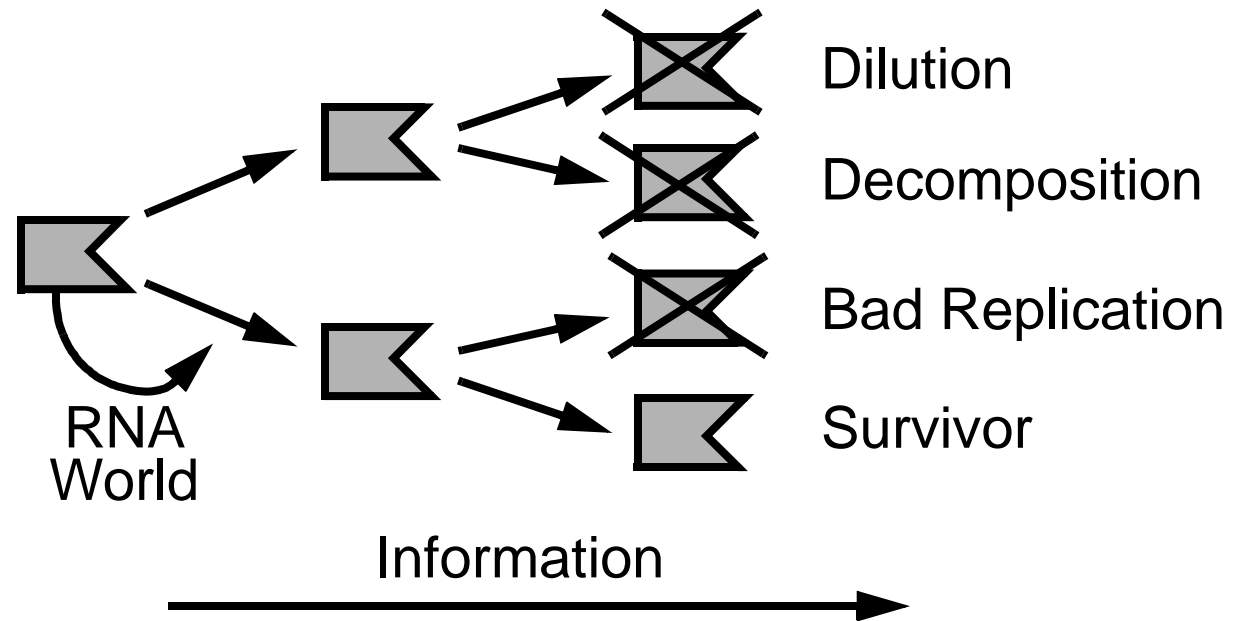


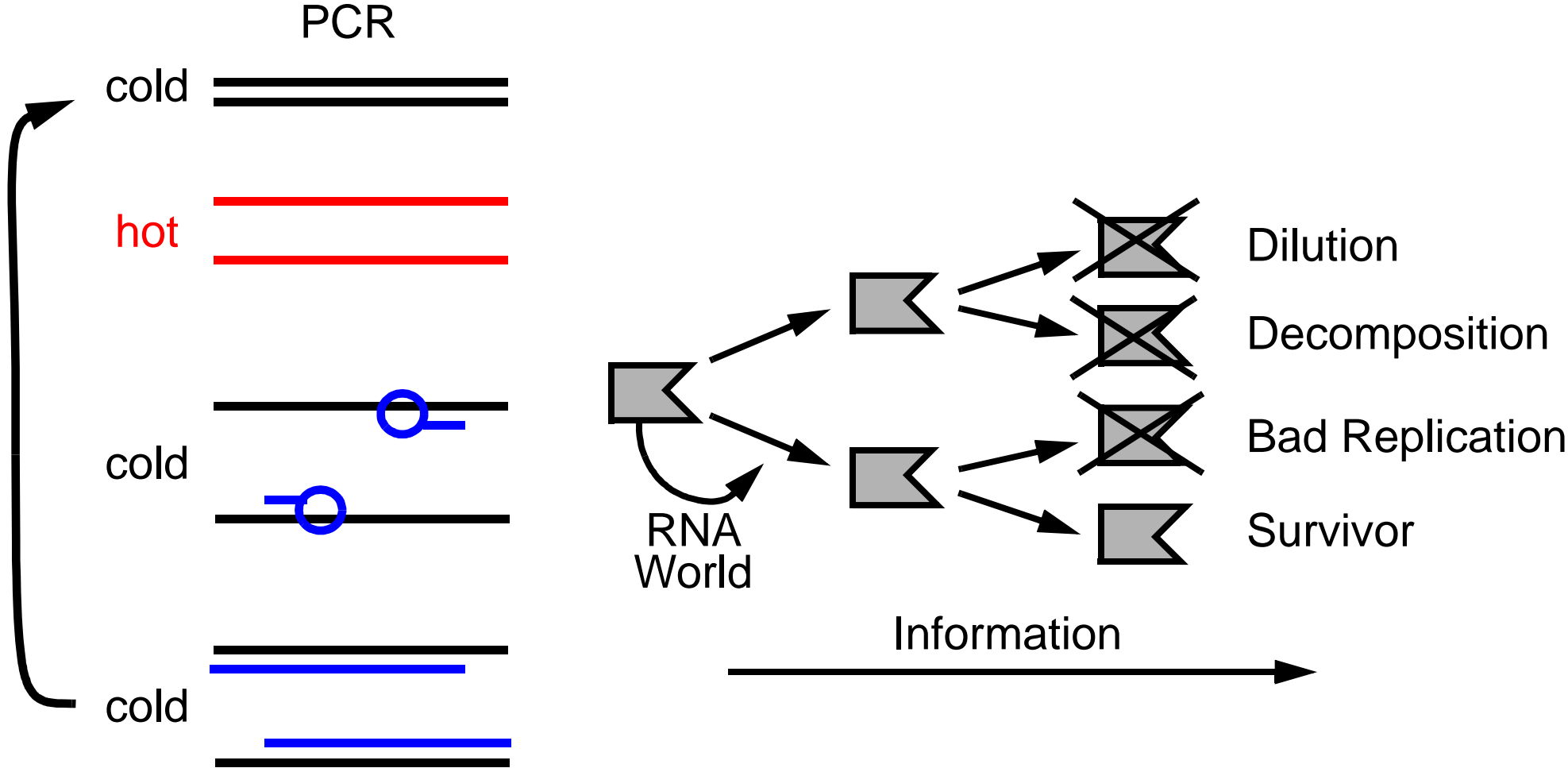
Convective PCR and Thermophoretic Trapping: Physical