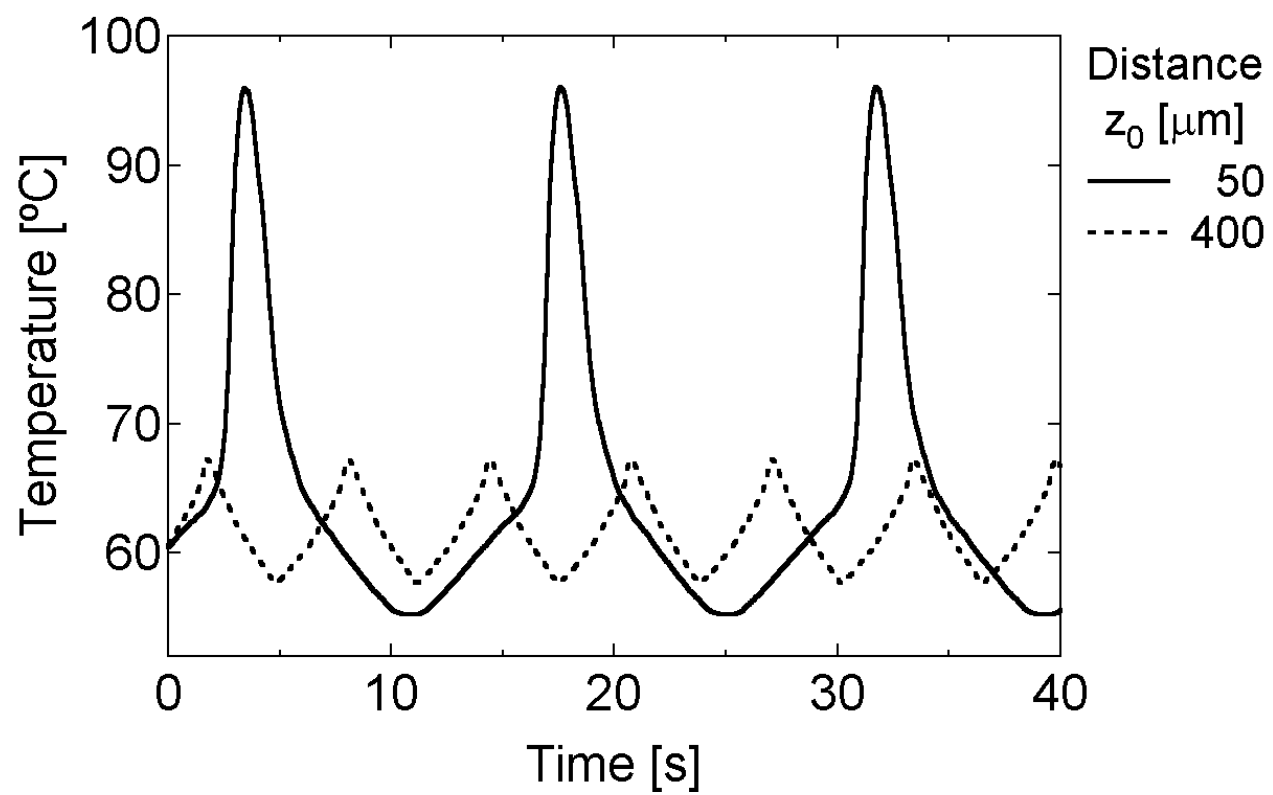
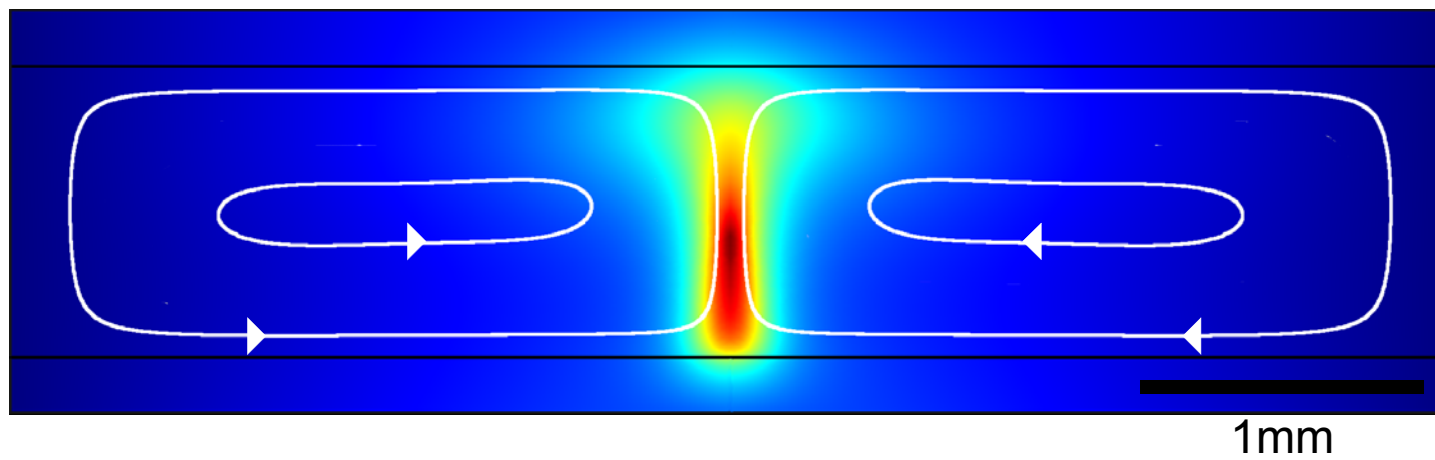


