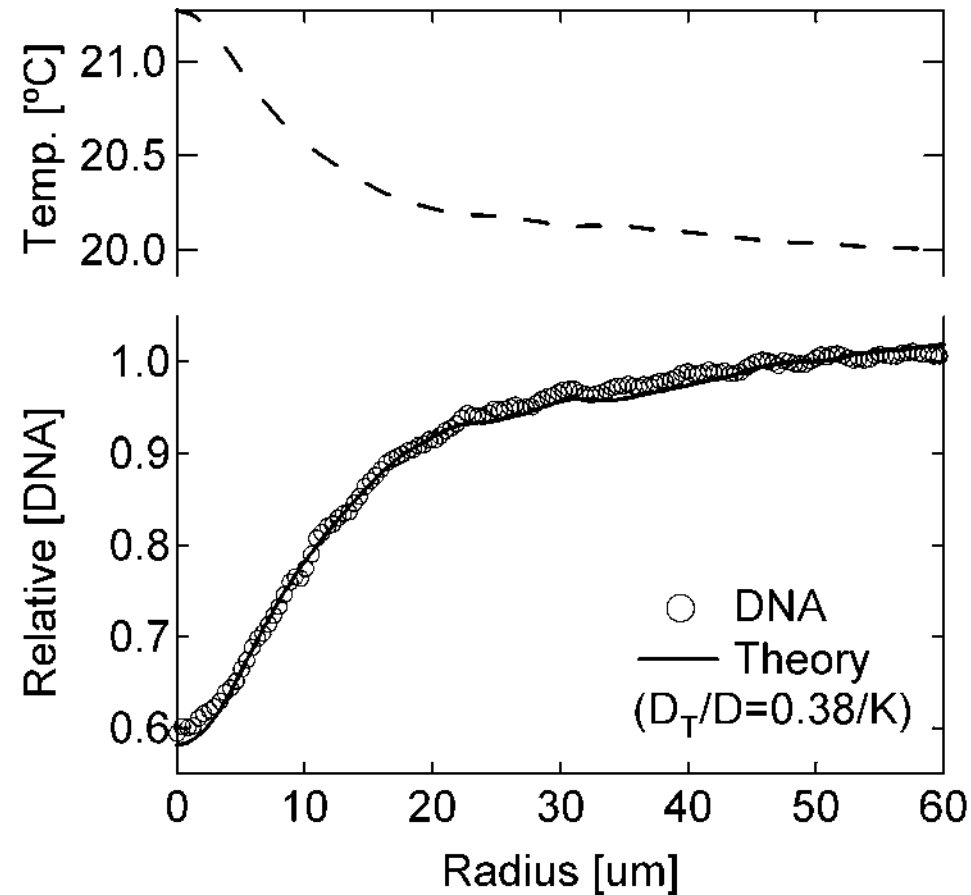
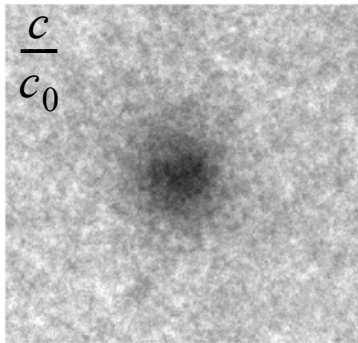
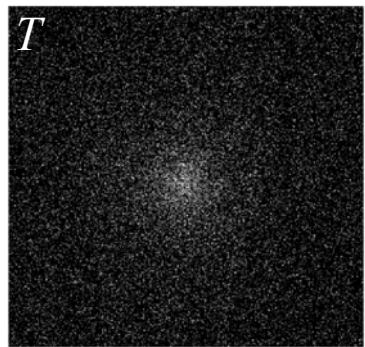
5000bp DNA