Approaches to the Origin of Life.

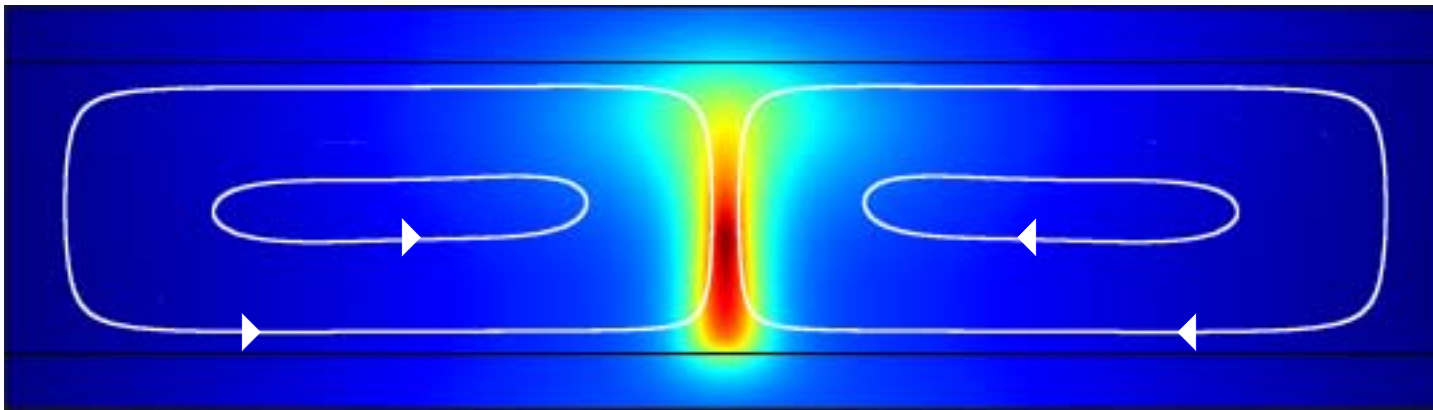
Dieter Braun, Noel Goddard, Albert Libchaber
Rockefeller University