# Convective PCR and Thermophoretic Trapping: Physical Approaches to the Origin of Life.

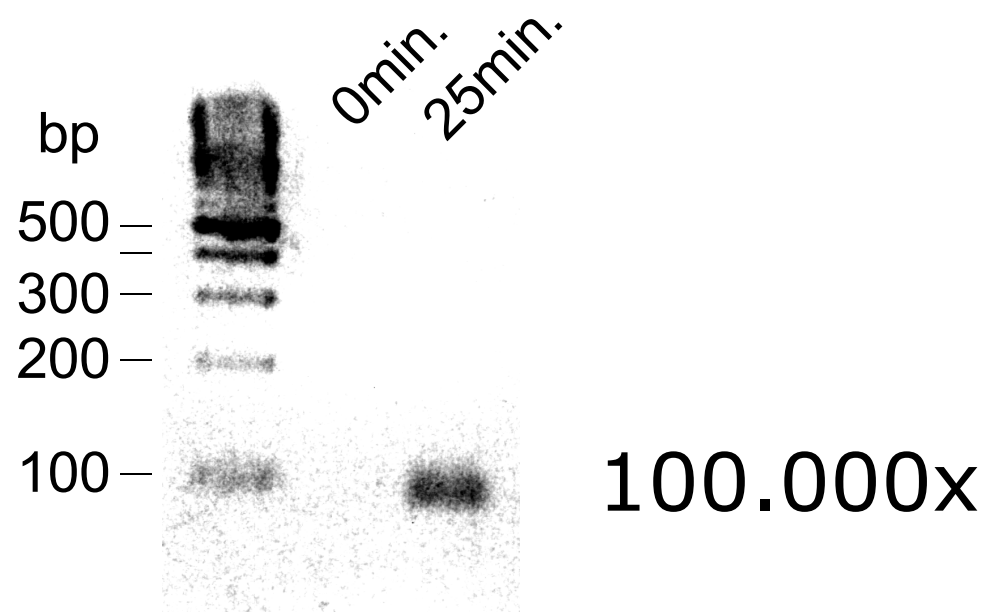
Dieter Braun



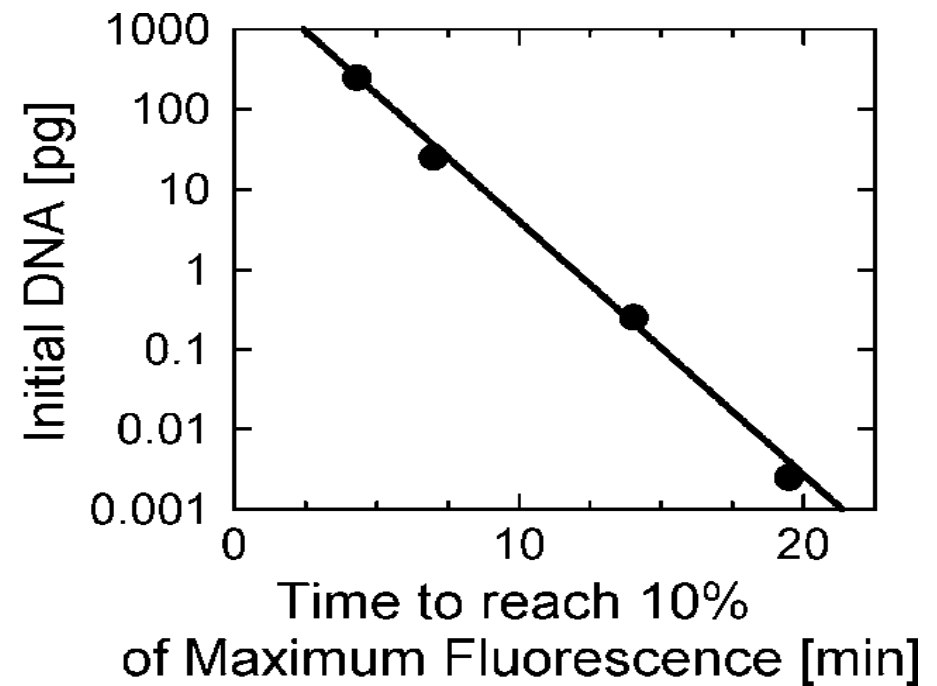
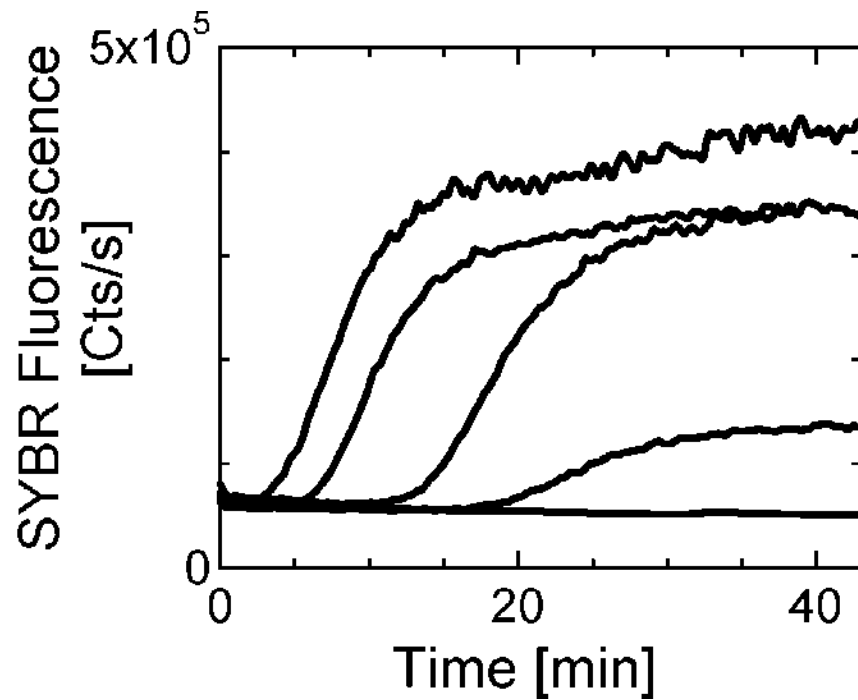
# Laminar Flow Movie