40nm Beads



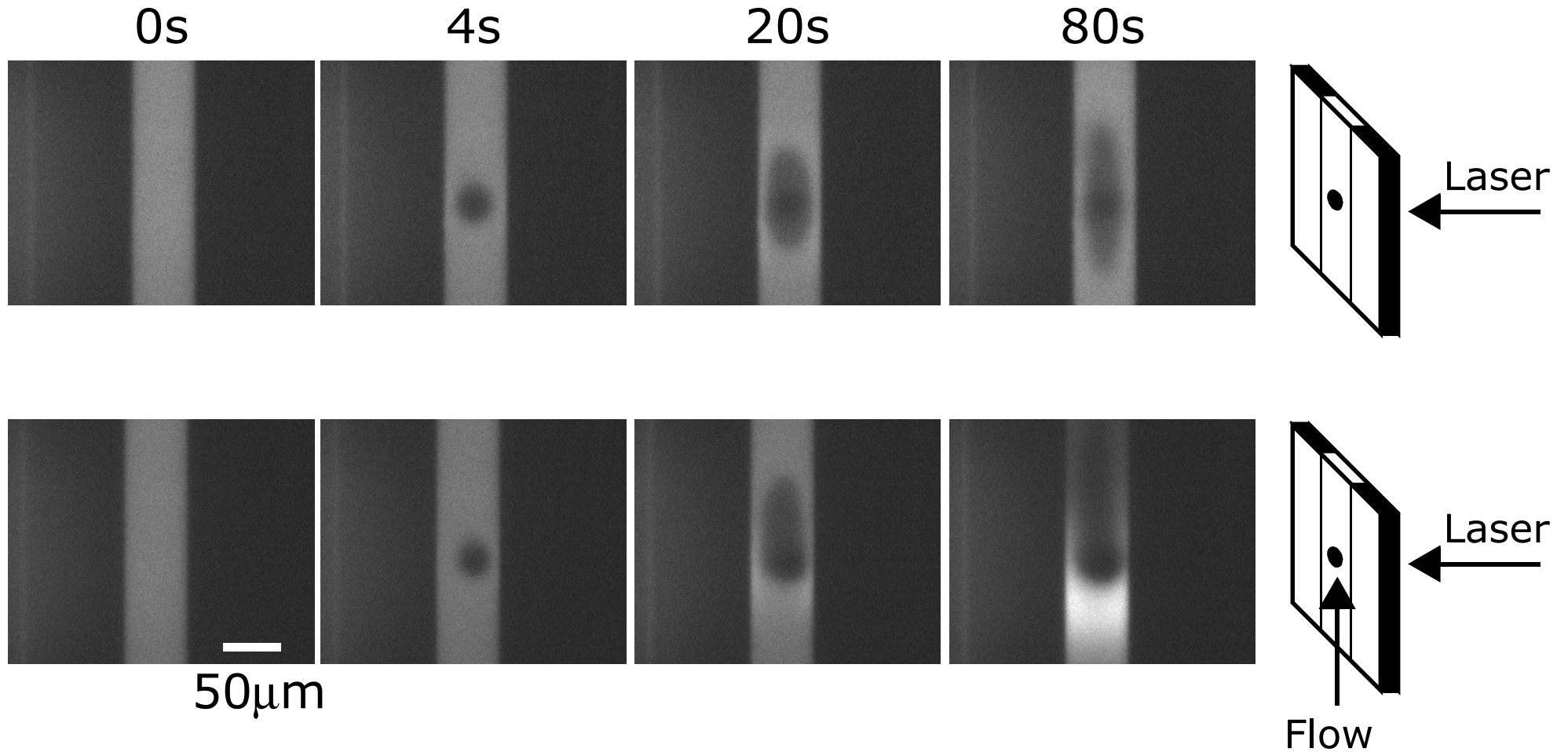
Quantifying Thermophoresis of DNA



With D from backdiffusion:

$$D_T = 0.4 \times 10^{-8} \text{ cm}^2/(\text{sK})$$

Flow turns depletion into accumulation



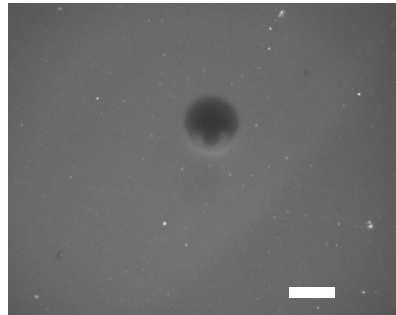
Thermophoretic Trapping by Convection

4s

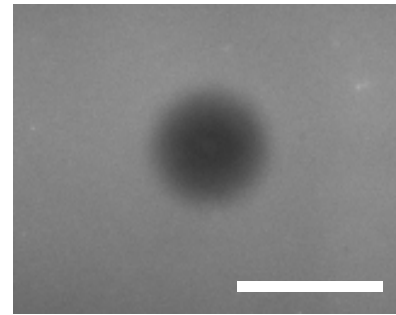
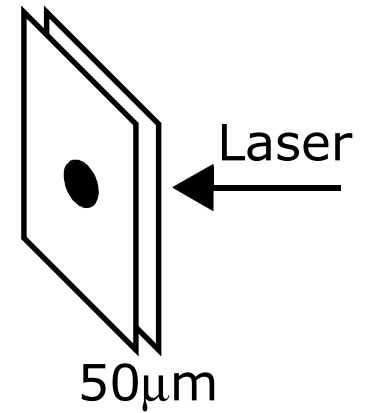
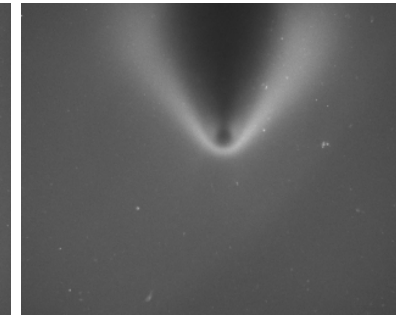
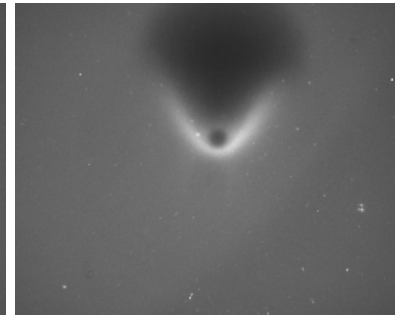
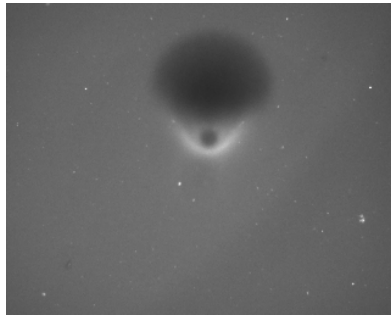
10s

20s

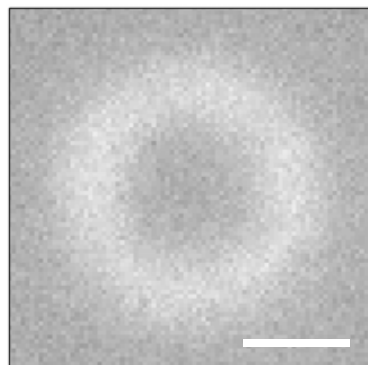
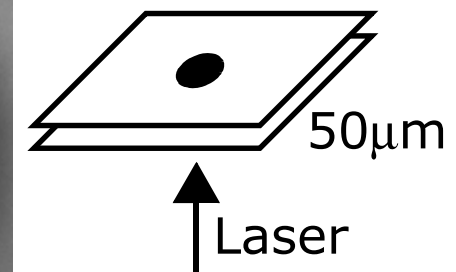
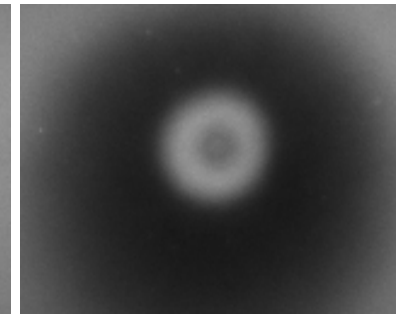
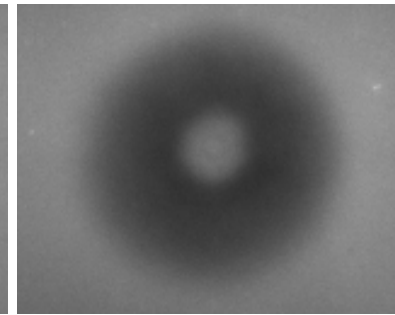
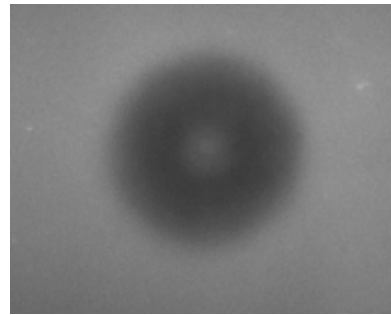
80s