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

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PCR

1mm

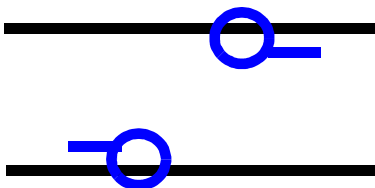
cold



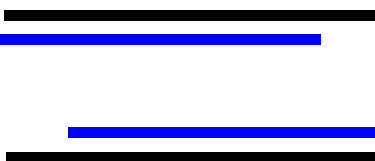
hot



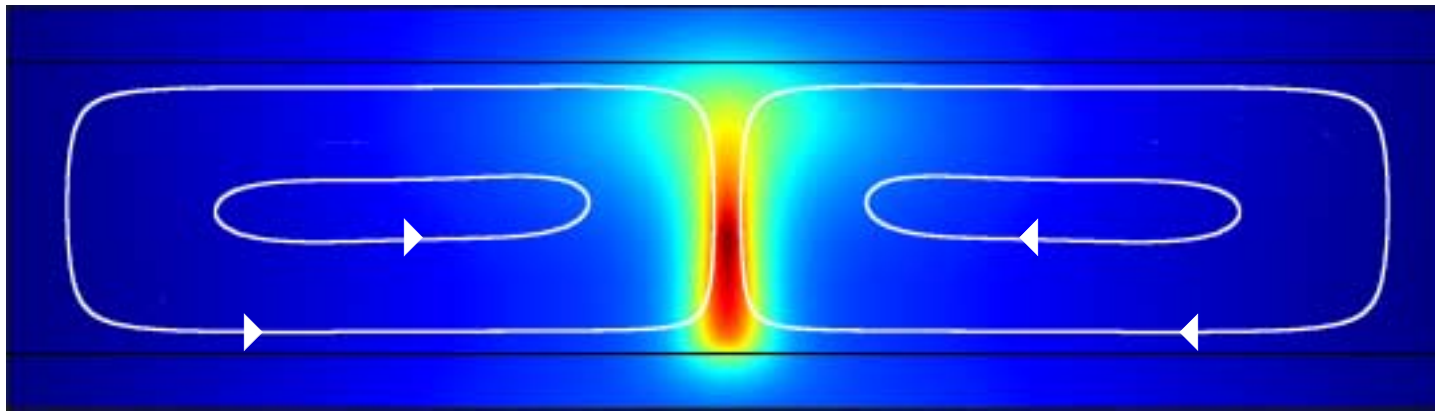