# PCR Amplification Movie

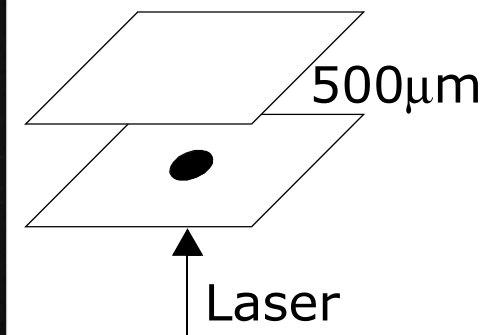
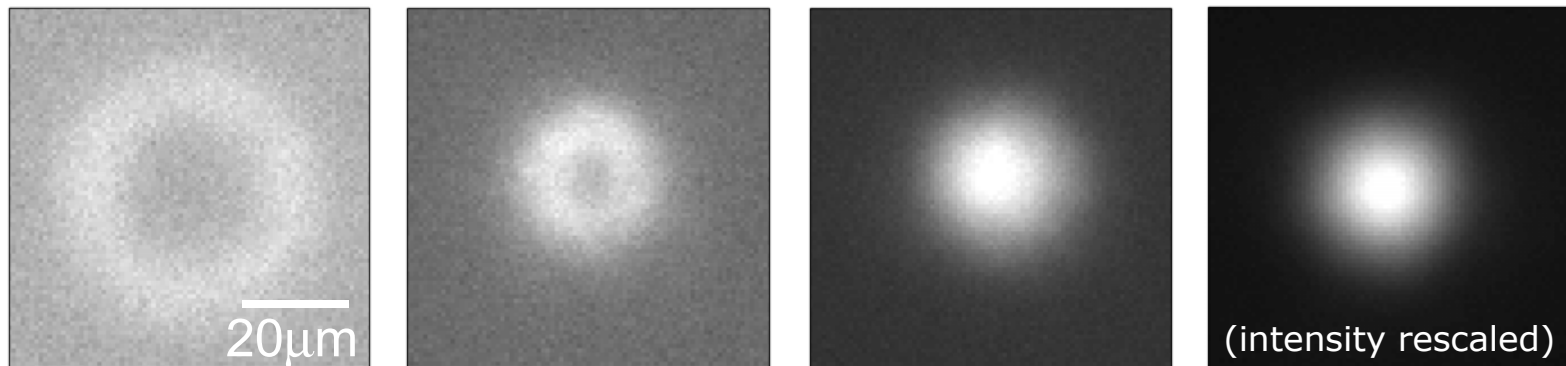
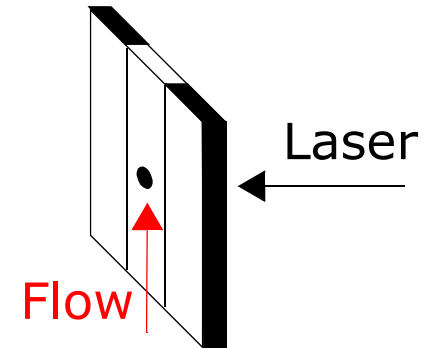
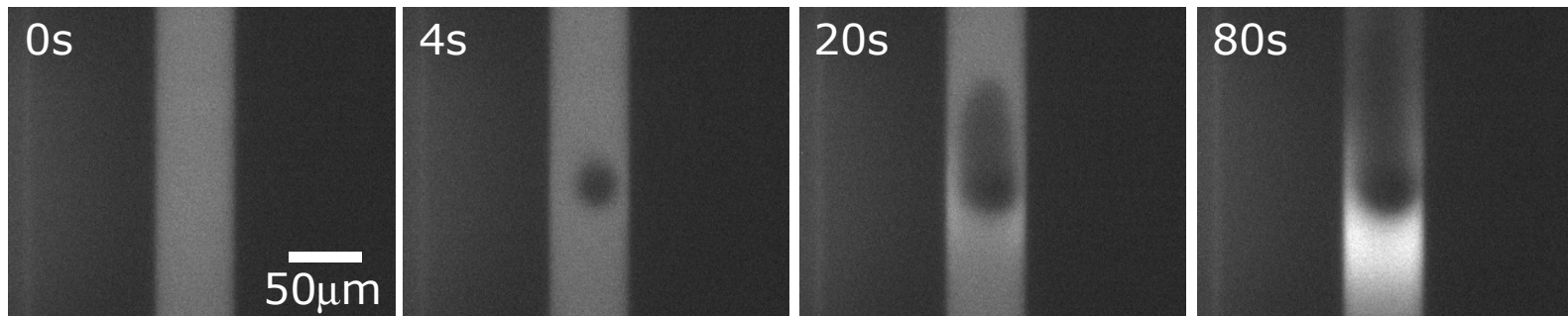
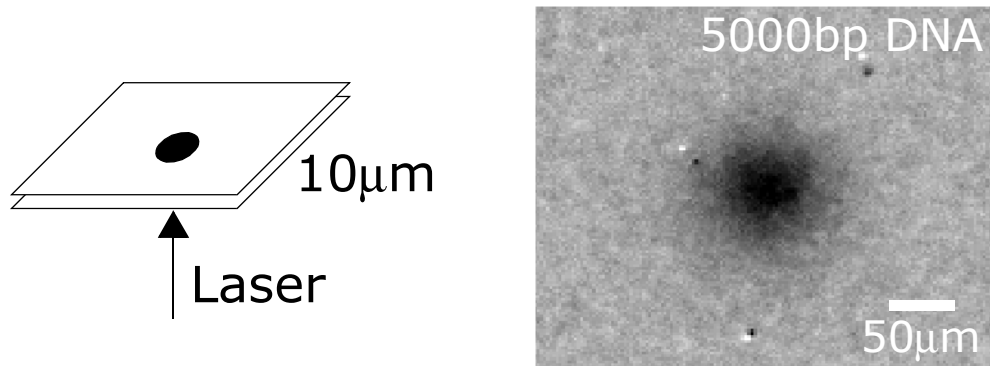