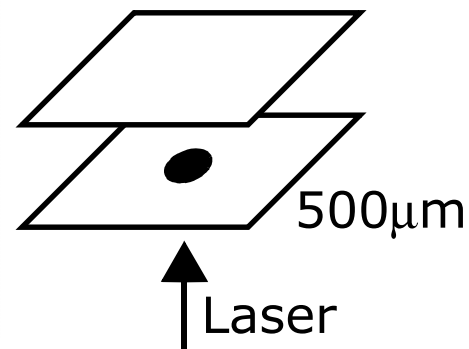
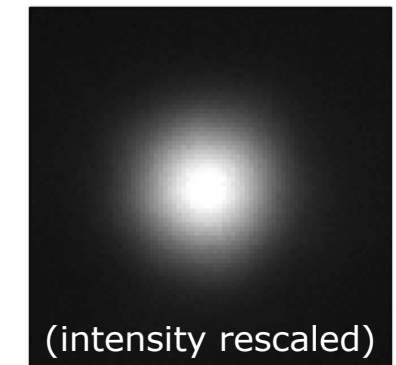
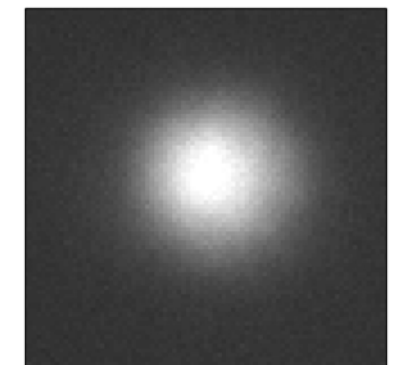
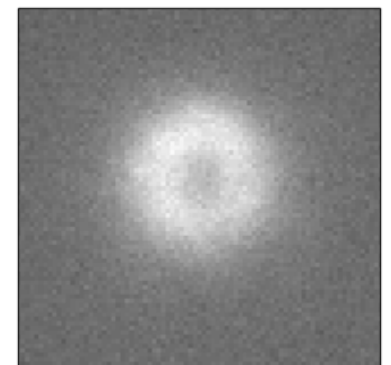
100μm