cold



cold



Ampli Movie



PCR

1mm

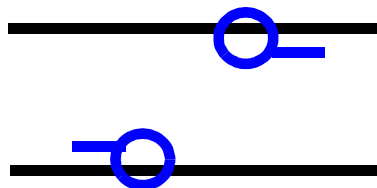
cold



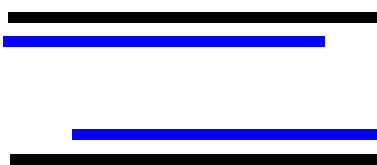
hot



cold



cold



Amplification 100.000x
in 25 Minutes

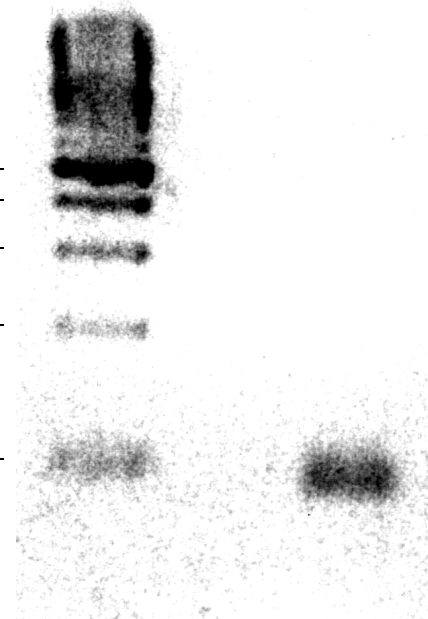