# Convective Quantitative PCR



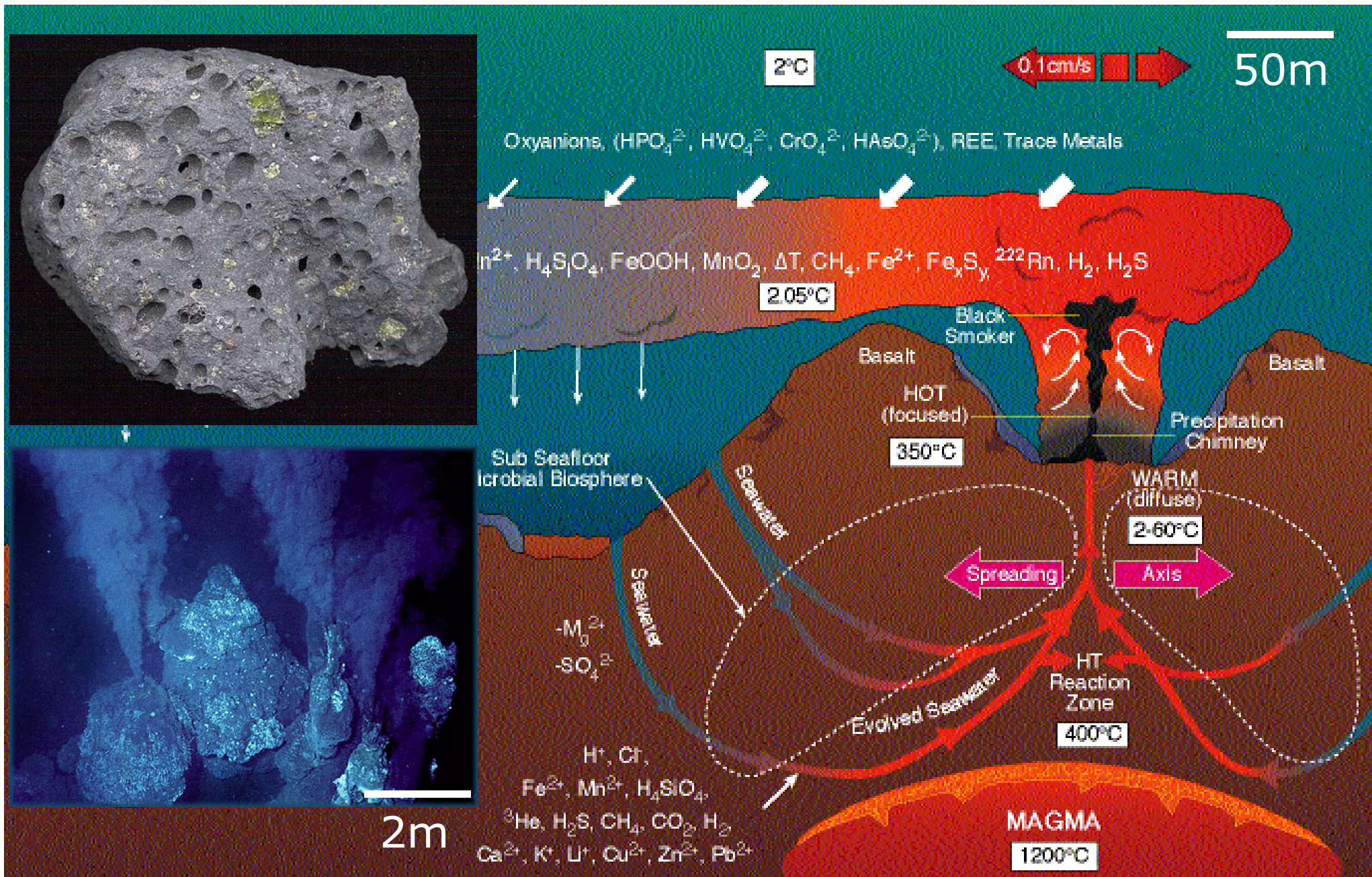


# Thermophoresis of DNA



Braun & Libchaber, Phys. Rev. Lett. 89:188103 (2002)  
Physics Today Feb. 2003

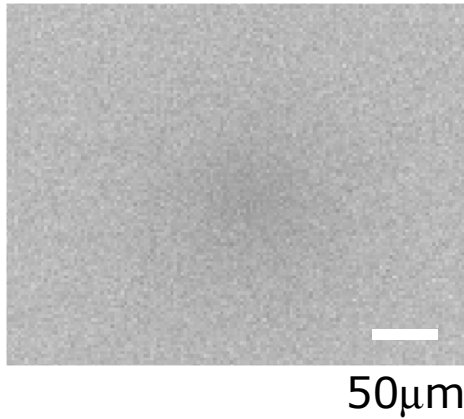