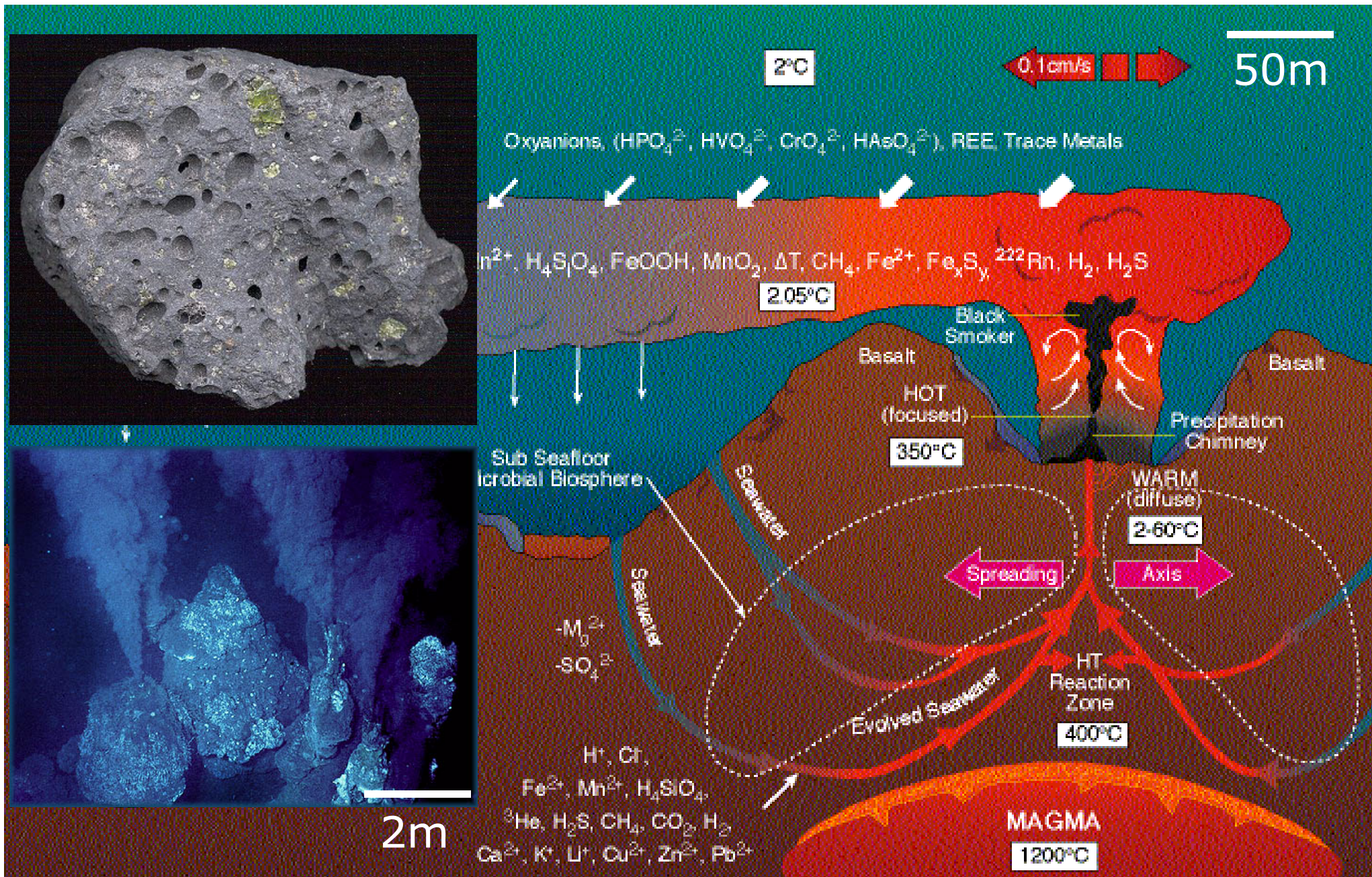
100μm



