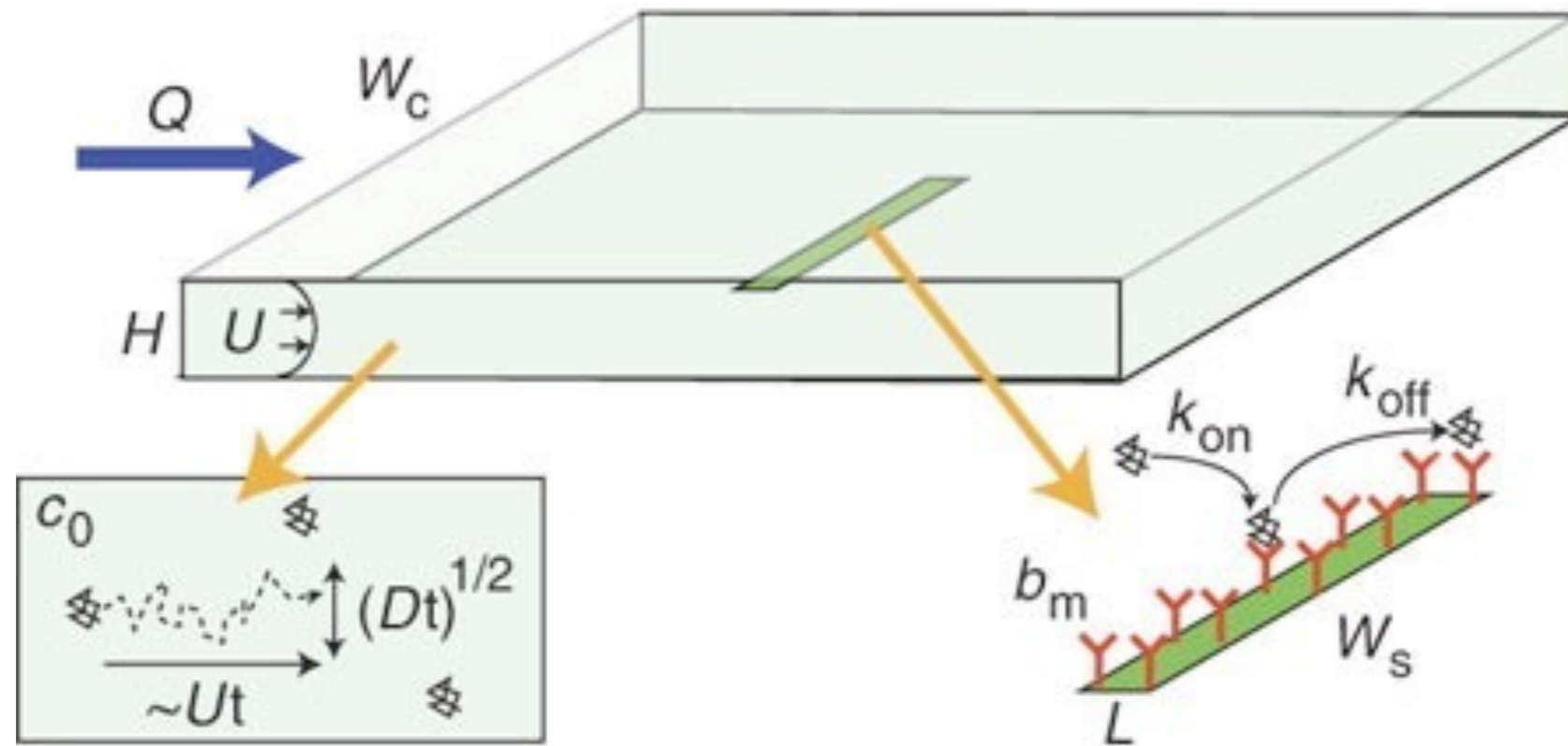


The microchip problem, T Squires et al. Nat. Biotech. 2008

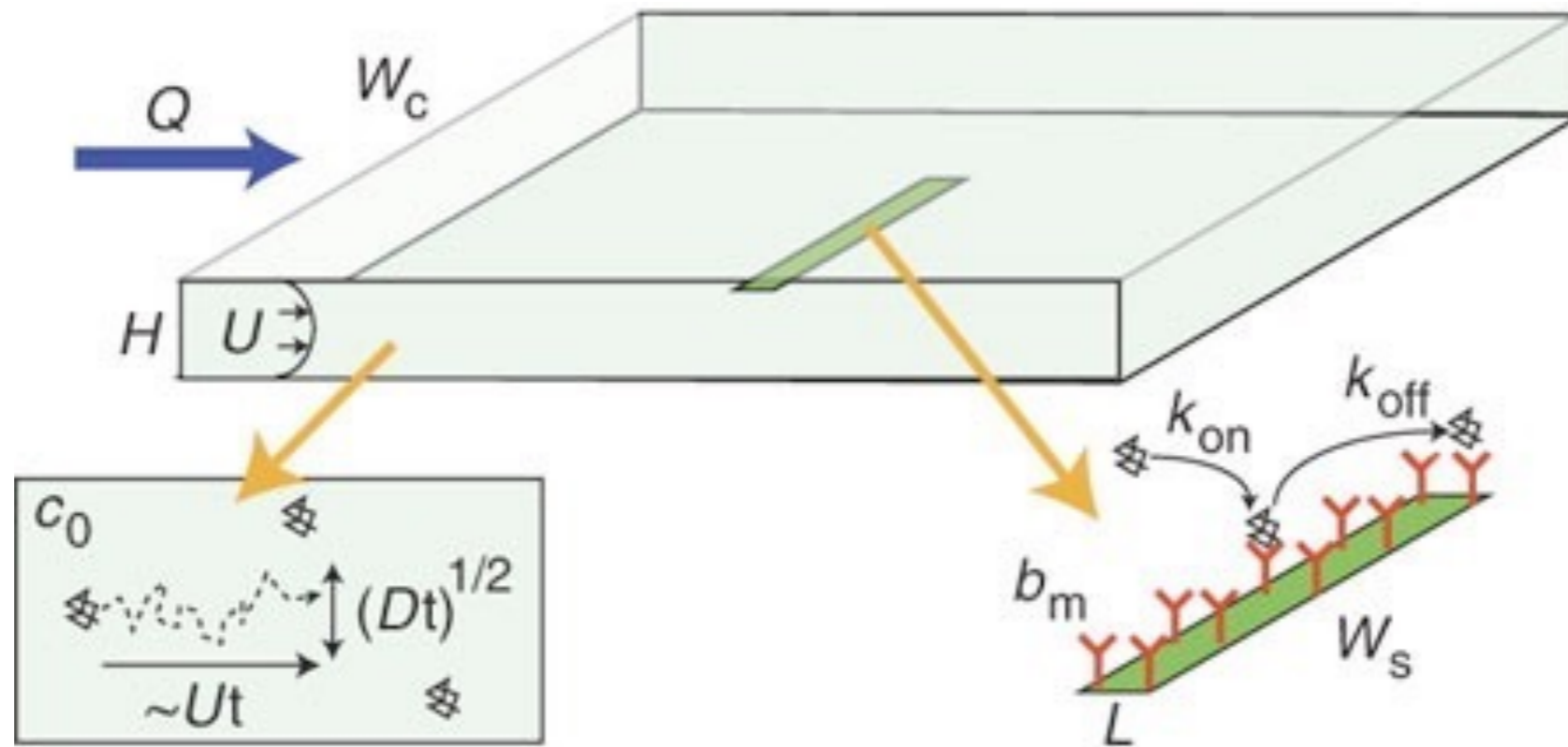


Given the following parameters

- Flow rate $Q=U H W_c$
- Poiseuille flow profile inside the channel
- Geometry channel height H , width W_c , reactive strip length L , width W_s
- $H \ll W_c$
- Inlet concentration C_0 , diffusion coefficient D of analyte

Compute the total flux of analyte J towards the reactive strip, at steady state (ignore kinetics and assume very fast adsorption)

Compare J to a purely diffusive flux $J_D = DC_0/L \times L W_s$



- $H \sim 100 \mu\text{m}$, $W_c \sim 1 \text{ mm}$, $L \sim H$, $W_s \sim W_c$
- $U \sim 1 \text{ mm/s}$
- $D \sim 10^{-9} \text{ m}^2/\text{s}$

Estimate the Peclet number and the thickness of the transport boundary layer