# Hydrothermal Vents



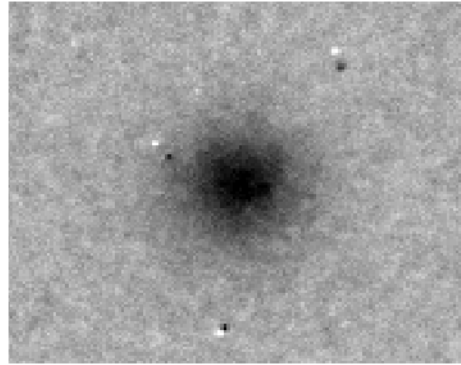


# Thermophoresis

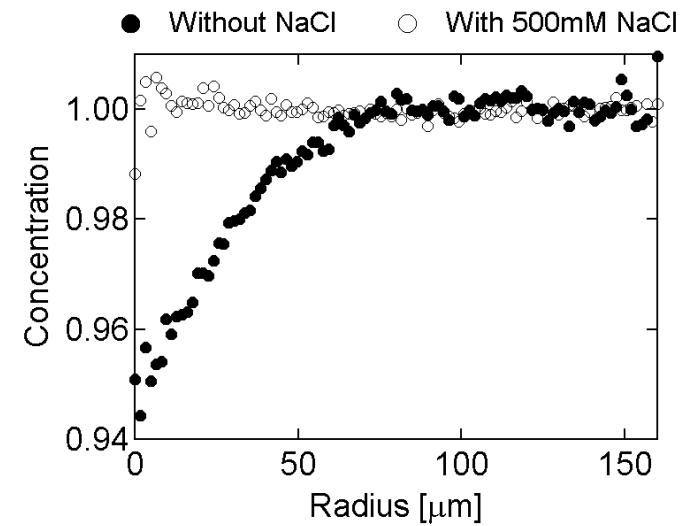
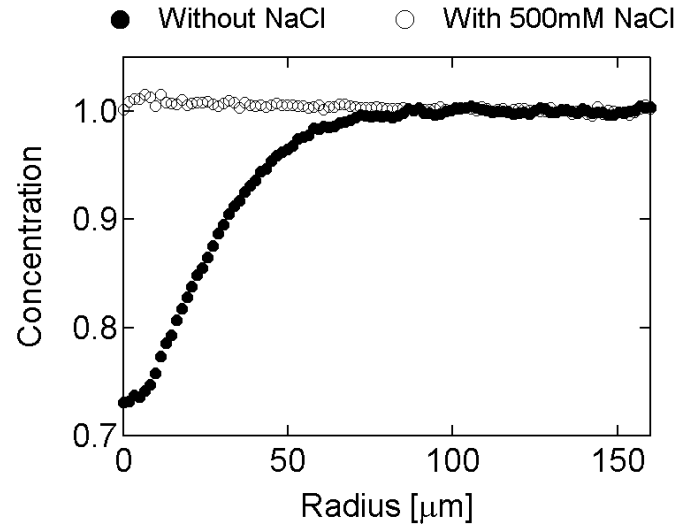
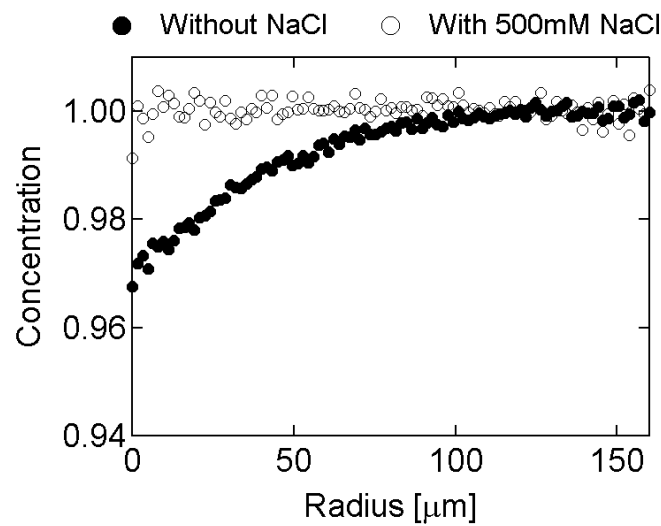