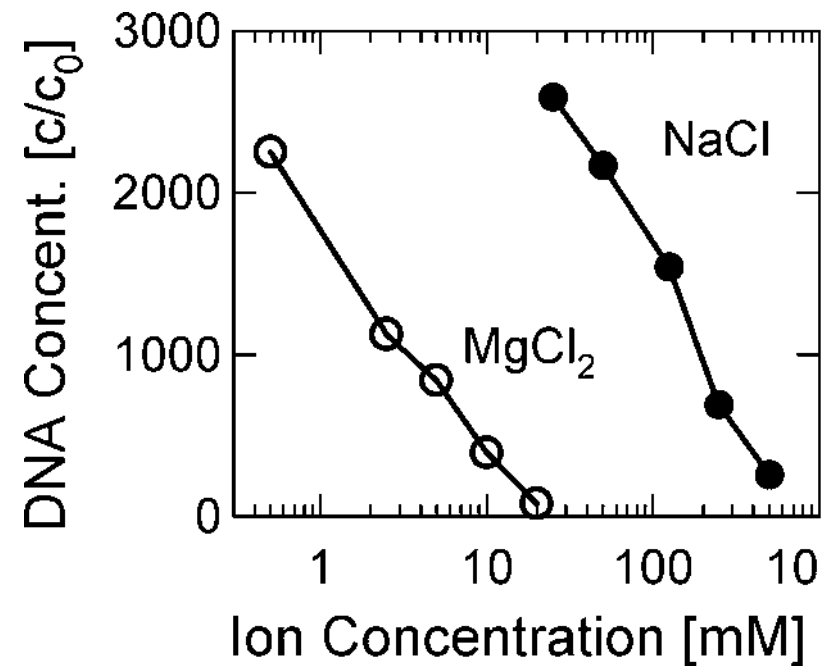
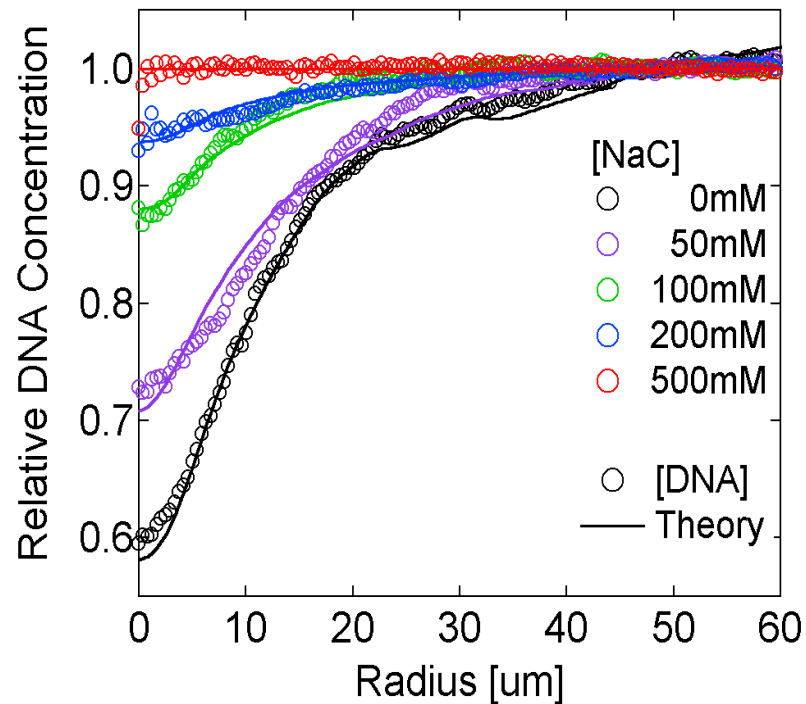
20μm