bp

500

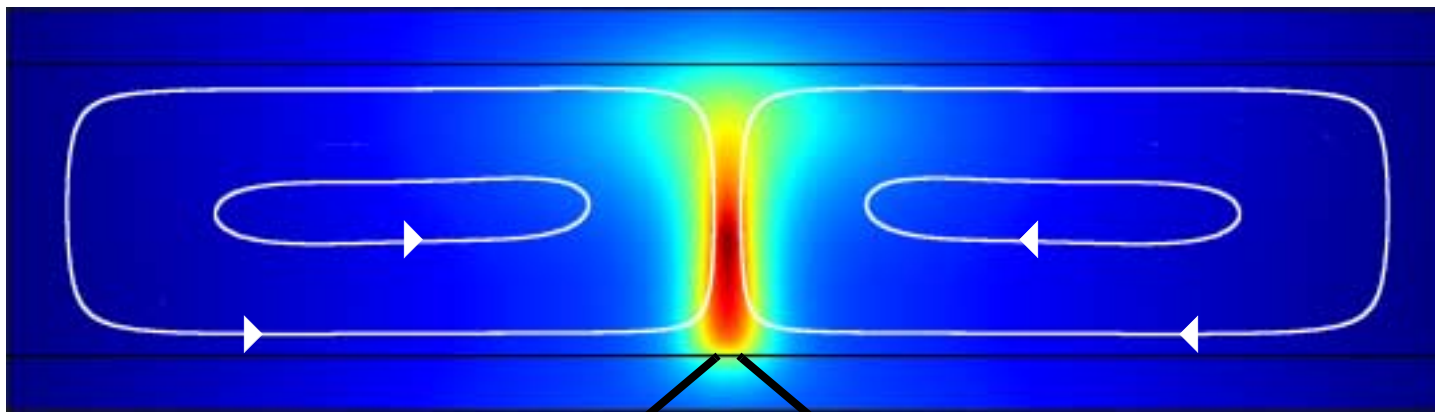
300

200

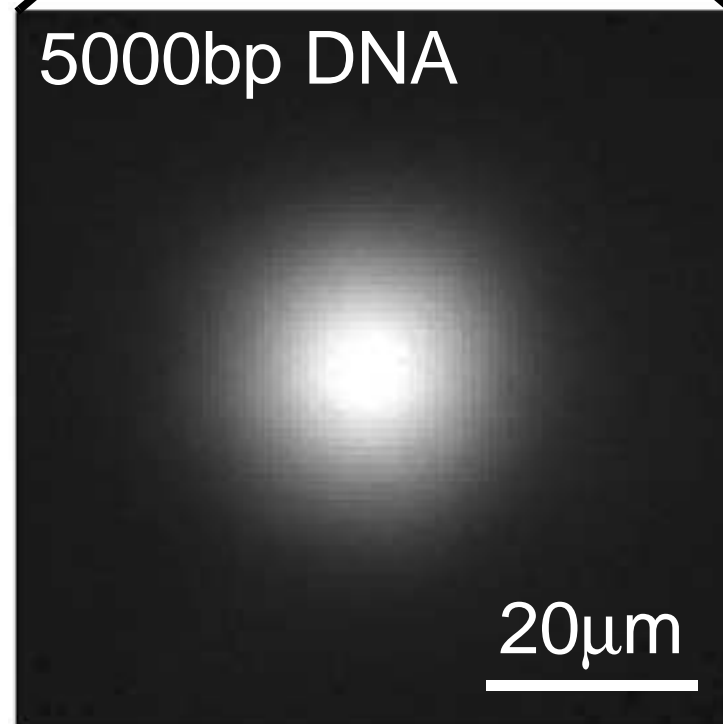
100



+ Quantitative PCR



1mm



5000bp DNA

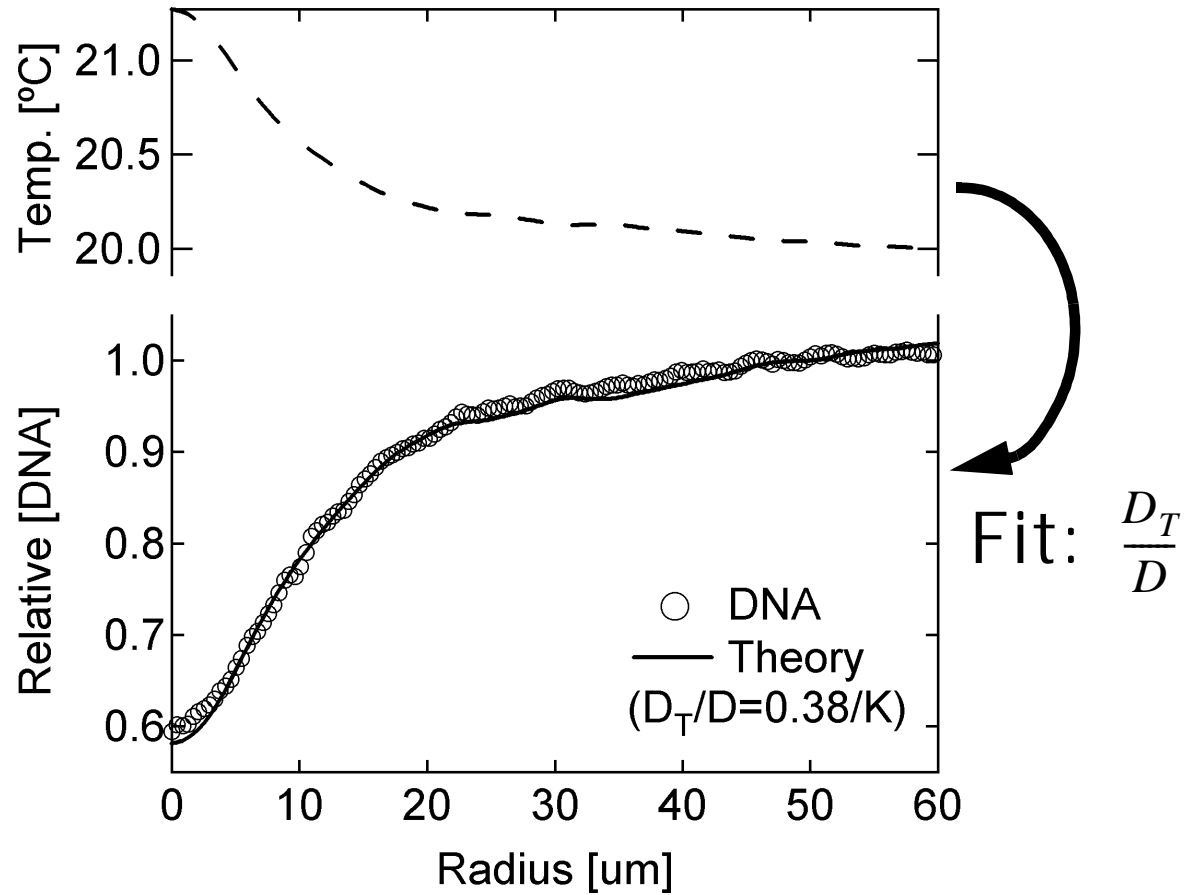
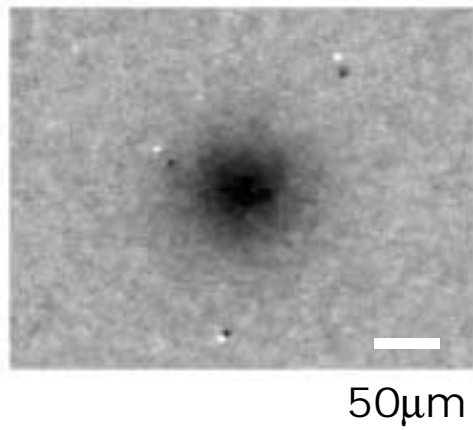
20μm