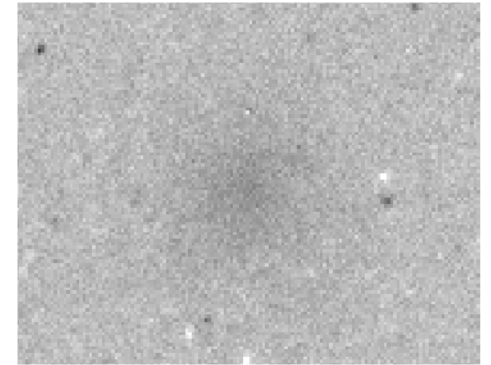
27bp DNA



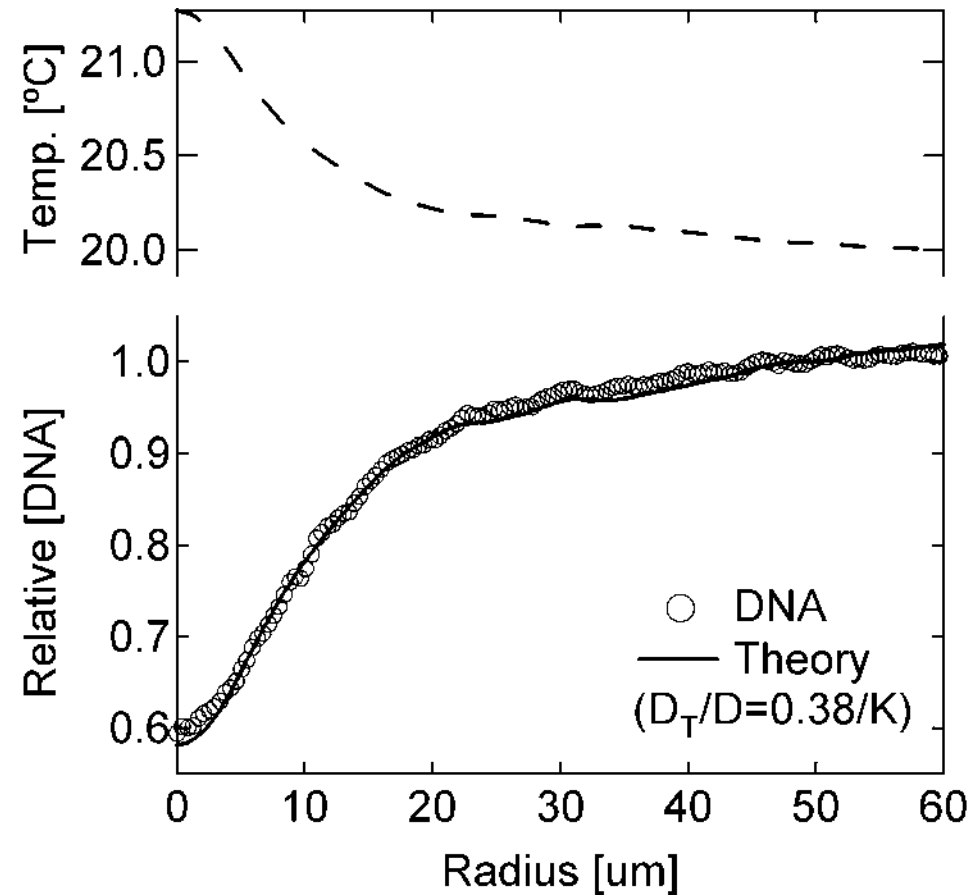
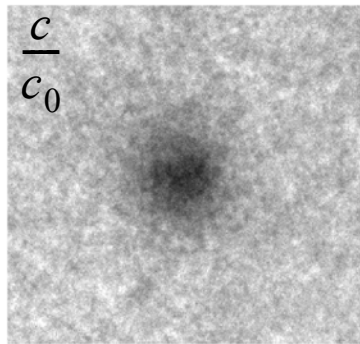
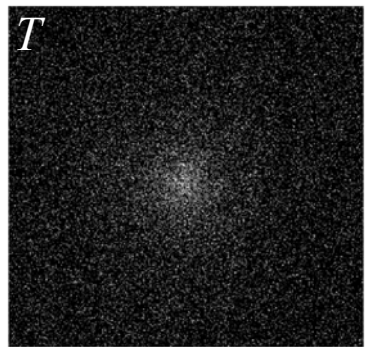
5000bp DNA