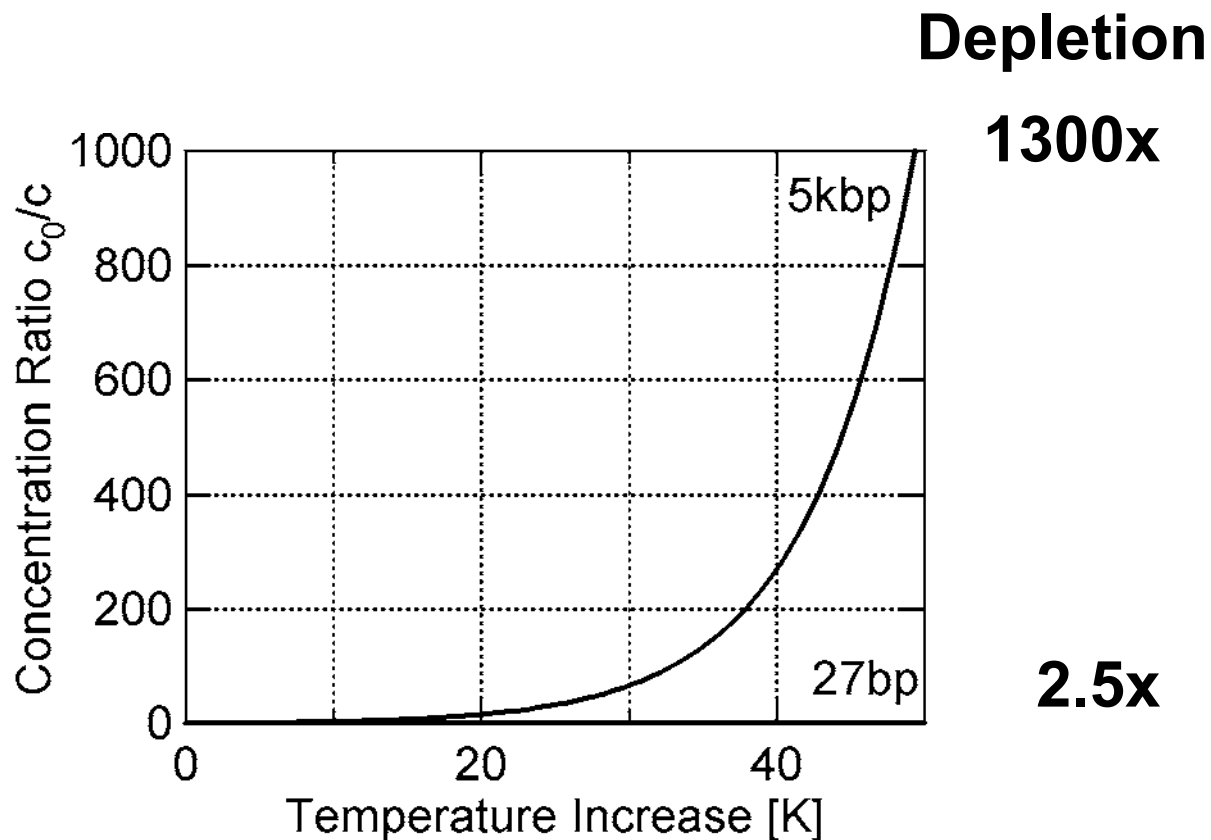
Hydrothermal Vents



Salt Dependence

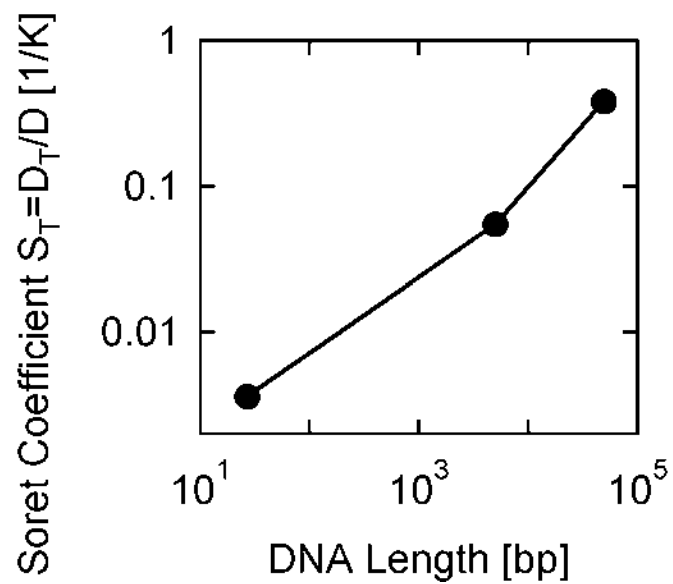


Exponential Dependence on Length and Temperature



$$\frac{c_0}{c} = e^{\frac{D_T}{D}(T - T_0)}$$

Length dependence



$$\frac{D_T}{D} \rightarrow D_T$$