Thermophoretic
Trapping

Braun & Libchaber, PRL 89:188103 (2002)
Physics Today Feb. 2003

Thermophoresis

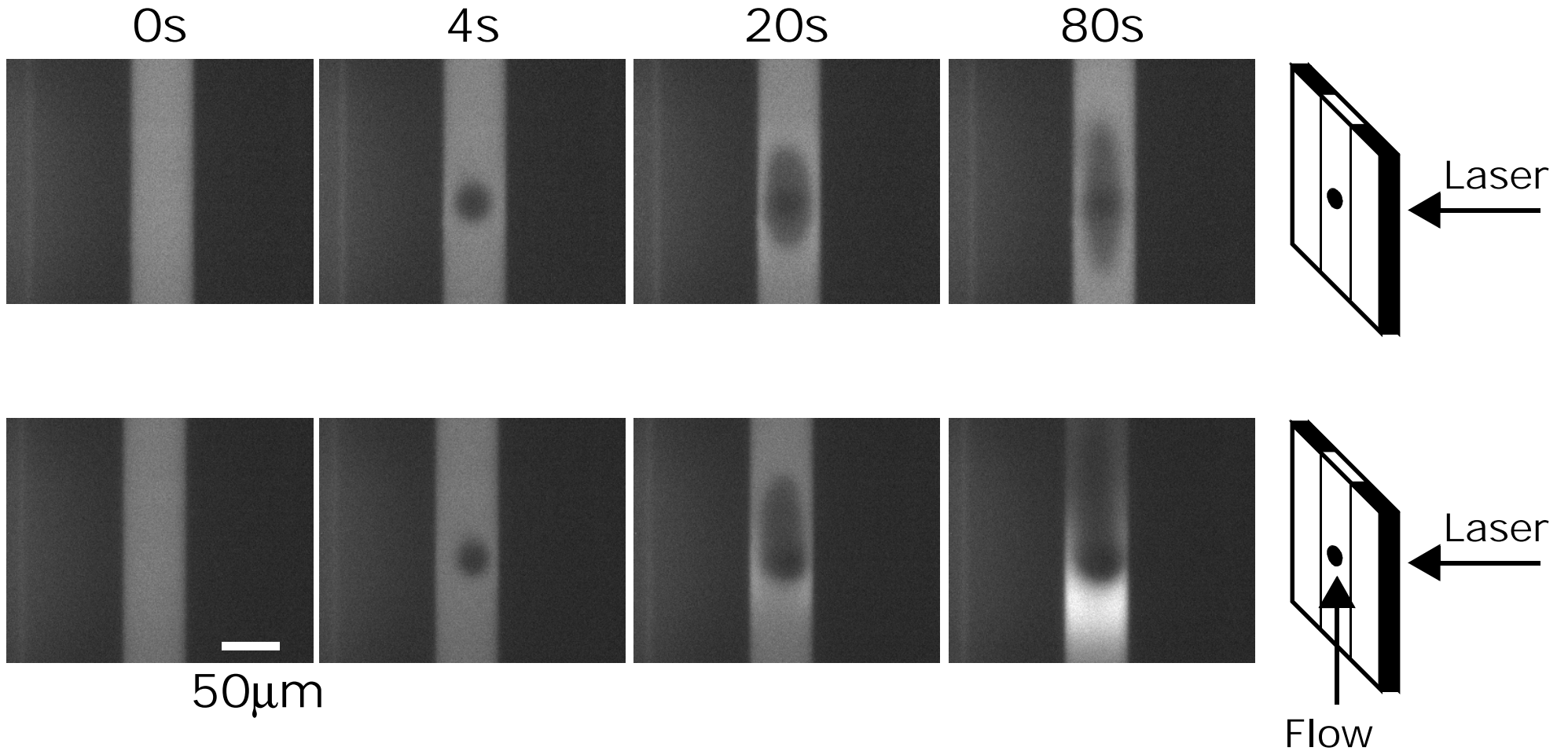
5000bp DNA



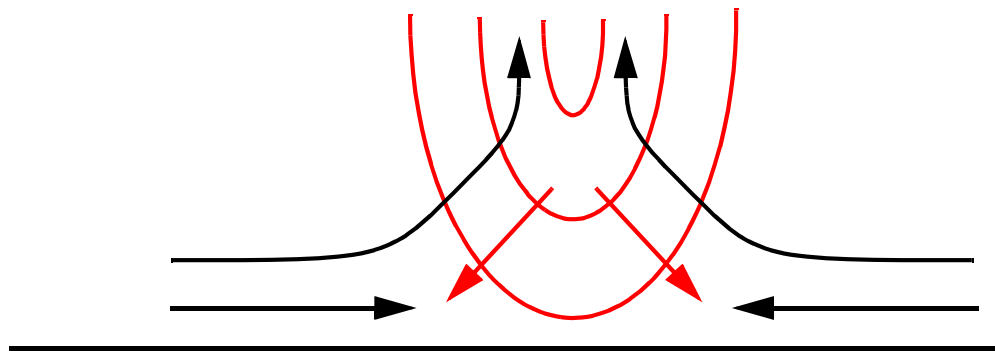
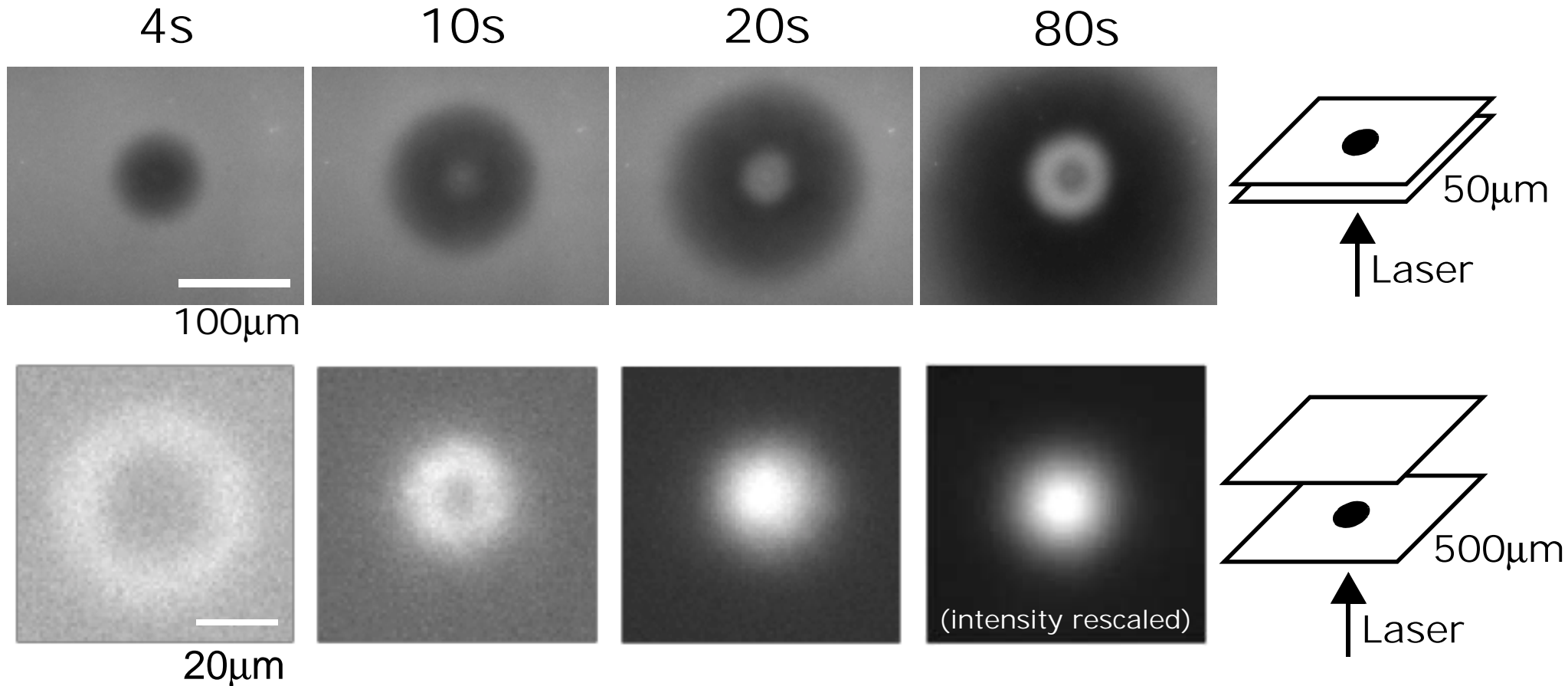
Exponential dependence
on length and temperature

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

Flow turns depletion into accumulation



Thermophoretic Trapping by Convection



Heat

- attracts convection
- repels DNA

Hydrothermal Vents