40nm Beads



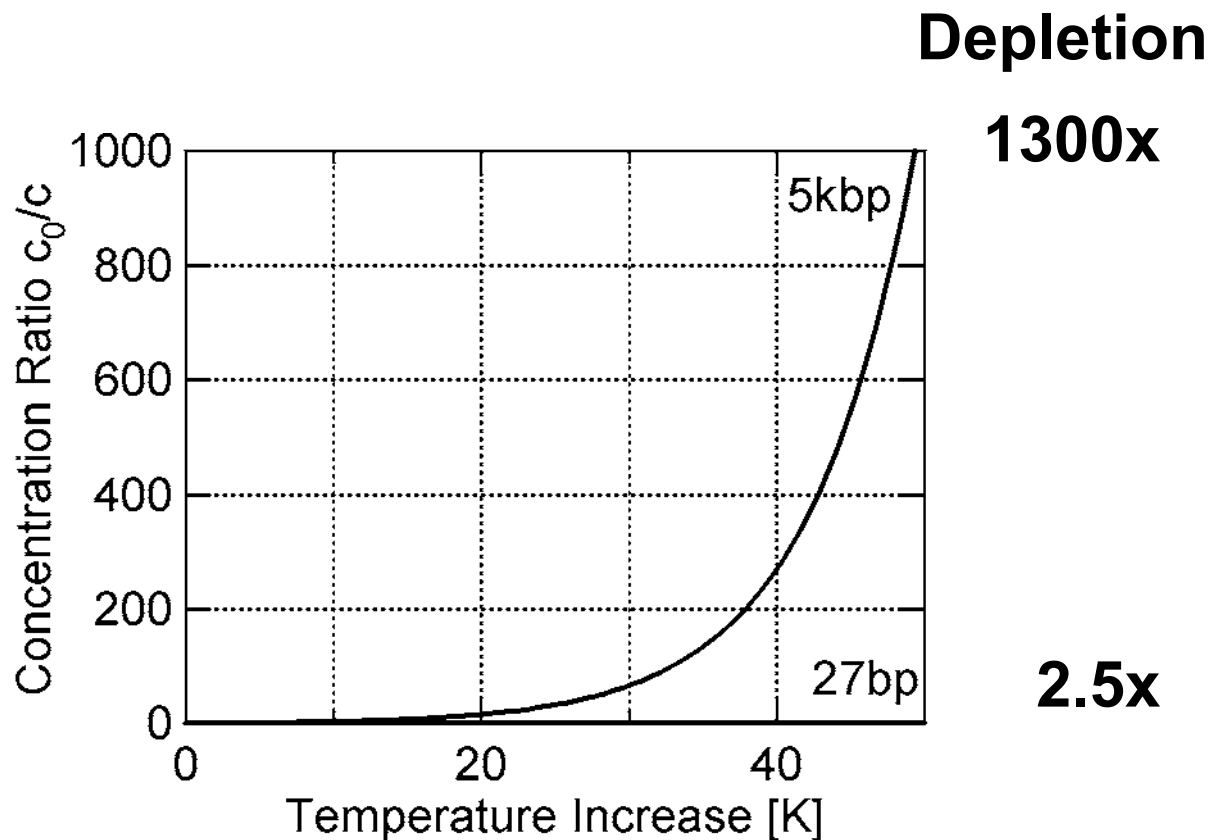
# Quantifying Thermophoresis of DNA



With D from backdiffusion:

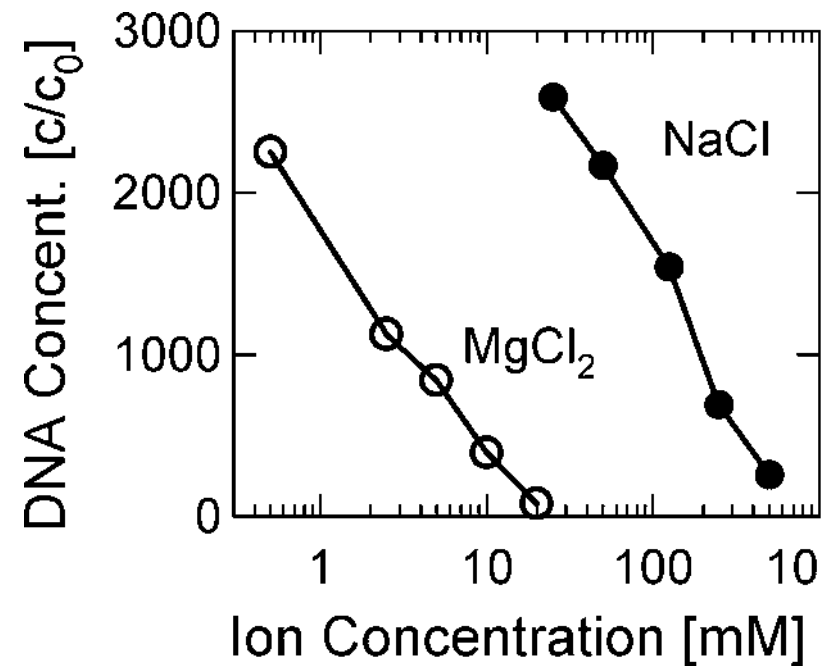
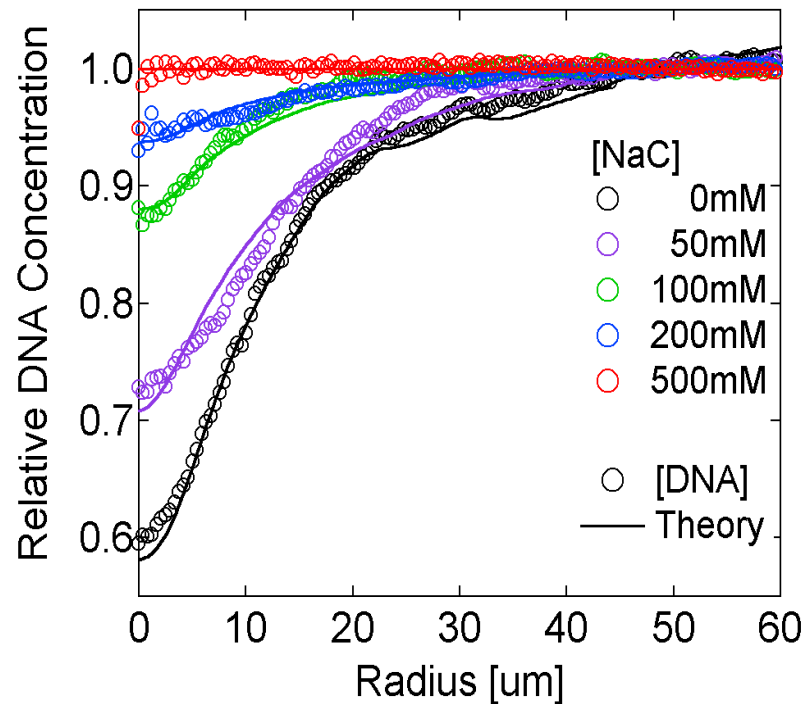
$$D_T = 0.4 \times 10^{-8} \text{ cm}^2/(\text{sK})$$

# Exponential Dependence on Length and Temperature

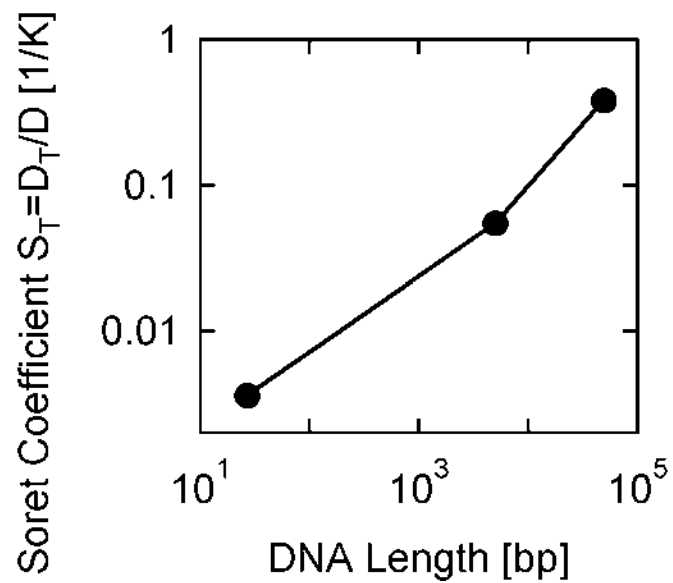


$$\frac{c_0}{c} = e^{\frac{D_T}{D}(T - T_0)}$$

# Salt Dependence



# Length dependence



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

